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Some Species of *Cyphella*, *Solenia*, and *Porothelium*

PAUL LEWIS LENTZ

The Thelephoraceae includes those genera of the Agaricales characterized by an inferior hymenium which is essentially smooth, that is, not borne on the surface of spines, pores or lamellae. The majority of forms are resupinate or reflexed, but a few genera are pileate. These have smooth, inferior hymenia and therefore belong in the Thelephoraceae as that family has been traditionally understood. The genera *Cyphella*, *Solenia* and *Porothelium* are included in these forms.

These three genera are of fairly common occurrence in Iowa and the surrounding region. However, most of them may be overlooked because of their minuteness. They are interesting as pileate genera which, in the more densely massed colonies, assume forms approaching those of the Polyporaceae. In fact, *Porothelium fimbriatum* Fries has been called *Poria fimbriata* (Pers. ex Fries) Lloyd by several authors, including Lowe (1946). However, each fructification of such pileate fungi may be regarded as an individual basidiocarp with an even hymenium, in which case these genera would fit into the Thelephoraceae. The more isolated fructifications may superficially resemble small species of Pezizales. It is necessary, therefore, to demonstrate basidia, or at least clamp-connections, in such forms.

The most comprehensive treatment of the Thelephoraceae in North America is the monograph of Burt (1914-1926). His conception of the species of *Cyphella* and *Solenia* has been adopted as the basis for the present work on those genera. He did not include *Porothelium* in the Thelephoraceae. Emmons (1927) studied several species of *Cyphella* and *Solenia* in Iowa. Additional collections in recent years have added a number of species which were not included in his study.

The specimens examined for this investigation were obtained from the mycological herbarium of the State University of Iowa, and the work was done at the University of Iowa under the direction of Professor G. W. Martin.

The genera *Cyphella*, *Solenia* and *Porothelium* may be distinguished from one another on the basis of several characteristics, as shown in the following key:

- a. Fructifications cup-shaped, scattered; subiculum usually scanty or absent..... I. *Cyphella*
- a. Fructifications saucer-shaped, or turbinate to cylindrical, usually gregarious, often densely crowded; subiculum usually present..... b
- b. Fructifications turbinate to cylindrical; subiculum scanty to abundant, floccose..... II. *Solenia*
- b. Fructifications usually saucer-shaped, merged to form a *Poria*-like mass at maturity; subiculum membranous..... III. *Porothelium*

The Species of Cyphella

The genus *Cyphella* was established by Fries (Syst. Myc. 2: 201. 1823). The type species is *C. digitalis* Fries. The fructifications are somewhat membranaceous, cup-shaped, rarely plane, adnate behind, commonly extended in stem-like form, pendulous; hymenium typically concave or disk-shaped, inferior, even or at length rugulose; basidia typically four-spored; spores globose, subovate or short-cylindrical, hyaline or rarely colored. The fructifications are produced on the bark of rotting twigs, or in some cases, on dead herbage.

Key to the species of *Cyphella*

- a. Mature fructifications whitish, becoming wholly pallid-gray, membranaceous, lacking external hairs1. *C. griseo-pallida*
- a. Fructifications not wholly pallid-gray, somewhat fleshy, with external hairs b
 - b. Fructifications usually not more than 0.25 mm. high, 0.2 mm. broad; hairs on exterior of cup irregularly branched, not granule-encrusted2. *C. sp. I*
 - b. Fructifications usually larger; hairs on exterior of cup unbranched, granule-encrusted c
- c. Fructifications pure white d
- c. Fructifications colored e
 - d. Spores at least 11 μ long; hairs on exterior of cup encrusted with fine, sandy particles.....3. *C. Tiliae*
 - d. Spores less than 11 μ long; hairs on exterior of cup encrusted with large, knobby or elongated granules4. *C. minutissima*
- e. Fructifications pale ivory-yellow; hairs on exterior of cup encrusted with large, knobby or elongated granules5. *C. Langloisii*
- e. Fructifications dark reddish-brown at base, gray-white above; hairs on exterior of cup encrusted with fine, sandy particles6. *C. sp. II*

1. CYPHELLA GRISEO-PALLIDA Weinm. Fl. Ross. 522. 1836.

Pl. 1, f. 12; pl. 2, f. 8

Fructifications gregarious, minute, 0.5-1 mm. high, 0.2-2 mm. broad, membranaceous, externally flocculose, white when fresh, becoming mouse-gray to dark mouse-gray when dried, appearing first as small, globose, closed spheres on the substratum, then becoming open, campanulate or crateriform, often dimidiate in old stages, adnate-sessile, or with a short stem; hymenium smooth; basidia 19-26 \times 4-6 μ ; spores hyaline, simple, even, pip-shaped, 7-8 \times 3.5-4 μ .

Cyphella griseo-pallida has been found on bark, twigs and leaves

lying on the ground. The Iowa collection is a small, whitish *Cyphella* which occurred abundantly on forest litter in Iowa City in June, 1946, especially on old over-wintered stems of *Impatiens pallida*. Burt (1914) notes only collections from New York and Ohio as representing this species in North America, giving the spore size of Peck's New York specimens as $4 \times 3\mu$, and describing the spores as somewhat flattened on one side. Patouillard (1884) illustrates the spores as pip-shaped, and the scale of his illustrations would make them about $6 \times 3\mu$. The spores of the Iowa collection are pip-shaped, but larger, about $7-8 \times 3.5-4\mu$. This difference, however, seems within the acceptable range of size variation.

TYPE LOCALITY: Russia.

SPECIMENS EXAMINED: Iowa: Iowa City (G.W.M. 6292).

ILLUSTRATIONS: Patouillard, Tab. Anal. Fung. 1; f. 255. 1884.

2. CYPHELLA SP. I

Pl. 1, f. 8; pl. 2, f. 6.

Fructifications gregarious, minute, 0.1-0.25 mm. high, 0.1-0.2 mm. broad, fragile, white to pale yellowish-tan, cup-shaped to somewhat cylindrical, sessile or with a very short stem; pubescent, hairs colorless, short, somewhat intertwined, repeatedly and irregularly branched, 2-3 μ in diameter, not encrusted; hymenium white to pale yellowish-tan; basidia 15-28 \times 6-7 μ , only two sterigmata observed; spores hyaline, simple, even, broadly oval, 6-7 \times 4-5 μ .

Cyphella sp. I has been found on bark of *Robinia* and *Ulmus*. Distinctive characteristics are the extremely small size of the fructifications, the irregularly branched hairs of the exterior of the cup, and the very broad spores. Many of the fructifications are isolated, but there are also many groups of approximately eight to ten laterally confluent cups.

SPECIMENS EXAMINED: Iowa: Iowa City (G.W.M. 4954, 4955).

3. CYPHELLA TILIAE (Peck) Cooke, Grevillea 20:9. 1891.

Peziza Tiliae Peck, Ann. Rep. N.Y. State Mus. 24: 96. 1872.

Trichopeziza Tiliae (Peck) Sacc. Syll. Fung. 8: 428. 1889.

Pl. 1, f. 9; pl. 2, f. 10.

Fructifications gregarious, minute, 0.25-0.7 mm. high, 0.25-0.8 mm. broad, slightly fleshy, white, globose then irregularly cup-shaped, sessile or with a short stem up to 0.4 mm. long; longitudinal section showing a very firm dark base and white, fleshy context; exterior surface densely white-villose, the hairs straight, cylindrical, 125-150 \times 3-7 μ encrusted with fine, hyaline granules; hymenium ivory-yellow to cream-colored; basidia 40-55 \times 8.5-12.5 μ , 4-sterigmate; spores white, simple, even, narrowly ovate, slightly curved, 12-19 \times 5.5-7 μ .

Cyphella Tiliae has been found on dead branches of *Tilia* and *Ulmus*. Distinctive characteristics are the white fructifications, large

spores and straight, granule-encrusted hairs. There is no subiculum, and the fructification is cup-shaped and often irregular, thus it does not resemble *Solenia*. It has a very slight external resemblance to *Aleurodiscus*, but is smaller. *C. Tiliae* has been collected more frequently than other species of *Cyphella* in Iowa.

TYPE LOCALITY: New York: Knowersville.

SPECIMENS EXAMINED: Iowa: Estherville (G.W.M. 1866), Milford (G.W.M. 1324), North Liberty (S.U.I. 1611), Okoboji (G.W.M. 4974), Unionville (F.J.S. 73-a).

EXSICCATI: Ell. & Ev. N. Am. Fungi, 2316a, (as *Cyphella pezizoides* Zopf); Shear, N. Y. Fungi, 55.

ILLUSTRATIONS: Burt, Ann. Missouri Bot. Gard. 1: pl 19, f. 16. 1914.

4. CYPHELLA MINUTISSIMA Burt, Ann. Missouri Bot. Gard. 1: 367. 1914.

Pl. 1, f. 10; pl. 2, f. 11.

Fructifications gregarious, minute, up to 0.7 mm. high, 0.1-1.5 mm. broad, snow white, very delicate, globose, then somewhat irregular with the margin inrolled; exterior surface villose, hairs white, 2.5-4 μ in diameter, encrusted with elongated or thorn-like granules; hymenium concave, white; basidia 12.5-32 \times 4-5.5 μ , only two sterigmata observed; spores hyaline, simple, even, oval, 9-10 \times 5.5-6.5 μ .

Cyphella minutissima has been found on dead wood of *Populus* and *Gleditsia*. The distinctive characteristics are the small, white, usually globose, villose fructifications, the hairs encrusted with thorn-like granules, and the oval spores. The measurements of the single specimen available are somewhat larger than those given by Burt. However, Burt examined only two specimens, thus it may be assumed that there is a possibility of considerable variation from his measurements. The general characteristics of this specimen agree with those given by Burt. The spores and the hairs of the exterior of the cup look very much like Burt's illustrations. The fructifications, when dry, were within or very close to the measurements of Burt.

TYPE LOCALITY: New Hampshire: Chocorua.

SPECIMENS EXAMINED: Iowa: Iowa City (G.W.M. 6302).

ILLUSTRATIONS: Burt, Ann. Missouri Bot. Gard. 1: pl. 19, f. 5. 1914.

5. CYPHELLA LANGLOISII Burt, Ann. Missouri Bot. Gard. 1:368. 1914.

Pl. 1, f. 11; pl. 2, f. 7.

Fructifications gregarious, minute, 0.25 mm. high, 0.25-0.5 mm. broad, membranaceous, pale ivory-yellow, cup-shaped, with inrolled margin, sessile; exterior surface downy-pubescent, hairs colorless, straight or slightly undulating, 100-150 \times 2.5-3.5 μ , encrusted with large hyaline granules which often give the hairs a fluted appearance.

ance; hymenium cream-color; basidia $18.5-22 \times 4-5.5\mu$; spores hyaline, simple, even, narrowly oval, angular, $6-7 \times 3-3.5\mu$.

Cyphella Langloisii has been found on stems of *Arundinaria* and *Verbascum*. Distinctive characteristics are the small, pale, ivory-yellow cup with the margin inrolled, the conspicuous, slightly elongated granules which form ridges along the hairs, and the angular spores. Many of the fructifications are isolated, but many are in groups of approximately six to twelve contiguous cups. The specimen examined has a very marked similarity to *Cyphella abieticola* Karst. as represented by Jaap, *Fungi Sel.* 824. The macroscopic characteristics are identical. The microscopic characteristics seem to differ only in the fact that the spores of *C. abieticola* are approximately twice as broad as those of *C. Langloisii*, and the basidia of *C. abieticola* may be somewhat shorter and broader than those of *C. Langloisii*.

TYPE LOCALITY: Louisiana: St. Martinville.

SPECIMENS EXAMINED: Iowa: Iowa City (G.W.M. 4956).

ILLUSTRATIONS: Burt, *Ann. Missouri Bot. Gard.* 1: pl. 19, f. 6. 1914.

6. CYPHELLA SP. II

Pl. 1, f. 7; pl. 2, f. 9.

Fructifications gregarious, minute, 0.7-1 mm. high, 0.5-1 mm. broad, the basal portion deep red-brown, the upper portion gray-white, becoming white at the margin, cup-shaped, sessile, recumbent; exterior surface tomentose, hairs white, cylindrical, straight, $165 \times 3.5-5.5\mu$, encrusted with hyaline granules; basidia $18.5-22.5 \times 4\mu$, 4-sterigmate; spores hyaline, simple, even, reniform, $6-7 \times 2.5-3\mu$.

Cyphella sp. II has been found on wood of *Betula*. The distinctive characteristics are the recumbent fructifications, which are deep red-brown at the base, gradually becoming gray-white and then usually white at the very margin, and the long, granule-encrusted hairs of the exterior of the cup. At first sight, *C. sp. II* may be mistaken for *C. Tiliae*, but it may be distinguished by its color, recumbency, and the smaller size of its hairs, basidia and spores.

SPECIMENS EXAMINED: Minnesota: Cook (G.W.M. 4957).

The Species of Solenia

The genus *Solenia* was established by Persoon (*Myc. Eur.* 1: 334. 1822). The type species is *S. candida* Pers. (*Myc. Eur.* 1: 334. 1822), which was originally described by Persoon in Roehmer (*Neues Mag. Bot.* 1: 116. 1794). Burt (1924) characterizes *Solenia* as having fructifications which are coriaceous or membranaceous, sessile or nearly so, cylindrical or turbinate, gregarious, fasciculate, rarely solitary, but not joined together except by confluence, seated on a superficial, felt-like, floccose and sometimes fugacious mycelium; basidia simple; spores white or colored.

Cyphella and *Solenia* intergrade, making a definite identification of some forms difficult. However, the fructifications of *Solenia* are generally more elongate and usually more regular than those of *Cyphella*. The fructifications of *Cyphella* are usually much more scattered than those of *Solenia*, and a subiculum is rare in *Cyphella* and common in *Solenia*. *S. candida* characteristically has solitary or scattered fructifications without a subiculum. However, it is very regular and cylindrical; therefore it cannot be mistaken for a *Cyphella*.

Key to the species of *Solenia*

- a. Fructifications brown or gray; basidia 4-sterigmate..... b
- a. Fructifications white or whitish; basidia 2-sterigmate..... c
 - b. Fructifications brown; exterior hairy, long hairs visible under microscope; spores cylindrical to subovate.....1. *S. ochracea*
 - b. Fructifications gray-brown to gray; exterior furfuraceous, no hairs visible under microscope; spores subglobose2. *S. tephrosia*
- c. Fructifications villose with long, appressed, silky, unbranched hairs; often growing in fasciculate groups3. *S. fasciculata*
- c. Hairs short or lacking..... d
 - d. Fructifications pubescent with very short, matted, branched hairs, at first granuliform and distinct, later becoming confluent and reticulate.....4. *S. polyporoidea*
 - d. Fructifications glabrous, remaining scattered5. *S. candida*

1. SOLENIA OCHRACEA Hoff. ex Pers. Myc. Eur. 1: 334. 1822.
Peziza stipata Pers. Myc. Eur. 1: 270. 1822.
Peziza anomala Pers. ex Fries Syst. Myc. 2: 106. 1823.
Solenia anomala (Pers. ex Fries) Fckl. Jahrb. Nass. Ver. Nat. 25-26: 290. 1871.
Solenia anomaloides Peck, Bull. Torrey Bot. Club 25: 326. 1898.
Solenia confusa Bres. Ann. Myc. 1: 84. 1903.

Pl. 1, f. 3; pl. 2, f. 1.

Fructifications gregarious, minute, 0.2-1.3 mm. high, 0.15-0.7 mm. broad, dull tawny-brown to olive-brown, irregularly cup-shaped to pyriform with mouth usually incurved, usually sessile but sometimes having a short, broad stem; exterior rarely pubescent, usually tomentose, hairs tawny-olive, about 150 μ long, 2.5-3 μ in diameter, sometimes straight but more often flexuous and often reflexed or spiralled near the tip, sometimes smooth, but often roughened or finely encrusted, especially near the tip, often inflated at the tip to form a

bulb about 10μ long and $5-6\mu$ in diameter; hymenium tan; basidia 4-sterigmate, $15.5-34.5 \times 3-5.5\mu$, usually about $20-25 \times 3-4\mu$; spores hyaline, simple, even, slightly curved, cylindrical to subovate, $5-10 \times 2-5.5\mu$.

Solenia ochracea has been found on bark and wood of *Alnus*, *Betula*, *Carya*, *Prunus*, *Quercus*, *Salix* and *Ulmus*. It appears in clusters of as few as four or five up to several hundred fructifications in crevices or on the surface of the bark. Some colonies are much larger, being spread out over several centimeters. As a rule, the fructifications are crowded against one another, but often they may be separated from one another by a distance of one or two times their diameter. The brown subiculum may be abundant, scanty, or completely lacking.

Burt (1924) discusses the varying size of spores as related to possible distinction of *S. confusa* from *S. ochracea*. He concludes that the spore differences do not warrant species distinction. Specimens collected in Iowa had spores varying from $10 \times 2\mu$ in one collection to $6.5 \times 4.5\mu$ in another. There were all variations in size between these two extremes, and frequently there was considerable variation of spore size in a single collection. Yet these differences in spore size and shape were associated with no apparent significant morphological differences.

TYPE LOCALITY: Germany.

SPECIMENS EXAMINED: Iowa: Hills (G.W.M. 3973), Iowa City (G.W.M. 1446, 1894, 1896, 4958, 4959, 4960, 4961, 4962, 4963, 4964, 4965), Johnson County (G.W.M. 1384), Milford (G.W.M. 1849), North Liberty (G.W.M. 4970), Sioux City (S.U.I. 1614), Soufals (S.U.I. 1615).

EXSICCATI: Ellis, N. Am. Fungi 611; Ell. & Ev. Fungi Col. 2085; Reliq. Farlow. 363, (as *Solenia anomala* (Fries) Fckl.); Sydow, Myc. Germ. 452, (as *Solenia confusa* Bres.); Jaap, Fungi Sel. 121, (as *Solenia confusa* Bres.).

ILLUSTRATIONS: Pat. Tab. Anal. Fung. 5: f. 456. 1886. (as *Solenia anomala* Pers.).

2. *Solenia tephrosia* (Pers.) comb. nov.

Peziza anomala var. *poriaeformis* Pers. Syn. Fung. 1: 656. 1801.

Peziza tephrosia Pers. Myc. Eur. 1: 271. 1822.

Peziza poriaeformis [Pers] Fries, Syst. Myc. 2: 106. 1823.

Solenia poriaeformis (Fries) Fckl. Jahrb. Nass. Ver. Nat. 25-26; 290. 1871.

Pl. 1, f. 6; pl. 2, f. 4.

Fructifications gregarious, minute, 0.1-0.7 mm. high, 0.25-0.6 mm. broad, pale gray to gray-brown, usually cup-shaped, sessile; pruinose-hairy, without true hairs but enveloped by the subiculum; hymenium pale gray; cystidia ventricose-rostrate, $12-18 \times 3-5.5\mu$, not encrusted;

basidia 4-sterigmate, $15.5-34.5 \times 4-9\mu$; spores hyaline, simple, even, subglobose, $4-6.5 \times 3.5-6.5\mu$.

Solenia tephrosia has been found on wood and bark of *Acer*, *Betula*, *Quercus*, *Salix*, *Tilia* and *Vitis*. The pale gray to gray-brown subiculum is usually abundant and often envelopes the fructifications, the whole colony resembling an ashy-gray, crustaceous lichen, of one to several centimeters diameter, bearing numerous small apothecia. The fructifications are clustered, but usually they are not contiguous.

TYPE LOCALITY: Europe.

SPECIMENS EXAMINED: Iowa: Estherville (S.U.I. 1618), Milford (G.W.M. 4973); Missouri: St. Louis (G.E.B. 149).

EXSICCATI: Reliq. Farlow. 364; Ell & Ev. N. Am. Fungi 2317; Jaap, Fungi Sel. 65.

ILLUSTRATIONS: Brefeld, Untersuch. Myk. 7: pl. 11, f. 21. 1888.

3. SOLENIA FASCICULATA Pers. Myc. Eur. 1: 335. 1822.

Pl. 1, f. 4; pl. 2, f. 2.

Fructifications gregarious, often fasciculate, minute, 0.5-2 mm. high, 0.15-0.4 mm. broad, white, drying pale tan, cylindrical-clavate; exterior minutely villose-silky, hairs hyaline, straight, $100-300 \times 2.5-3\mu$, not encrusted; basidia 2-sterigmate, $13-22 \times 5-7\mu$; spores hyaline, simple, even, subglobose, $4-7 \times 3-6.5\mu$.

Solenia fasciculata has been found on bark and wood of *Juniperus virginiana* and *Carpinus*. The fructifications are usually closely grouped, often in small, fasciculate clusters. The subiculum is white, usually scanty and often absent. Specimens which have been identified as *S. fasciculata* in this study seem to approximate the published descriptions. Likewise, they are similar to *S. villosa* Pers. of Ellis, N. Am. Fungi 937, which Burt (1924) identified as *S. fasciculata*. Care must be taken not to confuse *S. fasciculata*, which has long, silky hairs, with *S. polyporoidea*, which has very short, matted hairs little differentiated from the hyphae, or with *S. candida*, which is entirely glabrous.

TYPE LOCALITY: Europe.

SPECIMENS EXAMINED: Iowa: Iowa City (G.W.M. 4967); Virginia: George Washington Natl. Forest (G.W.M. 5094).

EXSICCATI: Ellis, N. Am. Fungi 937, (as *Solenia villosa* Pers.).

ILLUSTRATIONS: Pers. Myc. Eur. 1: pl. 12, f. 8, 9. 1822.

4. SOLENIA POLYPOROIDEA Peck ex Burt, Ann. Missouri Bot. Gard. 11: 16. 1924.

Pl. 1, f. 5; pl. 2, f. 3.

Fructifications gregarious, minute, 0.35-0.9 mm. high, 0.15-0.4 mm. broad, white, drying pale cream or pale tan, sessile, at first granuli-

form and distinct, becoming cylindrical to irregularly clavate, finally confluent along the sides in contact to form a honeycomb-like, reticulate group with bare wood showing in many little areas up to about 1 mm. in diameter; exterior pubescent, the hairs, hyaline, smooth, very weak, branched, matted, extending not more than approximately 30μ from the surface, scarcely differentiated from the hyphae, $1-2.5\mu$ in diameter, not encrusted; basidia 2-sterigmate, $13-25 \times 5-12\mu$; spores hyaline, simple, even, subglobose, sometimes slightly flattened on one side, $4-6.5 \times 3.5-6.5\mu$.

Solenia polyporoidea has been found on bark and wood of *Quercus*, *Robinia*, *Sabal*, *Tsuga* and *Ulmus*. Specimens have been identified on the basis of the description in Burt (1924). Apparently this species is differentiated from *S. fasciculata* mainly on the basis of the small, poorly-defined hairs and the poroid grouping of the fructifications. However, it must be emphasized that the poroid grouping is not always conspicuous. Dried specimens apparently show this characteristic better than fresh specimens. Many specimens scarcely show it, but are similar in their other characteristics to those which are poroid. The subiculum is white, but often absent.

TYPE LOCALITY: New York: Adirondack Mts.

SPECIMENS EXAMINED: Iowa: Iowa City (G.W.M. 4966, 4968, 4971, 4972; S.U.I. 905), Soufals (S.U.I. 1617); Bermuda: Fruitlands, Warwick (H.H.W. 103); Panama Canal Zone: Balboa (G.W.M. 3984).

5. SOLENIA CANDIDA Pers. Myc. Eur. 1: 334. 1822.

Pl. 1, f. 2; pl. 2, f. 5.

Fructifications scattered or solitary, minute, 0.35-0.6 mm. high, 0.2-0.25 mm. broad, white, drying pale tan, cylindrical or rarely obclavate, sessile; exterior glabrous; basidia 2-sterigmate, $9-19.5 \times 3-7\mu$; spores hyaline, simple, even, subovate, sometimes slightly flattened on one side, $4.5-6.5 \times 4-5.5\mu$.

Solenia candida has been found on dead wood. It is distinguishable from both *S. fasciculata* and *S. polyporoidea* on the basis of its glabrous exterior and its scattered fructifications. A typical colony consists of perhaps ten to several hundred fructifications, widely scattered and with no subiculum. The cylindrical shape of the fructification is often striking, for the mouth usually is of the same diameter as the cavity, as if the fructification were truncate. The fructifications examined were somewhat smaller and their spores slightly larger than those described by Burt (1924), but their measurements are in very close agreement with those given by Bourdot and Galzin (1928).

TYPE LOCALITY: Europe.

SPECIMENS EXAMINED: Iowa: Iowa City (S.U.I. 1612), Johnson County (S.U.I. 1613); Costa Rica; Finca Castilla (C.W.D. 9170).

ILLUSTRATIONS: Clements & Shear, *The Genera of Fungi*, pl. 42, f. 12. 1931.

The Species of Porothelium

The genus *Porothelium* was established by Fries (Syst. Orb. Veg. 80. 1825). He had previously included it as a subgenus of *Polyporus* (Syst. Myc. 1: 506. 1821). *P. fimbriatum* is the only species included in this discussion. It has shallow fructifications which are seated on a very dense, membranous subiculum. The fructifications arise singly and then become crowded or confluent to form a poroid layer surrounded by scattered young fructifications seated on or immersed in the dense subiculum.

1. POROTHELIUM FIMBRIATUM Fries, Syst. Orb. Veg. 80. 1825.
Polyporus (Porothelium) fimbriatum Fries, Syst. Myc. 1: 506. 1821.
Poria fimbriata (Pers. ex Lloyd) Mycol. Writings 52: 740. 1917.

Pl. 1, f. 1; pl. 2, f. 12.

Fructifications arising as minute, gregarious, papilloid cups up to 0.1 mm. high and 0.05-0.25 mm. broad, gradually coalescing toward the center of the colony to form a poroid layer in which the individuality of the single cups may be completely lost, pale yellowish-tan to pale vinaceous-russet; pores usually shallow, up to 0.5 mm. deep and 0.5 mm. broad; hymenium-bearing portion seated on a dense, byssoid, white subiculum extending from 1 to several mm. beyond the fertile area of the hymenophore, bearing scattered rhizomorphic strands; margin fimbriate; hyphae compactly interwoven, rarely branched, thick-walled, 1.5-2.5 μ in diameter, sparingly septate, bearing clamp-connections; hymenium yellowish-tan; basidia 4-sterigmate, 12-23.5 \times 4-6.5 μ ; spores hyaline, simple, even, depressed-ovate, 5-6.5 \times 2.5-3.5 μ .

Fries (Syst. Myc. 1: 506. 1821; Elench. Fung. 1: 125. 1828) used the spelling *Porotheleum*. However current usage is adopted here.

Porothelium fimbriatum has been found on wood of *Abies*, *Alnus*, *Betula*, *Carpinus*, *Fagus*, *Pinus*, *Quercus* and *Viburnum*. The distinctive characteristic is the poroid nature of the shallow fructifications, which are surrounded, near the margin of the colony, by scattered, papillate, individual cups. The cups are often not open, but some are open enough to permit the hymenial surface to be seen. Another characteristic is the gelatinous nature of the hymenium. This causes separation and clear observation of the basidia to be extremely difficult.

Porothelium fimbriatum is intermediate between the Thelephoraceae and Polyporaceae. It has been placed in both families by various authors. The primary justification for placing it among the genera of Thelephoraceae is its development from individual cups, each cup having a smooth hymenium. If the pores were developed as such, it would be placed among the genera of Polyporaceae. But they develop singly and then coalesce with one another. A situation

approaching this is the development of *Solenia polyporoidea* Peck ex Burt. *P. fimbriatum* may be regarded as progressing one step beyond that species.

TYPE LOCALITY: Europe.

SPECIMENS EXAMINED: Iowa: Iowa City (S.U.I. 1619, 1621), North Liberty (L.W.M. 388; S.U.I. 1620); Ontario: Minoki (G.R.B. 4207); Czechoslovakia: Trebusany (A. Pilat).

ILLUSTRATIONS: Cooke, Handbk. Brit. Fungi 291. 1871.

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Explanation of Plates

Plate 1

Photographs of fructifications at approximately $\times 2\frac{1}{2}$.

1. *Porothelium fimbriatum*.
2. *Solenia candida*.
3. *S. ochracea*.
4. *S. fasciculata*.
5. *S. polyporoidea*.
6. *S. tephrosia*.
7. *Cyphella* sp. II.
8. *C. sp. I*.
9. *C. Tiliae*.
10. *C. minutissima*.
11. *C. Langloisii*.
12. *C. griseo-pallida*.

Plate 2

Camera lucida drawings of microscopic elements at approximately $\times 1000$.

1. *Solenia ochracea*. Basidia, spores, peridial hairs.
2. *S. fasciculata*. Basidium, spores, peridial hair.
3. *S. polyporoidea*. Basidium, spore, peridial hair.
4. *S. tephrosia*. Basidia, spores, cystidia.
5. *S. candida*. Basidia, spores.
6. *Cyphella* sp. I. Basidium, spore, peridial hairs.
7. *C. Langloisii*. Immature basidium, spores, peridial hair.
8. *C. griseo-pallida*. Spore.
9. *C. sp. II*. Basidium, spores, peridial hair.
10. *C. Tiliae*. Basidium, spores, peridial hair.
11. *C. minutissima*. Basidium, spores, peridial hair.
12. *Porothelium fimbriatum*. Spores.

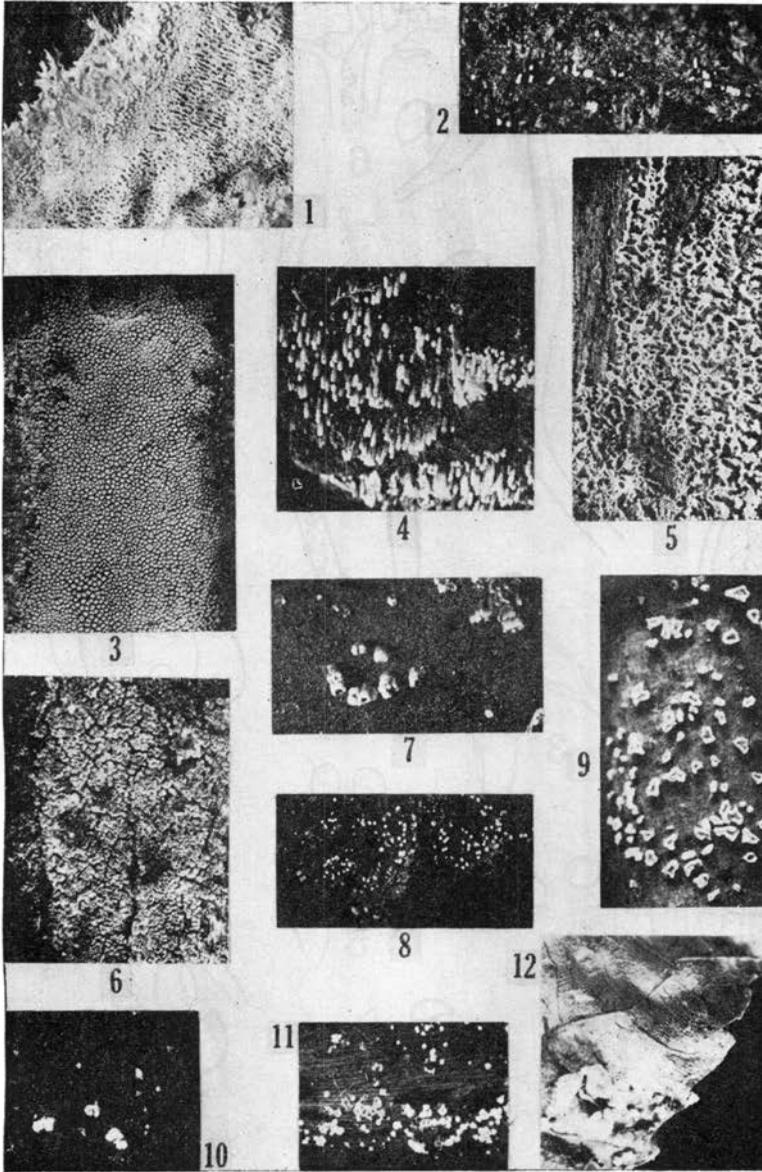


Plate 1

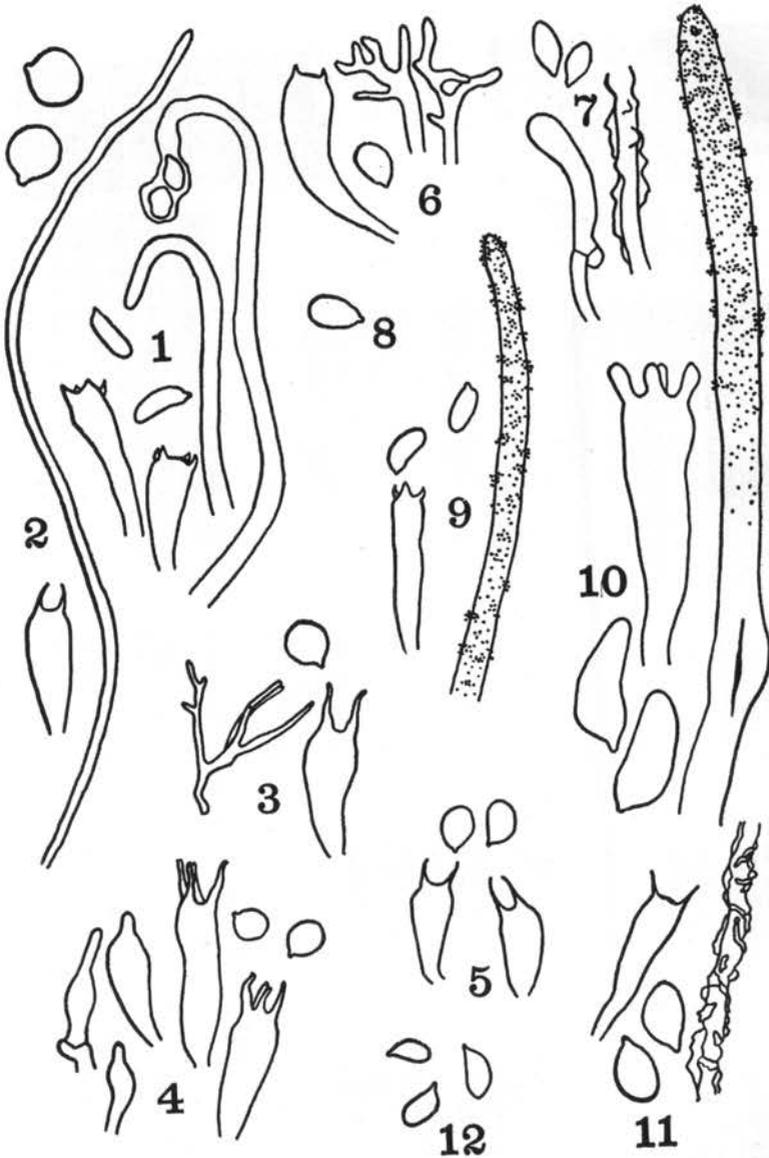


Plate 2