Some Dictyosporous Genera and Species of Pleosporales in North America

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Bronx, New York 10458, U.S.A.
Issued: 26 December 1990

Memoirs of the New York Botanical Garden Volume 62
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Abstract

Barr, Margaret E. (Department of Botany, University of Massachusetts, Amherst, MA 01003, U.S.A.). Some dictyosporous genera and species of Pleosporales in North America. Mem. New York Bot. Gard. 62: 1-000. 1990. From a survey of dictyosporous North American taxa in the Pleosporales (Loculoascomycetes), descriptions of 82 species in 17 genera belonging to 11 families are provided. Other dictyosporous genera are mentioned briefly and a key is provided to separate the genera. In the appendix, dictyosporous taxa in the other orders of Loculoascomycetes and a few Hymenoascomycetes are listed alphabetically; disposition is made for several species. A host index lists substrates and taxa that inhabit them. Six new species are proposed: Pleomassaria hesperia Barr, Teichospora bartholomewii Barr, T. ribis Barr, Graphyllium californianum Barr, Chaetoplea apicirubida Barr, Coccodinium citricola, one new subspecies Cilioplea coronata subsp. montana Barr, and one new name Teichospora minimispora Barr. New combinations include: Pleospora pygmaea (Ellis & Everh.) Barr, Cucurbitaria tenacella (Fr.) Barr, Teichospora borealis (Ellis & Everh.) Barr, T. comptoniae (Ellis & Everh.) Barr, T. congesta (Cooke & Ellis) Barr, T. coremae (Ellis & Everh.) Barr, T. juglandis (Ellis & Everh.) Barr, T. quercina (Ellis & Everh.) Barr, T. sambuci (Earle) Barr, T. zabriskeana (Ellis & Everh.) Barr, Phaosophera vitalbae (DeNot.) Barr, Graphyllium pentamerum (Karsten) Barr, G. permundum (Cooke) Barr, Chaetoplea amygdaloideis (Ellis & Everh.) Barr, C. aspera (Ellis & Everh.) Barr, C. carpinicola (Ellis & Everh.) Barr, C. crossata (Ellis & Everh.) Barr, C. ellisi (Sacc. & P. Sydow) Barr, C. helenae (Ellis & Everh.) Barr, C. hypiasmatis (Ellis & Everh.) Barr, C. longispora (Wegelin) Barr, C. nubilosa (Ellis & Everh.) Barr, C. oblongata (Niesl) Barr, C. stenocarpa (Ellis & Everh.) Barr, C. striogosa (Ellis & Everh.) Barr, C. umbilicata (Ellis) Barr, C. variabilis (Ellis & Everh.) Barr, Cilioplea fulgurata (Ellis & Everh.) Barr, Mycoglaena canadensis (Ellis & Everh.) Barr, M. alni (Dearness & House) Barr, Trybdilaria cucurbitaria (Cooke) Barr, Berlesiella minima (Ellis & Everh.) Barr, Rhytidhysteron opuntiae (J. G. Brown) Barr, and Strigopodia spongiosa (Barr) Barr.

Key Words: muriform Pleosporales—identification, muriform Pleosporales—classification, dictyosporous pyrenomycetes.

Introduction

Dictyosporous genera are widespread in the Loculoascomycetes and vast numbers of taxa are known in this class. They present considerable diversity, not only in ascospore shape, pigmentation, sequence and numbers of septa formed, but in characteristics of ascus, hama­thecium, peridium and ascoma. This study presents the results of analyses of these features in genera of families belonging to the Pleosporales sensu Barr (1987b). An article on the nonlichenized members of the Melanommatales includes dictyosporous taxa (Barr, 1990) and the past nomenclatural history of dictyosporous fungi made essential the preparation of this companion article. Earlier authors in North America, Ellis and Everhart, Peck, and Earle in particular, utilized rather few genera, mainly Pleospora, Teichospora, Cucurbitaria, and Thyridium. Many assorted species were of necessity forced into these genera and a major reassessment is needed. The assessment of families outlined by Barr (1987b) made additional genera available and these are indeed needed. For each genus treated in detail a description is provided, based upon the type species and expanded to include the variations that occur in related species. If it has not been treated recently, the type species is described and illustrated even when it is not known to occur in North America. The major emphasis is upon those taxa that are wood-inhabiting saprobes or hemibiotrophs, although a sharp line cannot be drawn, and a number of species that develop in herbaceous dicots or monocot culms are included. Some genera that have been studied recently are listed only, with appropriate references, or only a few species may be added, as for example
in Pleospora. Keys and descriptions of the species are provided for the majority of genera. It must be emphasized again that knowledge of these organisms is woefully incomplete. In fact, almost any region and substrate in the continent would repay intensive scrutiny and would produce species hitherto unknown, or seemingly rare and known from one or few collections.

As with all members of the class, examination of all available characteristics is essential. The arrangement within a family is based upon characteristics of ascomata—habit, position in or on substrate, shape of ascoma, peridium structure, details of the hamathecium and asci. In some families only a single dictyosporous genus is recognized, in others two or more; notes indicate the reasons for separation of these. The species described in each genus are recognizable by a combination of features. Most important are those of the ascospores: symmetry, shape, size and septation in particular, but also wall thickness, any surface ornamentation, variation in pigmentation, or other remarkable characteristics. Additionally, at least in some genera, variations in ascus shape or in ascoma shape or surface are valuable to aid in separating species. Most of the terminology has been explained or illustrated by Barr (1987b). The complexities of ascospore septation in these fungi have been studied and illustrated by several authors, including Wehmeyer (1961) for Pleospora and Eriksson (1967, 1981) for Clathrospora. The descriptions presented here utilize Eriksson's terminology with some simplification. Ascospore measurements are given as a range of length \times width (and where necessary depth) of mature ascospores, and exceptional sizes are enclosed in parentheses. The description includes ascospore symmetry or asymmetry and the resultant shape; for symmetric ascospores usually ellipsoid, oblong or fusoid, for asymmetric ascospores usually some variation of obovoid. The ends of ascospores are described as rounded, obtuse or acute. The two ends may differ. While many ascospores are straight, many more are inequilateral with one side flattened, or curved with one side indented. The septa of ascospores are occasionally distosepta, more frequently eusepta (Luttrell, 1963; Sutton, 1969). Some ascospores may produce a first-formed euseptum and later-formed distosepta, described and discussed by Hawksworth (1983) in Polypyrrena sexlocularis (Müll. Arg.) D. Hawksworth [Polythelis sexlocularis (Müll. Arg.) Clements]. Distoseptate ascospores may be difficult to recognize as such when they are mature and contain many transverse and longitudinal septa, but are more obvious in early stages of development. In euseptate ascospores, septation begins with the A1 or first-formed septum, and the median or nonmedian position of this septum produces hemispheres that are quite similar or are dissimilar. Septation continues with two A2 septa, one in each hemispor. A longitudinal septum within the two mid cells thus formed results in the simplest three-septate dictyospore. Additional septa are present in many species. These may be A3 septa in the terminal cells, or B1 septa formed between A1 and A2 septa. Still more septa, either transverse or longitudinal or both, are found in ascospores of increasing complexity. Fortunately, most ascomata will contain asci showing ascospores in several stages of maturity, so that it is feasible to construct a sequence of septation (illustrated in the figures), usually accompanied by increase in size and pigmentation, from immature hyaline through shades of deeper pigmentation to the mature color. Pigmentation of mature ascospores is typically in shades of brown, ranging from scarcely pigmented, hyaline to yellowish, to pale through dark yellowish brown, or pale cinnamon through dark reddish brown. Constrictions are most evident at the first-formed septum, laid down well before the ascospore has enlarged to full size; in some cases constrictions are conspicuous at the A2 septa, or even at most or all septa. The ascospore wall is thin at first, and may remain thin or more often becomes thickened and heavily pigmented. It may be smooth or variously ornamented, verruculose or foveolate (pitted) most frequently. Gel coatings are not uncommon; they may be narrow and inconspicuous or may form a wide sheath that can be indented at the first-formed septum or elongated terminally as appendages. Ascospore cell contents are usually granular or minutely globulate in early stages, later coalescing as one or more globules in a cell. The globules are spherical or less often lenticular. The arrangement of ascospores in the ascus is dependent upon the ascus shape: uniseriate in cylindric asci, biseriate or crowded in broadly cylindric or clavate asci, often overlapping as full-sized ascospores occupy the space available. The majority of ascospores contain
eight ascospores, sometimes one or more failing to develop; lesser numbers, most frequently four but in some taxa one or two, are characteristic of certain species.

A key to families of Pleosporales that contain dictyosporous genera follows. The key and the sequence of families in the following text is taken from the arrangement presented by Barr (1987b). A separate key to dictyosporous genera mentioned in the text is included. Species within a genus are separated in a key and their descriptions are arranged alphabetically.

Exsiccati cited under material examined are abbreviated as follows:

Ascomyc. = Rehm, variously Ascomyceten, Ascomycetes Exsiccati
Ascomyc. & L. F. = Seaver & Wilson, Ascomycetes & Lower Fungi
Canad. F. = Macoun, Canadian Fungi
Cryptog. Form. Colorad. = Clements, Cryptogame Formationium Coloradensium
Finland F. = Karsten, Finland Fungi
F. Carol. = Ravenel, Fungi Caroliniani
F. Col. = Ellis & Everhart, later Bartholomew, Fungi Columbiani
F. Dakot. = Brenckle, Fungi Dakotenses
F. Eur. = Rabenhorst-Winter, Fungi Europei
F. Hungar. = Linhart, Fungi Hungarici
F. Ital. = Saccardo, Fungi Italici
F. Rhen. = Fuckel, Fungi Rhenani
F. Saxon. = Krieger, Fungi Saxonici
F. Sel. Exs. = Roumeguère, Fungi Selecti Exsiccati
Fl. Ludovic. = Langlois, Flora Ludoviciana
Herb. B.-B. = Herbier Barbey-Boissier
Mycofl. Saximont. Exs. = Solheim, Mycoflora Saximontanensis Exsiccati
N.A.F. = Ellis & Everhart, North American Fungi, 2nd series
N.A.F. 1 = Ellis, North American Fungi
Nantucket F. = Guba, Nantucket Fungi
N.Y.F. = Shear, New York Fungi
Pacific Sl. F. = Baker, Pacific Slope Fungi
Pl. Nev. = Baker, Plants of Nevada
Pl. S. Colorado = Baker, Plants of Southern Colorado
Sphaer. Brit. = Plowright, Sphaeriacei Britannici
W.A.F. = Griffiths, West American Fungi

KEY TO FAMILIES OF PLEOSPORALES WITH DICTYOSPOROUS GENERA

1. Ascomata superficial, dimidiate scutate; peridium soft and thin. ...........................L. Micropeltidaceae.
1. Ascomata immersed, erumpent or becoming superficial, not dimidiate scutate; peridium variable.
2. Ascomata hysterothecioid, opening by long slit; peridium usually three layered. .... C. Hysteriaceae.
2. Ascomata perithecioid, or if elongate then peridium two layered.
3. Peridium of relatively large pseudoparenchymatous cells, thin walled or walls thickened and sclerotial.
4. Ascospores large, few septate, often pale brown; on monocots. ......................B. Pyrenophoraceae.
4. Ascospores variable in size, multiseptate when large, often dark brown; on varied substrates.
5. Ascospores usually large, distoseptate; on woody substrates. ......................D. Pleomassariaceae.
5. Ascospores variable in size, euseptate; on herbaceous, rarely woody substrates.
   6. Asci oblong or clavate, endotunica thickened or thin above. ......................A. Pleosporaceae.
   6. Asci cylindrical, endotunica thin above. .............................................E. Leptosphaeriaceae.
3. Peridium of small pseudoparenchymatous or compressed cells.
7. Ascomata turbinate, globose or ovoid, with plane or rounded apex, papilla minute, inconspicuous; peridium three layered, often thickened at base; usually erumpent in groups on woody substrates. ..................................................F. Cucurbitariaceae.
7. Ascomata variable in shape, tapered to apical papilla.
8. Ascomata obpyriform, ovoid or globose; peridium three layered, often thickened toward apex; usually immersed to erumpent in woody substrate. ......................H. Dacampiaceae.
8. Ascomata sphaeroid or globose; peridium two layered.
9. In woody or herbaceous substrates.
   10. Ascomata usually clypeate, in uppermost layers of periderm of woody substrates. ..................................................K. Anthopyreniaceae.
   10. Ascomata not clypeate, immersed in herbaceous or woody substrates.
      11. Ascospores constricted at primary septum and in each hemisphere; pseudoparaphyses numerous, sheetlike above asci........................J. Lophiostomataceae.
      11. Ascospores constricted or not at primary septum, not usually in each hemisphere; pseudoparaphyses sparse above asci. ......................I. Phaeosphaeriaceae.
**Key to Dictyosporous Genera Mentioned**

1. Ascomata indeterminate in growth, irregular in shape and margin; asci short and wide, arising singly among pseudoparenchymatous cells.
   - 2. Lichenized; asci separated by vertically oriented cells with free tips. *Arthothelium.*
   - 3. Epiphytic or hyperparasitic; asci overarched by pseudoparenchymatous cells.

2. Ascomata determinate in growth, regular in shape and margin; asci forming hymenial layer.
   - 5. Asci uniseriicate.
     - 6. Hamathecium lacking, disintegrating cells in centrum surrounding short ovoid or saccate asci, or hamathecium of short, usually inconspicuous, apical periphysoids.
       - 11. Ascomata immersed erumpent, usually lacking subiculum.
         - 12. Ascomata pulvinate or sphaeroid, medium sized; asci numerous, oblong to clavate.

3. Ascomata determinate in growth, regular in shape and margin; asci forming hymenial layer.
   - 5. Asci bitunicate.
     - 10. Hamathecium lacking, disintegrating cells in centrum surrounding short ovoid or saccate asci, or hamathecium of short, usually inconspicuous, apical periphysoids.
       - 11. Ascomata immersed erumpent, usually lacking subiculum.
         - 12. Ascomata pulvinate or sphaeroid, medium sized; asci numerous, oblong to clavate.

4. Hyperparasitic on other fungi, not forming stromatic basal tissues, soft and delicate.

5. Numbered genera are those treated in this work.
23. Cristate (keeled) apex of ascoma containing slit; peridium brittle, of compressed rows of cells.
25. Ascospores medium sized (to 30 \( \mu m \) long), few septate. Ostreola.
25. Ascospores large (over 30 \( \mu m \) long), many septate. Ostreichnion.
22. Ascomata rounded, perithecioid, opening by rounded pore or short slit.
26. Ascomata not coprophilous; ascospores not separating readily at septa.
27. Ascomata grouped on stromatic crust over scale insects on conifers. 11. Cucurba this.
27. Ascomata not grouped on stromatic crust over scale insects.
28. Ascomata immersed erumpent or when superficial not dimidiate.
29. Ascospores strongly laterally compressed, longitudinal septum not visible in side view.
30. Ascospores with two or more longitudinal septa visible in face view; in monocots.
31. Ascospores with one longitudinal septum visible in face view; in monocots or dicots. 16. Graphyllium.
29. Ascospores not laterally compressed or slightly so, longitudinal septum visible in side and face views.
31. Ascospores relatively large, distoseptate at least when young.
32. Lichenized species, in endophloedal tissues in woody branches; pseudoparaphyses narrow, not or scarcely branched. Anthracothecium.
32. Saprobic or hemibiotrophic species.
33. Ascomata sphaeroid or globose; peridium of large pseudoparenchymatous cells; pseudoparaphyses wide, cellular. 8. Pleomassaria.
33. Ascomata globose; peridium of compressed rows of cells; pseudoparaphyses trabeculate. Decaisnella.
31. Ascospores small to large, cuseptate.
34. Peridium of large pseudoparenchymatous cells, walls thin or thickened and sclerotial.
35. Ascomata medium to large sized, surface often bearing stiff hyphal appendages or conidiophores; in monocots. 4. Pyrenopora.
35. Ascomata small to medium (large) sized, surface glabrous or bearing soft hyphae or stiff appendages.
36. Ascomata conoid; ascospores elongate fusoid, mid portion only with longitudinal septa. 10. Heptameria.
36. Ascomata globose and collabent or sphaeroid; ascospores more obtuse, longitudinal septa in all cells or all but end cells.
37. Ascospores yellowish brown, septa few; in monocots.
37. Ascospores pale brown to dark brown, septa often many; in monocots, dicots or conifers.
38. Ascomata sphaeroid, in subiculum and often beneath small clypeus; in cones and twigs of conifer. 9. Curreya.
38. Ascomata globose or sphaeroid, in slight subiculum; usually in herbaceous dicots or monocots.
39. Peridium relatively soft and narrow; asci oblong to cylindrical, endotunica narrow. 2. Lewia.
39. Peridium relatively firm and wide; ascii usually clavate or oblong, endotunica wide. 1. Pleospora.
34. Peridium of small pseudoparenchymatous cells or compressed cells.
40. Ascomata lacking short setae in apical region.
41. Ascospores hyaline or lightly pigmented; ascomata immersed beneath clypeus. 20. Julella.
41. Ascospores brown.
42. Lichenicolous species (not yet known from North America). Dacampia.
42. Not lichenicolous.
43. Marine, in wood of Rhizophora; ascospores large, slightly compressed. Aigialus.
43. In terrestrial plants; ascospores small to medium sized, not notably compressed.

44. Ascospore wall thickened, verrucose; ascomata in ample hyphae or beneath clypeus; in large monocots. ............ 17. Montagnula.

44. Ascospore wall thin, smooth or nearly so; ascomata in monocots or dicots, herbaceous or woody substrates.

45. Ascomata sphaeroid or globose and collabent.

46. Ascomata separate or grouped in scanty hyphae; ascospores infrequently muriform. ............................... 15. Phaeosphaeria.

47. Peridium relatively soft; pseudoparaphyses narrowly cellular. ............................. 18. Chaetoplea.

47. Peridium firm; pseudoparaphyses trabeculate. ........................................... Karstenula.

45. Ascomata globose, turbinate, ovoid or obpyriform.

46. Ascomata separate or grouped, often in subiculum or beneath clypeus; ascospores usually muriform.

48. Ascomata obpyriform or ovoid, usually gregarious beneath hyphal disc in valsoid groups over other ascomycetes. ................................. Fenestella.

48. Ascomata separate or gregarious in or on hyphal subiculum or stromatic crust or beneath clypeus, not in valsoid groups.

49. Ascomata globose or ovoid, minute papilla in rounded apex, erumpent in groups on hyphal or stromatic base; peridium three layered, often thickened at base. .................................................. 12. Cucurbitaria.

50. Apex of ascoma often short beaklike, compressed, opening by slit. .......................... Platystomum.

50. Apex of ascoma short papillate, rounded or occasionally compressed or puckered.

51. Ascomata obpyriform or ovoid; peridium three layered, at least in upper regions; asci basal. ......................... 14. Teichospora.

51. Ascomata globose, turbinate or ovoid; peridium two layered; asci peripheral. .............................. Strickeria.

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**Pleosporales**

**A. Pleosporaceae**


The great majority of Pleospora species develop in herbaceous stalks and leaves or in culms and leaves of monocots. Those on woody substrates that Wehmeyer (1961) segregated into subg. *Teichosporoides* for the most part belong in other genera. The type of the subgenus, *P. shepherdiae* Peck, is a species in *Karstenula*. Other species in the subgenus are dispersed as follows: *Pleospora hookeri* sensu Wehmeyer is a complex containing at least two species of *Decampia*, *D. hookeri* (Borr.) Massal. and *D. engeliana* (Saut.) Massal. (Crivelli, 1983). *Pleospora amelanchieris* Wehm. is a synonym of *Strickeria insecuSa* (Ellis) Kuntze. *Pleospora obtusa* (Fuckel) von Höhnel is *Montagnula obtusa* (Fuckel) Crivelli. *Pleospora laricina* Rehm according to Crivelli (1983) is a species of *Teichospora* whereas var. *nitida* (Ellis & Everh.) Wehm. in the sense of Wehmeyer is mixed: the Colorado holotype material is *Strickeria nitida* (Ellis & Everh.) Kuntze, but a collection from West Virginia, also mentioned in the protologue, is instead identical with *Pleospora pygmaea* (see below). Finally, *P. henningsiana* Ruhland, Jahn & Paul is *Pleomassaria holoschista* (Berk. & Broome) Sacc. according to Crivelli (1983).

For identifying species in *Pleospora*, one should consult Wehmeyer's (1961) monograph, taking note of emendations made by O. Eriksson (1967), Shoemaker (1968), Crivelli (1983), Simmons (1969, 1985, 1986). Crivelli (1983) recognized and segregated species in genera such as *Massariosphaeria*, *Montagnula*, *Cilioplea*, *Paraphaeosphaeria*, *Pleomassaria*, *Pseudopleospora*, and *Decampia*. Many of these, now placed in other families, will be discussed in later pages. Two species that belong in *Pleospora* and inhabit woody substrates are added and are described below. These taxa have small, thin-walled ascocata that develop in decorticated wood or old periderm and have broadly clavate asci among cellular pseudoparaphyses. The ascocata are not collabent as in species of *Chaetoplea*, but may become collapsed laterally on drying, neither are they obpyriform to ovoid as in species of *Teich-
ospora. They are quite comparable to a European species identified in Rehm's Ascomyc. 384 as P. obtusa (Fuckel) von Höhnel but differ in shorter oblusa species identified in Rehm's taxon that Crivelli assigned as Montagnula obtusa (Fuckel) Crivelli. The North American species are quite alike in sizes, but differ in ascospore shape by which they may be separated.

**KEY TO SPECIES OF**

**PLEOSPORA TREATED**

1. Ascospores ellipsoid ovoid, lower and upper hemispores similar. ............... 1. P. ambleia.

**1. Pleospora ambleia** (Cooke & Ellis) Ellis in Britton, Catal. Pl. New Jersey 523. 1889

(Figs. 1a, b.

*Sphaeria ambleia* Cooke & Ellis, Grevillea 7: 10. 1878; *Thyridium ambleium* (Cooke & Ellis) Sacc., Syll. Fung. 2: 325. 1883.

Ascospores separate or gregarious, immersed to erumpent, 165-275 μm diam, papilla very short; peridium narrow, reddish brown, surrounded by reddish brown hyphae. Asci 50-60 × 15-16 μm. Ascospores 13-18 × 6.5-8 μm, yellowish brown to dark brown, ellipsoid ovoid, nearly symmetrical, 3-5-7-septate, with one longitudinal septum in mid cells, constricted at first-formed septum.

In decorticated or corticated branches, northeastern North America.

**Material examined:** U.S.A. Massachusetts: Franklin Co., Conway, Baptist Hill, in *Fagus grandi­folia*, 6 Nov 1983, M. E. Barr 6963 (MASS now NY).


*Sphaeria ambleia* was based upon the two New Jersey collections cited above. Both collections in NY are rather depauperate and bear in addition Botryosphaeria obtusa (Schwein.) Shoem. Ellis and Everhart (1892) said "The spec. of this species are poor and unsatisfactory." Other collections from the Ellis Herbarium identified as this species differ from the above and belong in other dictyosporous genera.

2. **Pleospora pygmaea** (Ellis & Everh.) Barr, comb. nov.

(Figs. 10–e.

*Teichospora pygmaea* Ellis & Everh., J. Mycol. 4: 63. 1888; *Strickeria pygmaea* (Ellis & Everh.) Kuntze, Rev. Gen. Pl. 3: 534. 1898.


Ascomata 140-275 μm diam., separate, immersed to erumpent, papilla very short; peridium 10-25 μm wide, reddish brown, surface roughened by short brown hyphae. Asci 54-85 × (8-)10-20 μm. Ascospores (10-)13-23 × (5-)6-8(-9) μm, pale yellowish brown, ovoid, asymmetric, upper hemispore short and obtuse, lower hemispore tapered to acute base, 3-4-7-septate, with one longitudinal septum in mid cells, at times into end cell, constricted at first-formed septum; wall smooth.

On old periderm, eastern and midwestern North America.

**Material examined:** U.S.A. Kansas: s. data, in *Populus*, comm. J. W. Eckfeldt (NY, holotype of *T. pygmaea*, 2 packets); Rooks Co. Rockport, in *Populus monilifera*, Sep 1894, E. Bartholomew, N.A.F. 3219, F. Col. 625 (MASS, NY); in *Fraxinus viridis*, 8 Mar 1895, E. Bartholomew, in *Negundo aceroides* (=*Acer negundo*), 18 Apr 1896, E. Bartholomew (both NY as *T. pygmaea*); s. loc., 1888, Dr. Egeling (NY, holotype of *T. kansensis*); Rockport, in *Salix amygdaloides*, 25 Nov 1893, E. Bartholomew 1391; in *Acer negundo*, 15 Aug 1894, E. Bartholomew 1555 (NY, both as *T. kansensis*).


**West Virginia:** Fayette Co. Nuttallburg, in *Rubus villosus*, May 1895, L. W. Nuttall 706 (NY as *Teichospora nitida*).

A note by Ellis on the holotype packet of *T. kansensis* states "Probably same as *T. pygmaea* E. & E." and this collection cannot be separated from *Pleospora pygmaea*.
See Simmons, 1986.

In Barr's sense, Clathrospora contains pleosporaceous taxa whose ascospores are flattened in one plane, showing (one)two to seven longitudinal septa in face but not in side view. Clathrospora includes Pleospora subg. Platysporoides Wehm. (1961) but not Platyspora Wehm. [Clathrospora subg. Platyspora (Wehm.) O. Eriksson]. Those taxa are described later in the Phaeosphaeriaceae under Graphyllium.

B. PYRENOPHORACEAE


Simmons (1989) has recently reviewed this genus and presented details on anamorphs.

C. HYSTERIACEAE

Two dictyosporous genera are recognized: Gloniopsis with hyaline or lightly pigmented ascospores and Hysterographium with strongly pigmented ascospores. Species of Gloniopsis show similarities to several taxa in the Lophiostomataceae, both in centrum structure and in ascospores. Species of Hysterographium have stout peridia and have affinities to members of the Cucurbitariaceae.


Ascomata separate or gregarious, immersed erumpent, finally appearing superficial, elongate, hysterothecioid, straight or curved; apex rounded, opening by long slit, closing on drying or remaining open to expose hymenium; surface smooth or longitudinally striate; peridium about equal throughout or narrowed at base, wide, composed of small pseudoparenchymatous cells, pigmented heavily externally. Asci basal, clavate. Pseudoparaphyses narrowly cellular, in granular matrix. Ascospores hyaline or yellowish, obvoid, ends obtuse or acute, often inequilateral or curved, several septate, with one or more longitudinal septa, constricted at first-formed septum; wall smooth, usually surrounded by gel coating; with one globule per cell; overlapping biseriate in the ascus.

Anamorphs coelomycetous where known (Lohman, 1932).
In woody or herbaceous substrates.
Two cosmopolitan species are recognizable in Gloniopsis; ascospore shape and septation separate these. Both species have been described many times because of variations in ascomata and substrate, as Zogg (1962) demonstrated. His list of synonymous names is not replicated here and should be consulted. Gloniopsis praelonga has widely ovoid ascospores that are obtusely ended, typically with two or three longitudinal septa. Gloniopsis smilacis has narrowly obvoid ascospores that are acutely ended and develop only one longitudinal septum.

**KEY TO SPECIES OF GLONIOPSIS TREATED**

1. Ascospores with acute ends, 3–5–(7–)septate, with one longitudinal septum, 15–26(–31) × 5–9 μm. ........................................... 2. G. smilacis.

Figs. 1f–i.

Ascomata 1–1.5 mm long, 300–400 μm wide, 220–245 μm high, erumpent to superficial; peridium 30–50 μm wide; exposed hymenial surface brownish. Ascii 60–120 × 15–25 μm. Ascospores 20–30 × 9–12 μm, hyaline or slightly reddish in age, obvoid, ends obtuse, 5–7–(10–) septate, with 2–3 longitudinal septa, constricted at least at first-formed septum.

Anamorph Aposphaeria-like; elongate conidiogenous cells lining cavity of conidioma; conidia
hyaline, oblong ovoid, one celled (Lohman, 1932).

In old woody branches or stout herbaceous stalks, north temperate and tropical regions.

Material examined: ITALY. Genoa, ex Herb. J. DeNotaris, in Herb. Fries (UPS, isotype Gloniopsis de­cipients).


Ascomata 0.5—1 mm long, 300—355 μm wide, 205—275 μm high, surface longitudinally striate; substrate often blackened; peridium 25—45 μm wide, narrow at base; exposed hymenial surface yellowish brown. Asci 73—120 × 15—22 μm. Ascospores 15—26(--31) × 5—9 μm, obovoid, ends acute, 3—5—(7—)septate, with one longitudinal septum in mid cells, constricted at first-formed septum, surrounded by gel coating.

In woody branches, north temperate regions.


The epithet smilacis has a long history. Cash (1939) recognized two taxa with quite similar elongate ascomata on Smilax. Ascomata of Hypodermopsis smilacis (Schwein.) Cash remain immersed and the ascospores are three-septate, light brown, 20—27 × 7—9 μm, and surrounded by a wide gel coating. Ascomata of Gloniopsis ellisi Cash (for G. smilacis sensu Ellis & Everhart, Underwood & Earle, Wilson & Seaver) become erumpent and the ascospores are 4—6-sep­tate with one longitudinal septum, hyaline, 15—22 × 5—8 μm, and surrounded by narrow gel coating. The specimens of N.A.F. 2375 and F. Carol. 49 on Smilax are erumpent superficial as in G. ellisi but the ascospores are hyaline and 22—26 × 6—7.5 μm as in H. smilacis, thus combining the features of the two taxa separated by Cash. Other exsiccati and recently collected spec­imens show erumpent-superficial ascomata and hyaline ascospores, 3—5—(7—)septate, 15—25 × 5—9 μm, surrounded by a variably narrow or wide gel coating. I must conclude that “Hypodermopsis smilacis” refers to young stages of Gloniopsis smilacis. For this reason the earlier epithet is utilized. The species is not restricted to branches of Smilax, but occurs also on other woody sub­strates.


Ascomata erumpent to superficial, separate or gregarious, elongate, hysterothecioid; apex rounded, opening by long slit; surface smooth or roughened or longitudinally striate; peridium wide, composed of small pseudoparenchymatous cells, heavily pigmented at surface. Asci 75—120 × 15—22 μm. Ascospores 22—26 × 6—7.5 μm as in H. smilacis, but the ascospores are hyaline and 22—26 × 6—7.5 μm as in H. smilacis, thus combining the features of the two taxa separated by Cash. Other exsiccati and recently collected spec­imens show erumpent-superficial ascomata and hyaline ascospores, 3—5—(7—)septate, 15—25 × 5—9 μm, surrounded by a variably narrow or wide gel coating. I must conclude that “Hypodermopsis smilacis” refers to young stages of Gloniopsis smilacis. For this reason the earlier epithet is utilized. The species is not restricted to branches of Smilax, but occurs also on other woody sub­strates.

Anamorphs coelomycetous where known.

Saprobic or hemibiotrophic on woody plants.


The extensive lists of synonymous names for the various species cited by Zogg (1962) are ac­cepted and not included here, except for a few. Hysterium nova-caesariense Ellis is removed from synonymy of Hysterographium flexuosum and is accepted as Ostreichnion nova-caesariense in the Mytilinidiaceae (Barr, 1975, 1990). Hysterium formosum Cooke, considered by Zogg (1962) to be a synonym of Hysterographium mori, is a species of Ostreola, also in the Mytilinidiaceae.
1. Ascospores 14—22(-26) × 6.5—9(-10.5) μm, 3-(5—7-)septate, obovoid, ends obtuse; ascoma surface longitudinally striate. 3. H. mori.
1. Ascospores longer, with additional septa.
2. Ascospores 20—25—33—(41) × 7—10 μm, (3—)5—8-septate, ellipsoid to narrowly obovoid or nearly cylindric, ends obtuse; ascoma surface smooth or transversely wrinkled. 4. H. subrugosum.
2. Ascospores longer, with 2—3 longitudinal septa.
3. Ascospores 25—30—45(-51) × (10—)12—15.5—(22) μm, 7—9-septate, obovoid, ends obtuse; ascoma surface smooth. 2. H. fraxini.


Ascomata 1—2(-3) mm long, 330—385 μm wide, 330—440 μm high; surface longitudinally striate; peridium 52—75 μm wide, to 90 μm wide at base. Asci 100—130—(180) × 20—30—(38) μm. Ascospores (30—)40—65—(80) × 10—18 μm, ellipsoid fusoid, ends acute, 7—15-septate, with 1—3 longitudinal septa, wall usually verruculose.

Anamorph in culture coelomycetous or conidiogenous cells developing on surface hyphae, 5—8 × 1.5 μm; conidia 3—4 × 1.3—1.5 μm (Lohman, 1932 as H. vulvatum).

On decorticated wood, cosmopolitan.

Material examined: CANADA. BRITISH COLUMBIA: Vancouver Island, Mt. Newton, on Arbutus menziesii, 11 Jun 1950, M. E. Barr 33 (UBC); Thetis Lake, on A. menziesii, 10 Aug 1950, W. G. Ziller s.n. (DAVFP 6525).


Although Zogg (1962) included H. acerinum as a synonym of H. fraxini based upon the type description, the original collection has narrower ascospores than those of H. fraxini and the ascomata are longitudinally striate, characteristics of H. flexuosum.


Ascomata 1—2 mm long, 330 μm diam., ellipsoid, widely erumpent; surface smooth, lacking longitudinal striae, longitudinal slit usually depressed; peridium 40—45 μm wide. Ascii 90 × 25—30 μm. Ascospores 25—30—45—(51) × (10—)13—15.5—(22) μm, obovoid, ends obtuse, 7—9-septate, with 2—3 longitudinal septa, constricted at median first-formed septum.

Anamorph coelomycetous; conidiomata developed within periderm of steam-sterilized ash twigs; conidiogenous cells 8—12 × 1—2 μm, as short branches; conidia 4.5—5 × 0.1—1.2 μm, hyaline, cylindric (Hysteropycnis fraxini Hiltz-er, Lohman, 1932).

On woody branches, chiefly Fraxinus, cosmopolitan.

Material examined: FRANCE. Saint-Quentin, près Bernay, Mar 1890, E. Niel s.n., P. Sel. Exs. 6595 as Teichospora obd Ducens (NY).


Fig. 2. Species of Hysterographium. a—c. H. fraxini: a, habit, b, ascoma in vertical section, c, ascospores. d—f. H. flexuosum: d, habit, e, ascoma in vertical section, f, ascospores. g—i. H. subrugosum: g, habit, h, ascoma in vertical section, i, ascospores. j—m. H. mori: j, habit, k, ascoma in vertical section, l, ascus and portions of pseudoparaphyses, m, ascospores. Standard line = 15 μm for ascus and ascospores, 150 μm for ascomata. Habit sketches not to scale.
BARR: DICTYOSPOROUS GENERA
now NY as Hystereum hiscens and on old Dichadera).


Zogg (1943, 1962) studied the development of this species in culture. Infection studies, utilizing pure cultures derived from single ascospores, resulted in the formation of the anamorph and/or the teleomorph on a wide range of woody plants, both gymnosperms and angiosperms. Zogg concluded that H. fraxini was a nonspecialized facultative saprobe that was able to spread from dead to living tissues.


Figs. 2j–m.

Ascomata 1–2(–3) mm long, 220–275(–440) μm wide, 190–330 μm high; surface usually longitudinally striate; peridium 32–52 μm wide, to 100 μm at base. Ascii (55–)80–120 × 11–16 μm. Ascospores 14–22(–26) × 6.5–9(–10.5) μm, obovoid, ends obtuse, 3–(5–7)–septate, with one longitudinal septum, rarely partial second septum in one or two cells; wall finely verrucose.

Anamorph coelomycetous, Aposphaeria-like in nature, in culture conidiodiomata as irregular locules; conidigenous cells 8–10 × 1.5–2 μm; conidia (2–)2.5–3.5(–4) × 1–2 μm (Lohman, 1932).

On periderm and decorticated wood, cosmo-politan.

Material examined: CANADA. ONTARIO: London, Jul 1904, J. Dearness s.n., F. Col. 1934; 1 Aug 1904, J. Dearness s.n., F. Col. 2035 (both MASS now NY).


CALIFORNIA: San Mateo Co. Boulder Creek Road, on Lupinus, 9 Dec 1971, M. E. Barr 5975c (MASS now NY).


NEW JERSEY: Gloucester Co. Newfield, J. B. Ellis, N.A.F. 1, 77, 458 (all MASS now NY).


VERMONT: Lamoille Co. Ranch Brook, 1 Sep 1964, M. E. Barr 4616 (MASS now NY).


Figs. 2g–j.

Ascomata to 1 mm long, 275–330 μm diam.; surface smooth; peridium 50 μm wide. Ascii (65–)80–150 × 15–22(–26) μm. Ascospores (20–)25–33(–41) × 78–10 μm, clear brown, ends paler at times, (3–)5–8–septate, with one longitudinal septum in some cells, not constricted at septa.

Anamorph coelomycetous; in culture conidiomata Aposphaeria-like; conidigenous cells 5–8 × 1 μm; conidia 2–2.5 × 0.7 μm (Lohman, 1932 as H. minutum).

In woody branches, north temperate zone.


KANSAS: Rooks Co. Rockport, on Quercus, May 1893, E. Bartholomew, N.A.F. 3037 as H. kans- sense (MASS now NY).


Lohman (1931) described ascospore germi- nation and (1932) characteristics in culture for this species (as H. kansense). His cultures did not produce an anamorph, but those that he cited as H. minutum (Lohman, 1932) did. Hysterogra-
Dictyosporous genera

Phialus subrugosum apparently is quite infrequent in occurrence in contrast to the other species in the genus. Zogg (1962) reported on a few collections in southern France. In North America it is also known from Missouri and New Jersey (Ellis & Everhart, 1892).

D. Pleomassariaceae


To the six species delimited by Barr (1982) must be added another. This species is known from Salix and Populus wood in western North America. It has globose to ellipsoid ascomata with stout peridia about equal in width throughout, as in P. ulmicola (Fuckel) Barr and P. maxima Ellis & Everh., but a single longitudinal septum in the ascosporae as in P. carpini (Fuckel) Sacc., P. siparia (Berk. & Broome) Sacc., and P. acericola Petrak. Ascosporae numbers in the ascus may be variable, but the ascosporae are never as large as in P. monosperma (Peck) Barr. Pleomassaria holoschista (Berk. & Broome) Sacc. is known from Salix as well as Alnus in Europe (Crivelli, 1983), but that species has sphaeroid ascomata whose peridium is wide at the sides, narrowed toward both base and apex. The description and figures of Pleospora moravica (Petrak) Wehmeyer on Salix (Wehmeyer, 1952; Crivelli, 1983) are suggestive of the present taxon, however, in that species the ascomata are much more sphaeroid with heavily sclerotized cells in the upper regions, asci are more numerous and shorter, and ascosporae are narrower.

A revised key to species follows. For descriptions and illustrations of the other species see Barr (1982). Pleomassaria acericola is now known from Massachusetts (Franklin Co., Conway, Baptist Hill, on Acer saccharum, 1 May 1988, M. E. Barr 7139, MASS now NY) in addition to the type collection from Pennsylvania.

**Key to Species of Pleomassaria Treated**

1. Ascospores one, rarely two per ascus, oblong, 104–140 × 24–36 μm, to 35 transverse septa, surface smooth; ascomata much depressed, peridium widest at sides, thin toward apex; on Betula. ............................................. P. monosperma.

1. Ascospores usually eight per ascus, smaller, to 15 transverse septa.

2. Ascospores 5–11-septate, with one (two) longitudinal septa in mid cells.

3. Ascocarps globose, peridium about equal in width throughout; ascospores fusoid to obovoid, 32–46 × 12–15 μm, 7–11-septate, surface verruculose or smooth; on Populus and Salix. ............................................. 1. P. hesperia.

3. Ascomata much depressed, peridium widest at sides, thin toward apex.


4. Ascospores relatively narrower.

5. Ascospores ellipsoid fusoid, (35–)50–64 × (10–)15–18 μm, surface foveolate; on Acer. .............................................................. P. acericola.

5. Ascospores oblong, 40–70(–90) × 13–16(–21) μm, surface verruculose; on Betula. P. siparia.

2. Ascospores 8–15-septate, with one to three longitudinal septa in mid cells, surface foveolate; ascomata globose, peridium about equal in width throughout.

6. Ascospores ellipsoid to obovoid, 38–48 × 11–16.5 μm; on Ulmus. ...................... P. ulmicola.


1. Pleomassaria hesperia Barr, sp. nov.

Figs. 3a–c.

Ascomata immersed to erumpent, globose or oblong, 660–880(-1000) μm diam., papilla short and wide; peridium 50–65 μm wide below, 80–220 μm wide above, of reddish to dark brown pseudoparenchymatous cells, with hyphae surrounding peridium and into substrate. *Asci* 130–200 × 15–20(--26) μm, 2–4–6–8-spored. Pseudoparaphyses cellular. *Ascospores* 32–46 × 12–15 μm, yellowish brown to dark brown, fusoid or somewhat obovoid, ends tapered, acute or somewhat obtuse at times, nearly symmetric, inequilateral to slightly curved, 7–11-septate, with one longitudinal septum, occasionally a partial second one, constricted at first-formed and often at A2 septa; wall smooth or verruculose, surrounded by gel coating.

In decorticated wood of aspen and willow, known from type localities.

E. **LEPTOSPHERIACEAE**

Two dictyosporous genera are accepted in the family: *Curreya*, with sphaeroid ascomata and obovoid ascospores, *Heptameria*, with conoid ascomata having an applanate base, and elongate-fusoid ascospores whose tapered ends are transversely septate only.

9. **Curreya Sacc., Syll. Fung. 2: 651. 1883.**

Barr (1981a) had transferred the lectotype species, *C. conorum*, to *Pleospora* and disposed of other species into assorted genera. However, von Arx and van der Aa (1983) pointed out the features that separate *Curreya* from *Pleospora*, and *Curreya* is now accepted to accommodate only *C. conorum*. The relatively small sclerotial cells of peridium and narrower, thinner-walled asci, as well as coelomycetous anamorph, serve to place *Curreya* in the Leptosphaeriaceae rather than in the Pleosporaceae.

1. **Curreya conorum** (Fuckel) Sacc., Syll. Fung. 2: 651. 1883.


Ascomata immersed to erumpent, scattered or gregarious, occasionally two or three connected as small stromata, sphaeroid, 220–385 μm wide, 135–330 μm high, apex rounded, papilla short; peridium 20–26 μm wide or to 52 μm wide in stromatic grouping, at times blackened and to 40 μm wide in upper regions, of small pseudoparenchymatous cells, walls often thickened and sclerotial in part. *Asci* (70–)90–130 × 22–30 μm. Pseudoparaphyses cellular. *Ascospores* (20–)25–32 × 10–14 μm, yellowish brown to pale reddish brown, obovoid, ends obtuse, (3–5–)7-septate, with one longitudinal septum, constricted at first-formed and often at A2 septa; wall smooth, surrounded by gel coating.

Anamorph (by association) coelomycetous; conidia 4–5 × 2–2.5 μm, hyaline, one celled (*Coniothyrium*-like, Petrak, 1940b).

Rare, in cone scales and twigs of conifers, Europe, western North America.

Material examined: GERMANY. F. Rhen. 2663 (FH, conidiomata only); on *Pinus sylvestris*, ex Herb. Fuckel (FH, Herb. F. Thiessen).


Lucas and Sutton (1971) discussed the dates of publication of the two generic names. The date of Fabre's account cannot be established exactly (Barr, 1985). *Heptameria obesa*, accepted for the type species and sole North American taxon, has ascomata typically leptosphaeroid in shape and in thick-walled, sclerotial cells of the peridium. The unique ascospores are characteristic of the genus. The first septum is slightly submedian.

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**Fig. 3.** a–c. *Pleomassaria hesperia*: a, habit, b, ascus apex, c, ascospores. d, e. *Curreya conorum*: d, ascomata in vertical section, e, ascospores. f–h. *Heptameria obtusa*: f, habit, g, ascus apex, h, ascospores. i–k. *Cucurbitaria pithyophila*: i, habit, j, ascus apex, k, ascospores. l–o. *Pleophragmia leporum*: l, habit, m, ascus apex, n, ascospores, o, ascospores separated as partspores. Standard line = 15 μm for asci and ascospores, 150 μm for ascomata. Habit sketches not to scale.
and the cell above this septum enlarges greatly to become the heavily pigmented, dictyosporous portion while the transversely septate ends remain pallid. Petrak (1951) described this species from *Baccharis* in California and provided the synonymy listed below. A second species not known in North America, *H. uncinata* Niessl in Rehm, was recognized by Lucas and Sutton (1971); the ascospores are thin walled and the tips are often bent.


   **Ascomata** immersed beneath epidermis, superficial on cortex after epidermis sloughed, separate to gregarious, conoid, bases applanate, 495-660 (im wide, 385-550 μm high, apex short papillate becoming excavated; peridium 104-330 μm wide at lower sides, narrowed to 50 μm above, base 26-40 μm wide, of small sclerotial-walled cells. **Asci** (90-)110-140(-170) × 18-22 μm. Pseudoparaphyses cellular. **Ascospores** 45-60 × 9-13 μm, mid region bright to dark reddish brown, ends paler brown or subhyaline, elongate fusoid, 10-14-septate, with two to three or three to four transverse septa in upper and lower narrow ends, mid region with five to seven transverse and two to four longitudinal septa, slightly constricted at septa separating mid portion; wall smooth.

   Anamorph coelomycetous; conidia 4-5 × 1.5-2 μm, hyaline, oblong (Lucas & Sutton, 1971).

   On stout herbaceous stalks, mostly of Asteraceae, Mediterranean regions of Europe, North Africa, Portugal; South Carolina and California in North America.

   **Material examined**: FRANCE. Serignan, on *Helichrysum stoechadi*, 1880, J. H. Fabre s.n. (L’Harmas, holotype of *Verlotia helichrysi*).

   **U.S.A. SOUTH CAROLINA**: on *Cirsium mulicum*, Ravenell, F. Carol. 640 (MASS now NY, isosyntype of *Sphaeria mesoedema*).

**F. CUCURBITARIACEAE**

Two genera producing dictyospores are recognized: *Cucurbitothis* symbiotic with scale insects, and *Cucurbitariar* hemibiotrophic or saprobic in woody substrates.


   The genus is monotypic; two varieties, *C. pithyophila* (Schmidt & Kunze: Fr.) Petrak var. *pithyophila*, with dictyospores, and var. *cembrae* (Rehm) Holm with transversely septate ascospores, were recognized by Holm (1967). The latter is known from Europe and has slightly smaller ascospores, 18–23 × 5–7 μm. Holm discussed the history of these varieties and provided the synonymy cited below. Casagrande (1969) provided evidence for the symbiotic relationship between fungus and scale insect.

   Holm (1968) recognized the affinities of *Cucurbitothis* with *Leptosphaeria* subgenus *Syncarpella*. *Syncarpella* is again restored to generic rank (Barr & Boise, 1989) in the Cucurbitariaceae, although earlier I had suggested that the genus was melanommataceous (Barr, 1979). The gregarious and globose ascomata of *C. pithyophila* are similar to those of species in *Syncarpella*, as is the hypertrophy and cankering caused to the host plant. Holm (1967, 1968) provided evidence that *C. pithyophila* and *Gibberidea visci* Fuckel are indeed quite different organisms. The position of the latter European species is still not clear, although it has many dothioraceous features, as noted by von Arx (1954). The reduction of *Cucurbitothis* as a synonym of *Curreya* (von Arx & Müller, 1975, von Arx & van der Aa, 1983) is not accepted. *Curreya* is accepted as a genus within the Leptosphaeriaceae.


   Figs. 3i–k.


Ascomata developing from and gregarious over crustose, superficial stromatic tissues over scale insects, stromatic tissues blackened externally, whitish internally, of scleroleptenchymatous cells; ascomata globose or ovoid, 385-440(-600) μm diam.; apex rounded, short papillate, opening by small pore; surface smooth; peridium of scleroleptenchymatous cells as in stroma, to 60 μm wide, blackened externally. Ascii 100-143 × 9-11 μm, basal, cylindric. Pseudoparaphyses narrowly cellular, numerous. Ascospores 15-25 × 6-8 μm, pale brown, ellipsoid fusoid, 3-(4-5-6)-septate, with one longitudinal septum in one or both mid cells; wall smooth, thin; one globule per cell; uniseriate in the ascus.

Anamorphs coelomycetous, as Coniothyrium pithyophila (von Höhnel) Petrak.

On twigs of conifers, over scale insects, north temperate zone.

Material examined: CANADA. BRITISH COLUMBIA: (all on Pinus monticola) Vancouver Island, Victoria Watershed, 23 May 1950, A. K. Parker s.n. (DAVFP 6728); near Nakusp, 18 Jan 1950, R. W. Davidson et al. s.n. (DAVFP 6749); Shawnigan Lake, 23 May 1950, R. E. Foster et al. s.n. (DAVFP 6570, DAOM 26771).


Ascomata developing in and on subiculum or compacted stromatic tissues beneath periderm or on scanty blackened stromatic crust on decorticated wood, cespitose, gregarious or separate, immersed becoming erumpent to superficial, medium to large sized, globose, ovoid or turbinate; apex rounded and plane or truncate, papilla minute, apical pore sometimes visible as light-colored area; surface dull black, glabrous and smooth or roughened, cracked or warted; peridium firm, rather crisp or brittle, externally of heavily pigmented, often sclerotial-walled cells, often with groups of cells protruding from surface, internally yellowish, pale vinaceous brown or pallid, at times thickened toward obconoid base or thickened apically. Ascii basal and at times lateral, cylindric or somewhat clavate. Pseudo-paraphyses cellular, extending into pore area. Ascospores brown, ellipsoid, fusoid or oblong and symmetric or obvoid and asymmetric, ends acute or obtuse, straight or inequilateral, several septate, with one or more longitudinal septa, often obliquely into end cells; wall thickened, smooth or finely verruculose, at times surrounded by gel coating; guttulate, finally one globule in each cell; uniseriate or partially biseriate in the ascus.

Anamorphs coelomycetous where known; conidiogenous cells holoblastic, determinate or an-nelidic; conidia brown, muriform (Camarosporium, Pseudodichomera), or conidiogenous cells enteroblastic phialidic; conidia hyaline, elongate, several septate (Megaloseptoria), or minute (Phoma-like).

Hemibiotic or saprobic on branches of woody plants.

Lectotype: C. berberidis (Pers.: Fr.) S. F. Gray. Welch (1926) restricted Cucurbitaria to five closely related species whose turbinate ascomata develop cespitosely in a massive subiculum or over compressed stromatic tissues and have a thick and obconoid base. The three North American species that Welch (1926) accepted and described in detail from North American material were: C. arizonica, C. berberidis, and C. elongata.

Mirza (1968) included similar species in his groups of C. berberidis and C. elongata, but the species of his groups of C. spartii and C. indigoferae have globose or ovoid to pyriform ascocoma that are gregarious on the substrate with
only sparse subiculum and lack an obconoid region in the base of the locule. My concept of the genus is wider than that of Welch, although not as wide as that of Mirza. *Cucurbitaria staphula* Dearness ex Arnold & Russell with its “*Pseudodichomera*” anamorph was described from Saskatchewan on species of *Populus* (Arnold & Russell, 1960). To the group of species having tubinate ascomata I add *C. rhamni*, and Mirza (1968) had additional species from Europe and Asia.

*Crotonocarpia* was described by Fuckel (1870) under “A. Simplices” for a fungus with solitary, globose, corrugate-tuberculate ascomata and muriform brown ascospores in oblong-cylindric asci, as opposed to *Cucurbitaria*, which he listed under “B. Compositi.” He reported that the substrate for *Crotonocarpia moriformis*, the sole species, was canes of *Rubus*. Von Höhnel (1903) examined the type specimen, declared that the host was *Berberis*, and that *C. moriformis* was identical with *Cucurbitaria berberidis*. Mirza (1968) accepted von Höhnel’s conclusion, but Welch (1926) had also examined the type specimen and illustrated it to show the differences from *C. berberidis*. I have been privileged to examine the slides that Welch prepared, and at first believed (Barr, 1979) that *Crotonocarpia* should be arranged in the Melanommatales. However, a recent collection from shoot bases of *Berberis* sp. (Barr 6685) provided a better understanding of the fungus. This material conforms with Fuckel’s specimen and the rather limited descriptions and illustrations of *Crotonocarpia moriformis*. The two taxa differ, as Welch (1926) pointed out, in arrangement and shape of ascomata, but the differences appear to be of specific value only.

Other species having globose ascomata with only slightly roughened or smooth surfaces differ in ascospore characteristics from *C. moriformis*.

*Gemmamyces piceae* (Borthwick) Casagrande, although a superficial parasite of buds and twigs of *Picea* spp., seems not to be genetically different from *Cucurbitaria*. Recent descriptions of this European species were provided by Shoemaker (1967) and Casagrande (1969). The ovoid ascomata with deep sterile bases do warrant separation of the species within the genus. *Cucurbitaria obducens* has somewhat similarly shaped ascomata, although these are saprobic in a thin black crust on branches, especially of *Fraxinus*.

**KEY TO NORTH AMERICAN SPECIES OF CUCURBITARIA**

1. Ascospores symmetric or nearly so.
   2. Ascomata turbinate in side view, widest toward rounded plane apex, tapered to base.
   3. Ascospores (20-)25–38.5 μm long, 7–9–(11-)septate.
   4. Ascospores 12–15.5 μm wide, with two to three (four) longitudinal septa; surface of ascoma coarsely warted. .................................................................................. 3. *C. berberidis*.
   4. Ascospores (8–)9–12 μm wide, with one to two longitudinal septa; surface of ascoma slightly roughened. .................................................................................. 4. *C. elongata*.
   2. Ascomata ovoid or globose in side view, widest in mid region or toward base.
   6. Ascomata globose.
   7. Surface of ascoma slightly roughened or smooth; ascospores narrower, with one longitudinal septum, ends obtuse.
   1. Ascospores asymmetric, upper hemispore wider than lower.
   10. Ascomata globose in side view, surface slightly roughened; ascospores 15–22 × 6–8 μm, upper hemispore longer and wider than lower. .................................................................................. 5. *C. interstitialis*. 

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1. **Cucurbitaria ailanthi** Rabenhorst, F. Eur. exs. n. 1833. 1874. Fig. 4p.


Ascomata immersed to erumpent, gregarious to crowded on basal stroma, globose, 330–660 µm diam.; surface smooth or at times sides roughened by short hyphae; peridium ca. 50 gm wide. **Asci** 100–140 × 9–15 µm. **Ascospores** 18–24 × 7–11 µm, clear brown, ellipsoid or fusoid, ends obtuse or somewhat acute, 3–5–7-septate, with one longitudinal septum in mid cells, at times obliquely into end cells, slightly constricted at first-formed septum.

On branches, north temperate zone.

**Material examined:** U.S.A. KANSAS: s. loc., on *Celtis*, 1 Mar 1894, E. Bartholomew, F. Kansas 1400 (NY, as *Teichospora fimbriata* Ellis & Everh. ined.). UTAH: Salt Lake Co. Near Salt Lake City, on *Acer negundo*, 17 Jun 1945, A. S. Rhoads s.n. (NY); Weber Co. Malans Basin, along Waterfall Creek, E. of Ogden, on *Sambucus caerulea*, 11 Aug 1972, C. T. Rogerson s.n. (NY).

The Kansas specimen bears conidiomata that are similar in appearance to ascomata; conidia are 16–20 × 6–7 µm, brown, 3–4–5–(7-)septate, often with one longitudinal septum in one or more of mid cells. The earlier name must be used, even though Rabenhorst’s fungus is on *Acer negundo* rather than *Ailanthus*.

2. **Cucurbitaria arizonica** Ellis & Everh., J. Mycol. 8: 16. 1902. Fig. 4f.

Ascomata immersed to erumpent, densely gregarious in subiculum of brown hyphae, turbi­nate, 350–500 µm diam.; surface roughened by protruding cells; peridium 30–50 µm wide, to 50–60 µm wide at base. **Asci** 110–120 × 12 µm. **Ascospores** 20–22 × 9–10 µm, dark brown, ellipsoid fusoid, hemispheres almost equal, 3–(5–6)-septate, with one longitudinal septum in mid cells, finally obliquely into end cells.

On *Acacia greggii*, known from type locality.

**Material examined:** U.S.A. ARIZONA: Pima Co. Tucson, Jan 1901, D. Griffihs, W.A.F. 313 (MASS now NY, isotype).

On the collection, conidiomata are similar in appearance to the ascomata. Conidia are 15.5–22 × 8–9 µm, dark brown, 3–4-septate, with one longitudinal septum.


Ascomata immersed becoming erumpent, ces­pitose in small groups from compact stromatic base, turbinate, tapered to obconoid base, 400–600 µm diam.; surface roughened, cracked in age; peridium 50–90 µm wide at sides, to 130 µm wide at base. **Asci** 140–180 × 12–20 µm. **Ascospores** (20–)26–38.5 × (8–)12–15.5 µm, yellow­ish brown to dark brown, ellipsoid fusoid, ends acute, often inequilateral, 7–9–(11-)septate, with two to three longitudinal septa.

On branches of *Berberis* (incl. *Mahonia*), north temperate zone.

**Material examined:** SWITZERLAND. Kt. Graubünden, Surava, 28 Jul 1956, W. Loeffler s.n. (MASS now NY).

**CANADA. ONTARIO:** London, on *Berberis vulgaris*, Nov, Dec 1903, J. Dearness, F. Col. 1915 (MASS now NY).


4. **Cucurbitaria elongata** (Fr.) Grev., Scottish Cryptog. Fl. 4: tab. 195. 1826. Figs. 4d, e.

**Sphaeria elongata** Fr., Syst. Mycol. 2: 422. 1823; **Gibberidea elongata** (Fr.) Kuntze, Rev. Gen. Pl. 3: 481. 1898.


Ascomata immersed to erumpent, gregarious in subiculum of brown hyphae, 450–600 µm wide at base.
diam., turbinate; surface smooth; peridium 60–70 μm wide at sides, to 100–150 μm at base. *Asci* 140–180 × 15–18 μm. *Ascospores* (20–)25–34 × (8–)9–12 μm, yellowish brown, ellipsoid fusoid, ends acute, often inequilateral, (5–)7–(9-)septate, with one or two longitudinal septa.

On branches of leguminous trees, north temperate zone.

**Material examined:** CANADA. ONTARIO: London, on *Cotula arborescens*, 28 May 1931, J. Dearness, *F. Col. 4115* (MASS now NY).


Mirza (1968) separated *C. coluteae*, *C. amorphae*, and *C. ailanthi* from *C. elongata*. *Cucurbitaria ailanthi* is a distinct species, but the other two names seem best placed in synonymy of *C. elongata* as Welch (1926) indicated.


*Ascomata* immersed to erumpent, separate or gregarious on thin stromatic crust blackening wood, 330–400 μm diam., globose; surface dull and somewhat roughened; peridium 52–65 μm wide. *Asci* 120–150 × 14–16 μm. *Ascospores* 15–22 × 6–8 μm, brown, oblong or obovoid, ends obtuse, (2–)3–(4-)septate, with one longitudinal septum in one or two of mid cells, usually constricted at first-formed septum.

In decorticated wood of *Prunus* sp., known from type locality.


This species has the simplest ascospores of those included in *Cucurbitaria*.

6. **Cucurbitaria longitudinalis** Peck, Rep. New York State Mus. 33: 34. 1880. Figs. 4n, o.


*Ascomata* erumpent in rows through longitudinal cracks in periderm, 400–800 μm diam., globose; surface roughened and irregular, dull black; peridium 40–60 μm wide, to 100 μm in apical region. *Asci* 100–155 × 13–22 μm. *Ascospores* 24–33 × 9–12 × 7.5–(8) μm, yellowish brown to dark brown, ends slightly paler, oblong, somewhat compressed laterally, 3–5–(7-)septate, with one longitudinal septum in mid cells, not or slightly constricted at first-formed septum.

On branches of *Lyonia ligustrina*, known from type locality.


Slightly compressed ascospores are unique to this species, but even in side view the longitudinal septum is visible, which is not the case in species of *Graphyllium* or *Clathrosora*. The ascomata and other features suggest affinity to other species in *Cucurbitaria*.


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**Fig. 4.** Species of *Cucurbitaria*. a–c. *C. berberidis*: a, habit, b, ascoma in vertical section, c, ascospores. d, e. *C. elongata*: d, habit, e, ascospores. f. *C. arizonica*, ascospores. g. *C. rhamni*, ascospores. h, i. *C. obducens*: h, habit, i, ascospores. j, k. *C. moriformis*: j, habit, k, ascospores. l, m. *C. tenacella*: l, ascoma in vertical section, m, ascospores. n, o. *C. longitudinalis*: n, habit, o, ascospores. p. *C. ailanthi*, ascospores. q. *C. interstitialis*, ascospores. r, s. *C. staphula*: r, habit, s, ascospores. Standard line = 15 μm for ascospores, 150 μm for ascomata. Habit sketches not to scale.

Ascomata erumpent, separate or gregarious on blackened thin stromatic crust, 300–550 μm diam., globose, base somewhat flattened; surface coarsely tuberculate roughened; peridium 40–70(–80) μm wide. Ascii 120–190 × 20 μm. Ascospores 25–36 × 10–15 μm, clear brown to dark brown, ellipsoid fusoid, ends obtuse, 7–9–13-septate, with two or three longitudinal septa, constricted at first-formed septum.

On old branches, north temperate zone.

Material examined: FRANCE. Franceville (Rhône), on Ribes rubrum, May, J. Therry, F. Sel. Exs. 4211 as C. ribis (NY).

SWITZERLAND. Geneva, Chambesy, on Rubus idaeus (CUP, slide ex holotype).


This is the type of Crotonocarpia, a good species of Cucurbitaria that is quite separable from C. berberidis. The Massachusetts specimen bore closely associated conidiomata that were small, thin walled, setose, and contained minute, hyaline, rod-shaped microconidia.


Ascomata erumpent to superficial, densely gregarious on blackened thin stromatic crust, ovoid, 257–495 μm wide, 330–550 μm high; surface smooth, dull black; peridium 40 μm wide at sides, to 90 μm wide at base. Ascii 90–150 × 15–20 μm. Ascospores 20–30 × 7–12 μm, clear brown, ellipsoid, ends obtuse, 3–5–7-septate, with one (or two) longitudinal septa, constricted slightly at first-formed septum.

On branches, north temperate zone.


FINLAND. Mustiala, Finland F., P. A. Karsten 564 (NY).

FRANCE. Saint-Quentin, près Bernay, on Fraxinus, Mar 1890, E. Niel, F. Sel. Exs. 6595 (NY).

GERMANY. Sugenheim in Franken, on Fraxinus, Apr 1870, Rehm. Ascomyc. 42 (NY).

CANADA. ONTARIO: London, on Viburnum lenta-
go, 21 Feb 1890, J. Dearness s.n., on Fraxinus. 1 Jan 1892, J. Dearness, s.n., on Fraxinus, undated coll., J. Dearness s.n. (all NY).


The unpublished 'Teichospora praestipa' was determined by Wehmeyer (1961) to be a synonym of Pleospora amelanchieris [the latter now a synonym of Strickeria insecura (Ellis) Barr] but it fits instead within the concept of C. obducens. Petrak (1927) was the first to recognize the generic position of C. obducens, although Mirza (1968) did not include it in his study. The ovoid ascomata are striking and quite unmistakable once they have been studied. In my earlier concept of the species under Teichospora, before seeing authentic material, I had included a number of collections that do not belong to C. obducens, and that now may be sought under names in Teichospora.

9. Cucurbitaria rhamni (Nees: Fr.) Fr., Summa Veget. Scand. 391. 1849. Fig. 4g.


Ascomata erumpent, gregarious in brown subiculum, turbinate, 440–495 μm diam.; surface smooth or roughened; peridium 50–60 μm wide. Ascii 100–140 × 10–13 μm. Ascospores 15–18(–20) × 6–8 μm, clear brown, ends often paler, ellipsoid fusoid, ends quite acute, 3–5–7-septate, with one longitudinal septum in mid cells, at times obliquely into end cells, constricted at first-formed septum.

On branches of Rhamnus spp., north temperate zone.


SWEDEN. Tryskland, Herb. E. Fries (UPS).


Ascomata erumpent, densely gregarious over gall-like enlargements of branches, turbinate,
4-)5-(7-)septate, with one longitudinal septum in mid cells, rarely into one end cell, slightly constricted at first-formed septum.

On woody branches, northeastern North America.


The New York collection does not differ from the Schweinitz specimen that was labelled as Sphaeria tenacella. On the twigs from New York are conidiomata of a species of Camarosporium: short dark upright setae form a papilla, short conidiogenous cells produce brown conidia, 17–20 × 6–7 μm, five septate with one longitudinal septum in some cells. These conidia bear a strong resemblance to the ascospores of C. tenacella, although they are smaller.

G. PHAEOTRICHACEAE


The genus is typified by P. leporum and its characteristics are described below. Von Höhnel (1920) submerged Pleophragmia under Pleospora, but the two differ in structure of peridia and especially in ascospore septation.


Figs. 31–30.


Ascocoma immersed, separate or gregarious, globose or ovoid, apex short papillate, 330–440 μm wide, 440–550 μm high; peridium soft, 25–30 μm wide, of small reddish-brown, pseudoparenchymatous cells, surrounded by brown hyphae. Asci 120–180 × 18–25 μm. Pseudoparaphyses narrowly cellular. Ascospores 38–47 × 7–10 μm, dark brown, oblong, ends obtusely rounded, usually curved, 9-septate, with two longitudinal septa at right angles to one another, constricted at all septa, at times separating into partspsores; wall smooth, lacking germ slits or germ pores.
surrounded by narrow gel coating; lenticular globule in each cell.

On animal dung, cosmopolitan.

Material examined: GERMANY. Between Königstein and Glashütten, on rabbit dung, Aut, Herb. B.-B. 691 (NY); Königstein, 17 Apr 1883, W. Krieger, F. Saxon. 34 (NY).


Cain (1934) described and illustrated this species from Ontario, and a larger-spored species P. onlariensis Cain, whose ascospores measure 55-68 x 15-19 \( \mu \text{m} \). Pleophragmia seems closely related to Sporormia. In neither genus are germ slits or pores present in the ascospore walls, but the innermost walls of cells in the muriform ascospores of Pleophragmia and those of the fascicle of phragmosporous ascospores of Sporormia are considerably thinner than the outermost walls.

H. Dacampiaceae

Dacampia, the dictyosporous genus that provides the family name, is not yet known from North America. The species are lichenicolous; D. hookeri (Borr.) Massal. and D. engeliana (Sant.) Massal., were described and illustrated by Crivelli (1983). A third species D. rufescens (Vouax) D. Hawksworth was added by Hawksworth (1986).

Several species of Teichospora are known on woody substrates. The following account attempts to clarify concepts within this genus and to describe the North American species.


Ascocoma separate or gregarious, immersed, often becoming erumpent to superficial with bases embedded in substrate, mostly medium sized, obpyriform, ovoid or globose; apex tapered to widely papillate or bluntly rounded low papilla, ostiole rounded, periphysate at times; surface smooth and shining or dull, roughened with protruding cells or short hyphae, at times bearing hyphal appendages or in ample hyphal tomentum; peridium relatively wide, soft, reddish brown or yellowish to dark brown, of small pseudoparenchymatous cells, three layered: outer layer darkened, mid layer most visible toward apex, inner layer of more compressed, pallid cells. Asci basal, sometimes lateral, cylindric or clavate, short stipitate, (2-4)-8-spored, wall relatively thin, ocular chamber small. Pseudoparaphyses narrowly cellular, extending into ostiole. Ascospores yellowish brown, clear brown or reddish brown, end cells often paler than mid cells, symmetric and ellipsoid, fusoid, oblong, biconid or asymmetric and obovoid, ends obtuse or acute, with three or more transverse septa and one or more longitudinal septa in mid cells, often oblique when in end cells, constricted or not at first-formed septum; walls smooth or finely verruculose, at times surrounded by gel coating; homogeneous, minutely guttulate or with one rounded globule in each cell; obliquely uniseriate or partially biseriate in the ascus.

Anamorphs coelomycetous where known.

Saprobic in woody substrates or over other fungi.

Type: T. trabicola Fuckel.

When Fuckel erected the genus, he specified “Typ. T. trabicola” and his choice of type species must be followed. Incidentally, this is the sole example in his works of typification for a genus. He included five species that represent at least four genera: T. morthieri Fuckel is probably a species of Strickeria; T. obducens (Fr.) Fuckel belongs in Cucurbitaria; T. dura Fuckel, with hyaline dictyospores, is patellariaceous and is the type species of Teichosporella (Sacc.) Sacc. (Barr, 1981b); T. brevirostris Fuckel appears to be congeneric with T. trabicola. Teichospora was lectotypified by T. obducens by Clements and Shear (1931); von Arx and Müller (1975) accepted the lectotypification and their concept of the genus consequently differs from mine. Authentic specimens of T. obducens have ovoid ascocoma with much thickened peridium, growing in dense crowds, and the species is referred to Cucurbitaria.

Teichospora has long been confused with Strickeria Körber. Strickeria kochii Körber was described as lichenized, in the Verrucariaceae, with collabent ascocoma. Rehm (1879) examined Körber's fungus and declared that it did not form a thallus, further that Teichospora pezizoides Sacc. & Spec. was identical with S. kochii, and that Strickeria belonged in the “Sphaeriaceae,” Saccardo (1883) and others subsequently utilized Teichospora, and recognized subg. Eu-Teichos-
pores to include species with noncollabent ascomata, subg. Strickeria to include species with collabent ascomata. Winter (1885) and Kunze (1898) included species under Strickeria, the earlier name of the two.

Study of authentic specimens of the type species of both Teichospora and Strickeria confirms that the two genera are indeed different. Teichospora is a member of the Pleosporales and Strickeria is a member of the Melanommatales closely related to Melanomma. When only the two type species are compared they are readily separable. In T. trabicola the obpyriform ascomata are immersed and partially erumpent from the substrate, the peridium is soft, pseudoparenchymatous, three layered, and relatively wide, the ascii develop basally, pseudoparaphyses are narrow, the nearly symmetric ascospores are ellipsoid, ends are obtuse or somewhat acute, the first-formed septum is slightly constricted, and the A2 septa form closer to the A1 septum than to ends. In S. kochii the globose and somewhat collabent ascomata are superficial with bases embedded in the substrate, the peridium is firm, relatively narrow, composed of small, thick-walled cells, asci develop peripherally, pseudoparaphyses are trabeculae, the symmetric ascospores are ellipsoid fusoid, ends are acute, and there is no constriction at the first-formed septum or at the medianly placed A2 septa. Not all species of Teichospora have obpyriform ascomata, however, nor are all species of Strickeria collabent; both genera contain species with more globose ascomata. The composition of the peridium, the type of pseudoparaphyses, and the arrangement of asci must be employed to determine generic position of a collection.

Ascospores vary considerably in shape, size, and septation among species in Teichospora. Some species have conspicuously asymmetric ascospores, wherein the upper hemispore is wider and either shorter or longer than the lower; other species have nearly symmetric ascospores, with little difference in width and length of hemispores. Many species have ellipsoid ascospores, where ends are tapered but obtuse, others fusoid where ends are acute, and still others oblong where ends are rounded. Constrictions at the first-formed septum are usual in the first two shapes, not in oblong ascospores. Sizes of ascospores range (10-)12-18 μm in length for small, 15-24 μm for medium-sized, (25-)35-40 μm for large spores. Septation is variable: three septate with a single longitudinal septum through the two mid cells is the basic septation, and additional transverse septa as well as longitudinal septa increase the complexity of the ascospore. Both sizes and septation are variable, within limits, in a species.

**KEY TO SPECIES OF TEICHOSPOREA TREATED**

1. Ascospores conspicuously asymmetric, the two hemispores differing in length and width.
2. Ascospores with upper hemispore shorter and wider than lower.
   3. Ascospores 25-35 x 7.5-10 μm, 5-10-septate; ascomata immersed in abundant tomentum. .................................................. 17. T. sambuci.
   3. Ascospores 28-40(-46) x 10-15(-20) μm, 7-11-(17-)septate; ascomata widely erumpent, heavily blackened and roughened over surface. ............................... 4. T. clavispora.
2. Ascospores with upper hemispore both longer and wider than lower.
4. Ascospores 15.5-22(-24) x 7.5-10(-12) μm, (3-)5-7-septate; ascomata widely erumpent, surface smooth and shining black. ............................................................... 16. T. ribis.
4. Ascospores (15-)20-40 μm long, 7-9-(11-15-)septate; ascomata immersed erumpent, surrounded by hyphae, surface dull.
5. Ascoma glabrous or when tomentose, hyphae recumbent.
   6. Hyphae, peridium, and apical cells reddened; ascospores red brown, (15-)20-32 x (6-)8-10 μm. .................................................. 2. T. Bartholomewii.
   6. Hyphae, peridium, and apical cells brown; ascospores brown, 28-33(-40) x 10-13(-16) μm. .................................................. 1. T. aridophila.
1. Ascospores symmetric or slightly asymmetric, the two hemispores nearly equal in length and width.
7. Ascoma bearing short radiating hyphal appendages over upper surface; ascospores (15-)18-22 x 7-10 μm, (3-)5-7-septate. .................................................. 8. T. hispida.
7. Ascoma glabrous or hyphae recumbent.
8. Ascoma superficial on pericarps of Caryya, shining black above, appressed recumbent hyphae
below forming brown weft around bases; ascospores 18–23 × 6–7.5(–8) μm, 5–7-septate.

8. Ascomata erumpent superficial, surface shining or dull and tomentose.
9. Ascomata often associated with old stromata or ascomata of other ascomycetes, shining brown to black above, dull below with brown hyphae from sides into substrate.
9. Ascomata not usually associated with other ascomycetes, surface dull with tomentum or roughened by protruding cells and short hyphae.
12. Ascospores with A2 septa usually closer to first-formed septum than to ends, ellipsoid oblong with obtuse ends, mostly 3-septate, (10–)12–18(–20) × (5.5–)6.5–9 μm. ... ........................................ 19. T. trabicola.
12. Ascospores with A2 septum approximately median in each hemispore.
14. Ascospores not so deeply constricted, fusoid or ellipsoid fusoid, clear brown or dark brown, 6–9(–11) μm wide; ascomata immersed or erumpent.
15. Ascomata erumpent or superficial, apices dark.
16. Ascomata often in small groups erumpent through periderm, surface smooth or irregular with protruding cells. .... 5. T. comptoniae.
16. Ascomata separate or loosely gregarious on decorticated wood, surface roughened with protruding cells and short hyphae.
18. Ascospores (17–)20–30(–36) × (8–)9–14(–15) μm, broadly ellipsoid or oblong with obtuse ends.
19. Ascomata erumpent superficial, hyphae sparse.
20. Ascomata separate to gregarious, erumpent through fibers, surface slightly roughened with hyphae or protruding cells. .......... 18. T. solitaria.


Teichospora xerophila Sacc. (as Peck), Syll. Fung. 2: 299. 1883.

Ascomata separate or gregarious, immersed, apex erumpent, obpyriform, 385–550 μm diam., substrate blackened at times, hyphae brown, sparse; peridium 20–30 μm wide, brown. Asci 80–130(–170) × 20–28 μm. Ascospores 26–33(–40) × 10–13(–16) μm, brown, obvoid, ends obtuse, asymmetric, upper hemispore wider and longer than lower, inequilateral to curved, 7–9–(11–)septate, with one or two (three) longitudinal

septa, oblique when in end cell; wall smooth or finely verruculose.

On decorticated wood, arid western North America.


As noted earlier (Barr et al., 1986), two collections in NYS bear the name of T. aridophila. The second, from Colorado (30 Mar 1881, C. G. Pringle 22), is now named Chaetoplea apicirubida Barr. The sparse information on the label of the Arizona collection is more in agreement with the protologue of the species and this specimen accords with Peck’s description. Ascospores have the upper hemisepore both longer and wider as in those of T. bartholomewii which differs especially in cylindrical ascii and strong reddish pigmentation to peridium, hyphae and ascospores.

2. Teichospora bartholomewii Barr, sp. nov.

Ascomata erumpentia superficialia globosa 330–550 µm diametro, apice rubra, hyphae superficiales rubrae, peridia 39–60 µm lata rubrobrunnea. Asci bitunicati (60–)100–120 x (10–)15–16 µm. Pseudoparaphyses cellulosae. Ascospora (15–)20–32 x (6–)8–10 µm rubrobrunnea obovoidea, hemispora supera infernae longiori et laetiori, transversaliter 3–5–7–9-septatae et longitudinaliter 1–2-septatae. Holotypus in Querci neae obovoideae, hemispora supera infemae longitudinaliter 1–2-septatae, with one or two longitudinal septa, constricted at median septum; wall smooth.

On periderm and branches, eastern and midwestern North America.

Material examined: U.S.A. Kansas: (All Quercus) s. loc. et coll., 26 Feb 1894, 1 Jun 1894 (NY as T. pruniformis); Rooks Co. Stockton, 4 Nov 1912, E. Bartholomew s.n. (NY, holotype); F. Col. 4989 (MASS, NY, isotypes, as T. obducentis). North Carolina: Macon Co. Highlands Biological Station, on Sorbus americana, 18 Aug 1985, M. E. Barr 7082 (MASS now NY).

The brilliant red pigmentation of the ascoma apex and the reddish brown of peridium, hyphae and ascospores, set this species apart from other species in Teichospora. The asymmetric ascospores whose upper hemisphere is both wider and longer than the lower are similar to those of T. aridophila, but other features differ. The original determination as T. obducentis which belongs in Cucurbitaria, or as T. pruniformis (Nyl.) Karst. which has glabrous brown ascomata, masked the true characteristics of the fungus. The species epithet honors Elam Bartholomew whose discerning eye uncovered many species on his Kansas farm and elsewhere in Kansas. The North Carolina collection is smaller in ascus and ascospores, but has identical ascomata with reddened surface and reddish brown hyphae.

3. Teichospora borealis (Ellis & Everh.) Barr, comb. nov.

Ascomata erumpentia in small groups or rows, in subiculum of brown hyphae, 385–550 µm diam., globose, short papillate; peridium 25–50 µm wide, dark reddish brown or brown. Asci 130–200 x 10–20 µm. Ascospores 20–30(–35) x (9–)12–14 µm, reddish brown, broadly ellipsoid, ends obtuse, 7–9-septate, with one to three longitudinal septa, constricted at median septum; wall smooth.

In branches, northeastern North America.

Material examined: Canada. Ontario: London, on Staphylea trifolia, 23 Dec 1891, J. Dearnay 986 (NY; one collection as Thyridium ambleum); Parkhill, 24 May 1892, J. Dearnay 1847 (NY as Fenestella minor).


Teichospora borealis has well-developedomentum surrounding globose ascomata, large cy-
BARR: DICTYOSPOROUS GENERA

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Fig. 5y.

Strickeria clavispora (Ellis & Everh.) Kuntze, Rev. Gen. Pl. 3: 534. 1898.


Ascomata separate to gregarious, erumpent to superficial, 550–990 μm diam., obpyriform with apex wide and conspicuous, appearing sulcate or compressed at times, surface dull black, roughened; peridium wide, externally 30–90 μm, heavily encrusted with blackish pigment over surface, internally 30–65 μm wide, yellowish or pallid, cells more compressed. Asci 100–200 × (10–)15–30 μm, 8- or 4-spored. Ascospores 28–40(-46) × 10–15–(20) μm, yellowish brown to dark brown, fusoid becoming asymmetric and obovoid, upper end obtuse, tapered to obtuse or more acute lower end, 7–11-(17)-septate, with one or two (three) longitudinal septa at least in mid cells, slightly constricted at first-formed septum; wall smooth.

On thickened periderm, known from type locality.


Although these species were described in the same article, in two different genera, the authors did not compare them. The collections are remarkably similar and readily recognizable by large erumpent ascomata with conspicuous, sometimes compressed apex and heavy peridium, as well as large, asymmetric, multiseptate ascospores. The habit is similar in each collection. Chesters and Bell (1970) had L. pachystomum as a synonym of Platystomum pachysporum (Sacc.) Chesters & Bell, citing the holotype under that name. Although the species are similar in size, other important features differ so that L. pachystomum, even with somewhat compressed papilla, must be included under Teichospora, whereas P. pachysporum belongs in Decaisnella (Melanommatales).

5. Teichospora comptoniae (Cooke & Ellis) Barr, comb. nov. Fig. 5k.

Cucurbitaria comptoniae Cooke & Ellis, Grevillea 6: 12. 1877; Gibberidea comptoniae (Cooke & Ellis) Kuntze, Rev. Gen. Pl. 3: 481. 1898.

Ascomata erumpent to superficial, gregarious, often in small groups, 200–330 μm diam., obpyriform, surface irregular with protruding cells; peridium 12–15 μm wide, reddish brown. Asci 100–120 × 11–15 μm. Ascospores 15–20 × 7.5–9 μm, clear brown to dull brown, ellipsoid fusoid, ends acute becoming obtuse at maturity, 3–7-septate, with one longitudinal septum rarely into end cells; wall smooth or finely verrucose.

In dead branches of Comptonia peregrina, northeastern North America.


Welch (1926) suggested that Cucurbitaria setosa Winter on Myrica germanica could be the same species, but the ascospores in Winter's species are larger, 22–26 × 8–10 μm, and ascomata bear numerous short setae over the surface. This species has been transferred to Berleseilla (Chaetothyriales) as B. setosa (Winter) Berlese.

6. Teichospora congesta (Cooke & Ellis) Barr, comb. nov. Fig. 5x.

Cucurbitaria congesta Cooke & Ellis, Grevillea 6: 12. 1877; Gibberidea congesta (Cooke & Ellis) Kuntze, Rev. Gen. Pl. 3: 481. 1898.

Memorials of the New York Botanical Garden

Teichospora coremae (Ellis & Everh.) Barr, Rev. Gen. Pl. 3: 534. 1898.

Ascomata erumpent to superficial, densely gregarious on blackened wood, separate or sides connected, 220–495 μm diam., ovoid, apex blunt, appearing low sulcate at times, surface irregular with protruding cells; peridium 25–40 μm wide, reddish brown. Asci (80–)100–135 × 16–25(–30) μm. Ascospores 18–26(–30) × 9–13(–15) μm, reddish brown or dull brown, broadly ellipsoid, of one end cell; wall verruculose.

One longitudinal septum aid to identify the species. Most taxa in Cucurbitaria whose ascospores are tomentose have recumbent hyphae. Tomentose ascomata are widespread.


The collections undoubtedly comprise only one species. The firm, irregular surface of ovoid ascomata and the wide, ellipsoid ascospores whose septa are often irregular are identical in all collections. Teichospora congesta is much like T. silvana Sacc. & Speg. in aggregated ascomata and the wide, ellipsoid ascospores whose septa are often irregular are identical in all collections. The specific epithet was given because of the mistaken identification of substrate as Corema conradi, as Ellis and Everhart (1892) noted. Narrowly fusoid ascospores with a single longitudinal septum aid to identify the species.

Material examined: Germany. Bei Hattenheim (Nassau), on Prunus domestica, Spring, L. Fückel, Herb. B.-B. 531 (FH, isotype).


Small, Asteromella-like pycnidia were produced from germinated ascospores of the collection Barr 6561. The short radiating hyphae over the upper surface of ascomata are characteristic of this species. Most taxa in Teichospora whose ascomata are tomentose have recumbent hyphae.


Berlese (1897) indicated that this species belonged in Teichospora without making the combination, and Welch (1926) also excluded it from Cucurbitaria. The specific epithet was given because of the mistaken identification of substrate as Corema conradi, as Ellis and Everhart (1892) noted. Narrowly fusoid ascospores with a single longitudinal septum aid to identify the species.


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Ascomata immersed in periderm or decorticated wood, in small groups, apex at surface or erumpent after weathering of substrate, obpyriform, 300–495 μm wide, to 495 μm high; peridium reddish brown or dark brown, 25–40 μm wide, usually pallid and wide at apex, surrounded by short brown hyphae and included substrate cells. Asci 100–140 × (10–)12–15 μm, occasionally 2- or 4-spored. Ascospores 16–22(–27) × 7–9(–11) μm, clear pale brown to dark brown, fusoid, ends becoming obtuse, 3–(4–5–)septate, with one longitudinal septum in mid cells, rarely lacking, constricted at first-formed septum and bicoid; wall smooth.

In twigs of Juglans, mid and western North America.


The type material is composed of corticated twigs, with the ascomata forming small pustules and ostioles perforating the surface. The surrounding peridium is pallid and forms a minute whitish ring. The Arizona specimen, on decorticated twigs, is more erumpent and the apex is not notably pallid. Wehmeyer (1961) included this species as a synonym of Pleospora shepherdiae Peck, and ascospores in the two are indeed quite similar. However, Peck's species has a different centrum and belongs in Karstenula (Mellommatales).

10. Teichospora minimispora Barr, nom. nov.


Ascomata separate to gregarious, erumpent superficial, 330–495 μm diam., ovoid or nearly globose, papilla short, surface roughened with protruding cells and hyphae toward base; peridium 30–50 μm wide, reddish brown. Asci 70–125 × (7.5–)10–15 μm. Ascospores 15–23 × 6–8 μm, clear brown to dark reddish brown, fusoid, ends acute, 3–5–7–(8–9–)septate, with one longitudinal septum in mid cells; wall smooth.

On woody stalks and branches, often decorticated wood, western North America.


The roughened surface of the ovoid ascomata and the fusoid, scarcely constricted ascospores are the features that distinguish the species. Welch (1926) thought that C. minima was closely related to C. ribis Niessl; North American specimens under that name are described here as Teichospora ribis and have smooth, shining black ascomata. A new name is needed when this species is transferred to Teichospora, because of T. minima Ellis & Everh. which is a species of Berlesiella.


Fig. 5w.


Ascomata immersed to erumpent or superficial, gregarious, sides connected at times, (150–)200–330 μm diam., obpyriform, surface smooth and somewhat shining brownish black; peridium (16–)20–30(–40) μm, reddish brown, on blackened crust of cells and hyphae. Asci (80–)100–130 × 10–15 μm. Ascospores 13–21 (–23) × 6–8(–9) μm, reddish brown to dull brown, fusoid, ends acute, 3–5–7–septate, with one (two to three) longitudinal septum, oblique when in ends, slightly constricted at first-formed septum; wall smooth.

On decorticated wood or corticated branches, often over old stroma of other ascomycetes, eastern North America.

Figs. 5o, p.  

Ascomata gregarious, erumpent to superficial, 190–275 μm diam., short obpyriform, surface shining black above, with dark brown appressed hyphal appendages from sides and base; peridium 15–25 μm wide. 

*Asci* 80–100 × 12–14 μm.  

*Ascospores* 18–23 × 6–7.5(–8) μm, dark brown, ends paler, fusoid, usually inequilateral, 5–7-septate, with one (two) longitudinal septum in mid cells; wall smooth. 

On pericarps of *Carya* sp., known from type collection.


Small, nearly superficial ascomata are shining black above, and below bear short to elongate hyphae that anchor them to the substrate.

Fig. 5q.  

Ascomata separate or gregarious, immersed becoming superficial, 275–385 μm diam., ovoid or nearly globose, papilla short and wide, surface roughened by protruding cells, dusted with redish granules; peridium 40–50 μm wide, reddish brown. 

*Asci* 80–100 × 7–9 μm.  

*Ascospores* 12–15 × 6–7(–7.5) μm, clear brown, ellipsoid, ends obtuse, 3(–4)-septate, with one longitudinal septum in one or both of mid cells, rarely obliquely into one end; wall finely verruculose. 

On *Opuntia arborescens*, known from type collection.


The sizes of ascospores in *T. opuntiae* are similar to those of *T. trabicola*, but the A2 septa are equidistant in each hemispore. Ascomata differ in shape also in the two species. The authors noted that ascomata of *T. opuntiae* and *Cucurbitaria minima* were similar; the larger fusoid ascospores of the latter (see *T. minimispora*) readily separate it from *T. opuntiae*.

14. *Teichospora quercina* (Ellis & Everh.) Barr, comb. nov.  
Fig. 5r.  

Ascomata erumpent to superficial, gregarious, (200–)275–550 μm diam., globose or ovoid to obpyriform, apex papillate, surface dull black and somewhat roughened with protruding cells; peridium 20–50 μm wide, brown. 

*Asci* 90–130 × 10–16.5 μm.  

*Ascospores* 15.5–22(–25) × 6.5–10 μm, yellowish brown to reddish brown, ellipsoid, biconoid, 3–5(–7)-septate, with one longitudinal septum in mid cells, constricted deeply at first-formed septum; wall smooth or finely verruculose.

On old periderm or decorticated wood, western North America.


Welch removed this species from *Cucurbitaria* into his grouping “B. Sphaeriaceae,” that is, for species having superficial ascomata, but did not provide a nomenclatural transfer. The deeply constricted ascospores separate *T. quercina* from the others in this group, *T. comptoniae, T. minimispora,* and *T. rhypodes,* that show considerable similarity.

Fig. 5s.  
Ascomata immersed becoming erumpent to superficial, gregarious, 165–330 μm diam., obpyriform, surface dull, with brown hyphae at lower sides; peridium 20–25 μm wide, dark brown. Asci 70–110 × 11–14(–18) μm. Ascospores 15–22 × 6–8 μm, yellowish brown to dark brown, ellipsoid fusoid, (3–)5–7-septate, with one longitudinal septum in mid or obliquely in end cells; wall smooth.

On decorticated wood, widespread in North America.


Teichospora rhyphodes has smaller ascomata than does T. minimispora, but the two are otherwise closely related.

16. Teichospora rhibis Barr, sp. nov. Fig. 5t.


The majority of specimens cited above are from Ribes and were identified as Cucurbitaria rhibis Niessl. Welch (1926) excluded that taxon from Cucurbitaria because of the shape and position of ascomata on the substrate. He thought it to be close to C. minimispora (T. minimispora) which has narrower and more symmetric ascospores. Mirza (1968) illustrated a superficial species, as this is, but with symmetric and larger ascospores, (21–)26–31 × (9–)10–12 μm, having as many as eight transverse and one to three longitudinal septa. Because the type specimen of C. rhibis seems no longer to exist, and European specimens differ from North American ones, according to Mirza, I separate the North American collections as a new species in Teichospora. The small asymmetric ascospores in shining black ascomata are characteristic for T. rhibis.

17. Teichospora sambuci (Earle) Barr, comb. nov. Fig. 5g.

Teichospora sambuci (Earle) Barr, sp. nov. Fig. 5t.


Ascomata erumpentia superficialia, in groups or rows, 260–495(–550) μm diam., globose, papilla short, inconspicuous, surface shining black; peridium 20–50 μm wide, reddish brown or dark brown, with basal hyphae. Asci 80–120 × 10–14.5(–18) μm. Ascospores 15.5–22(–24) × 7.5–10(–12) μm, yellowish brown, clear brown or dark brown, obovoid, asymmetric, upper hemispore both longer and wider than lower, ends acute, inequilateral, (3–)5–7-septate, with one (two) longitudinal septa, constricted at first-formed septum; wall smooth.

On branches of Ribes spp., also known from Spiraea, widespread.
septum; wall finely verrucose, surrounded by gel coating 2–2.5 μm wide.

On branches of *Sambucus* spp., western North America.


The disposition of this *"Thyriadium"* as a species of *Karsienula*, where many under that name are now placed (Barr, 1990), is not possible, for the ascomata are more nearly sphaeroid, ascii are basal, and pseudoparaphyses are narrowly cellular. The ascospores usually have a longitudinal septum only in a few of the middle cells.


![Fig. 5u.](image)


**Ascomata** immersed, becoming erumpent to superficial, separate to gregarious, (275–)385–660(–1000) μm diam., globose or ovoid, apex short papillate, finally eroded, surface dull brown, roughened at times by protruding cells and short hyphae; peridium 30–80(–130) μm wide, reddish brown. *Asci* 120–160(–200) × (13–)15–18 μm. *Ascospores* (20–)23–30(–36) × (7.5–)10–12(–15) μm, reddish brown, ends paler, nearly oblong, ends obtuse, inequilateral, (3–)5–7–9(–11)–septate, with one or two longitudinal septa, usually constricted at first-formed septum; wall smooth, rarely verrucose.

On decorticated branches of various woody plants, widespread in western North America; also known from eastern Asia (Vasilyeva, 1987).


Berlese (1897) noted that this species belonged in *Teichospora* and Welch (1926) simply referred to that disposition by Ellis and Everhart (1892). Several collections identified by Ellis as *T. solitaria* are *Strickeria pruniformis* (Nyl.) Barr but the holotype is indeed a species of *Teichospora*. Type material and other collections identified by Ellis as *T. megastega* cannot be separated from the type of *C. solitaria*, so the two names are combined under one species. The ascomata are variable in shape; in early stages of development the ascospores may be quite fusoid with acute ends but by maturity they assume the diagnostic oblong shape with ends quite obtuse to rounded. The Nebraska collection on *Fraxinus* does not seem separable either. *Cucurbitaria fraxini* Ellis & Everh. and var. *effusa* Ellis & Everh. were both described from Ontario specimens; the type material now bears none of the fungus, as Welch (1926) had reported already.


![Figs. 5a–c.](image)

**Ascomata** immersed to erumpent, separate to gregarious, obpyriform, (190–)275–440 μm wide,
330–495 μm high, apex papillate, ostiole periph­ysate; peridium 15–40 μm wide, reddish brown, with brown hyphae over surface and in substrate. Asci (65–)90–120 × (7–)10–13(–15) μm. Ascos­pores (10–)12–18(–20) × (5.5–)6.5–9 μm, brown with reddish tinge, ellipsoid, ends obtuse, sym­metric, 3–(4–5)–septate, with one longitudinal septum in mid cells or obliquely in end cells, constricted or not constricted at first-formed septum, A2 septa usually closer to A1 than to ends; wall smooth.

In branches or decorticated wood, widespread, north temperate zone.


Teichospora trabicola, the type of Teichospora, has relatively small ascospores whose A2 septa are usually closer to the first-formed septum than to the ends. Teichospora trabicola is evidently widely distributed in north temperate regions, for several collections in North America are con­gruent with the European ones.

20. Teichospora winteriana Berlese, Icon. Fung. 2: 54. 1896. Fig. 5v.

Ascomata immersed to erumpent, finally super­ficial, gregarious, (180–)250–500 μm diam., obpyriform or nearly globose, surface smooth and often shining above, dull with ample brown hyphae around sides and base and into substrate; peridium 15–40(–60) μm wide, reddish brown to dark brown. Asci (65–)100–150 × (10–)14–16.5 (–20) μm, 2–4–8-spored. Ascospores (17–)20–27 (–32) × (7.5–)9–11(–13) μm, yellowish brown to dark brown, ellipsoid or somewhat asymmetric with upper hemispore slightly wider, ends ob­tuse, (3–)5–7–(9)–septate, with one (two to three) longitudinal septa, obliquely into end cells, con­stricted at first-formed septum; wall smooth.

In dead branches, often around or over old ascomata, north temperate zone.


Berlese (1896) erected T. winteriana for the fungus named T. trabicola in F. Eur. 2863. According to the specimen of this exsiccatum in NY,
there are two fungi present: *T. trabicola* with three-septate ascospores (12-)14-15(-17) x 6-7 µm and *T. winteriana* with five- to seven-septate ascospores 28-32 x 10-17 µm. Several collections fit within the concept of *T. winteriana*, although the ascospores may be smaller than originally stated. These are often grouped over and around old stromata of other ascomycetes, and have larger ascospores than does *T. nigrobrunnea* with a similar habit. Measurements and ascospore shape are similar to those of *Cucurbitaria obducens* (Fr.) Petrak, and several collections have been misdetermined as that species under *Strickeria* (e.g., Barr, 1961). Ascomata of the two taxa differ profoundly in both shape and position and *S. obducens* is best referred to *Cucurbitaria*.

21. *Teichospora zabriskieana* (Ellis & Everh.)
Barr, comb. nov. Fig. 5h.


Ascomata erumpent in small groups, 275-440 µm diam., globose to obpyriform, surface roughened by thick-walled, setalike hyphae, 50-70 µm long; peridium 15-30 µm wide, brown. *Asci* (90-)110-160 x 20-30 µm. *Ascospores* (25-)30-40 x 12-18 µm, yellowish brown to clear brown, broadly ellipsoid, ends obtuse, 11-15-septate, with three to five longitudinal septa, constricted at first-formed septum, upper hemisphere somewhat wider than lower at times; wall smooth.

In and erumpent from periderm, northeastern North America.


The large, multiseptate ascospores in ascomata that bear short setalike hyphae are distinctive. Wehmeyer (1961) listed the species among dubious names of *Pleospora*; he was unable to locate mature ascomata. The species is similar in hyphal appendages to *T. hispida* where, however, the asci are more cylindric and ascospores smaller (18-22 x 7.5-90 µm) with seven transverse and two to three longitudinal septa.

*Pleosphaeria*, typified by *P. australis* Spec. (Anales Soc. Cient. Argent. 12: 181. 1881), is known to me only from the description. The genus may be synonymous with *Teichospora*, for this species seems to have similar features to those of *T. zabriskieana*. Several other taxa placed in *Pleosphaeria* by Berlese (1896) are small and could belong in *Berlesiella*.

1. **Phaeosphaeriaceae**

Three dictyosporous genera are included in this family: *Graphyllium* whose ascospores are laterally compressed and the longitudinal septa visible in face but not in side view, and *Chaetoplea* and *Montagnula* whose ascospores are not laterally compressed. Species of *Chaetoplea* have relatively thin and mostly smooth-walled ascospores and inhabit dicotyledonous stalks or wood and periderm, whereas species of *Montagnula* have thick-walled and coarsely verrucose ascospores and inhabit large monocotyledonous plants. Additionally, a few members of *Phaeosphaeria* are dictyosporous; a longitudinal septum is somewhat irregularly inserted in some cells of the ascospore or it may be lacking, i.e., this could be considered "accidental" dictyospory.


Leuchtmann (1984) provided a recent account of the genus which should be consulted. Three species in the series *vagans* have dictyospores according to Leuchtmann (1984). *Phaeosphaeria vagans* (Niessl) O. Eriksson, chiefly on grasses, is cosmopolitan in northern and mountainous regions of Europe, Asia and North America. This species was described by Wehmeyer (1961, under *Pleospora*) and by Eriksson (1967) and Leuchtmann (1984). The latter added two species from Europe that also are dictyosporous and form
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typical Stagonospora anamorphs in culture, P. phragmiticola Leuchtmann and P. phragmitis (Hollos) Leuchtmann. Still another species, on dicotyledonous stems, should be included in the genus as another member of the vagans series. This species has not been reported previously from North America, but a collection from Maine is entirely in agreement with European specimens and descriptions.

1. Phaeosphaeria vitalbae (DeNot.) Barr, comb. nov.


Ascomata immersed, often in rows and sometimes joined laterally, 300-700 μm wide, 250-400 μm high, papilla well developed, often curved and short beaklike, to 200-250 μm high, 100-130 μm wide; peridium 24-40 μm wide, brown, of compressed rows of cells, with brown hyphae into substrate. Asci 100-170 x 9-13 μm, often stipitate. Pseudoparaphyses narrowly cellular, in gel matrix. Ascospores 16-22-(25.5) x 5.5-7(-9) μm, yellowish brown to dull brown, symmetric, narrowly ellipsoid, ends obtuse, straight to slightly curved, 3-5(6-7)-septate, with one longitudinal septum in mid cells; wall smooth or verruculose, surrounded by gel coating 2-5 μm wide.


On stems of Clematis spp., north temperate zone.


The synonymy follows that of Berlese (1895) and Wehmeyer (1961) who added to it Pleospora illex Wehm. (Mycologia 45: 408. 1953), described on Ilex from Argentina. Petrak (1940a) commented on the stout peridium and suggested that the species was related to Pleospora dura Niessl [now Montagnula dura (Niessl) Crivelli]. The anamorph is similar to that of Phaeosphaeria vagans (Webster, 1955), however, and peridium structure is not unlike that in several species of Phaeosphaeria.


Ascomata immersed, separate or gregarious or in rows, sphaeroid, elongate at times, often collabent, small to medium sized; apex rounded, opening by rounded pore or slit; peridium narrow, of few rows of pseudoparenchymatous cells, light to dark brown, at times encrusted with pigment externally, internally of pallid compressed rows; surface with few or many hyphae, some stiff and setalike. Asci bitunicate, basal, relatively few, clavate. Pseudoparaphyses narrowly cellular, often deliquescent in mature state. Ascospores brown or reddish brown, asymmetric, obovoid in face view, straight, inequilateral or slightly curved below, compressed and oblong in side view, three or more transversely septate, with one longitudinal septum in mid cells in face view, not visible in side view; usually with one globule per cell; wall firm, smooth or verruculose, usually surrounded by gel coating; biserrate in the ascus.

Anamorphs scarcely known (coelomycetous where associated).

Hemibiotrophic or saprobic in culms of monocots, herbaceous stalks, mostly arctic-alpine.

Type: G. chloës Clements = G. hysterioides (Ellis & Everh.) Barr.

The taxa arranged in Graphyllium have mostly been included under Clathrospora or Pleospora by earlier authors. Clathrospora, which includes Pleospora subg. Platysporoides Wehm. (Wehmeyer, 1961) seems best disposed in the Pleosporaceae. The ascospores of taxa assigned to Graphyllium have different shapes, septation and pigmentation from those of Clathrospora; they are more closely related to species of Chaetoplea in the Phaeosphaeriaceae. Clathrospora differs from Pleospora as Graphyllium does from Chae-
toplea most markedly in the compressed ascospores whose longitudinal septa are not visible in side view.

The earliest name for the entity, Graphyllium was described for G. chloës, as a hysteriaceous fungus with elongate ascomata; Rehm (1915) added G. graminis and G. dakotense. Von Höhnel (1918, 1919) recognized similarities to Clathrospora. Petrik (1952) did not separate Clathrospora and Pleospora, and transferred both G. chloës and G. dakotense to Pleospora. Elongate ascomata or closely grouped rows of small ascomata are not uncommon when they grow in the spaces between large parallel veins of monocot leaves or culms, e.g., the isotype of Pleospora planispora bears rows of connected ascomata. As Petrik (1952) remarked, this character alone is not sufficient to recognize a genus.

Comoclathris is based on C. lanata, and C. ipomoeae was added later. This generic name fell into disuse until Harr (1971) used it as an earlier name for Platyspora, described by Wehmeyer (1961) for P. permunda, P. pentamera, and P. planispora. Both Wehmeyer and Harr utilized ascospore shape and septation to separate species of Clathrospora and Pleospora/Comoclathris. Von Arx and Müller (1975) recognized two genera Clathrospora and Comoclathris with the same distinguishing characters. Eriksson (1967) analyzed the characteristics of ascoma peridium and ascospore shape, septation and surface features. He retained all of the species that he examined in Clathrospora with three subgenera, and was followed in this concept by Luttrell (1973). Eriksson and Hawksworth (1987) placed Comoclathris, with synonym Platyspora, in the Pleosporaceae but did not assign either Clathrospora or Graphyllium to a family. Crivelli (1983) merely mentioned the taxa having compressed ascospores in his dissection of Pleospora s. lat.

The North American species of Graphyllium are separated by ascospore septation, shape and sizes, in addition to some of the features of ascomata.

**KEY TO SPECIES OF GRAPHYLLIUM TREATED**

1. Ascospores 3-septate.
2. Ascomata elongate or in rows, with sparse hyphae; ascospores 13–18(–22) × 6.5–7.5 × 4.5–6 μm, inequilateral. .......................................................... 2. G. hysterioides.
2. Ascomata separate, surrounded by stiff tomentum; ascospores 20–33 × 9–15(–18) × 6.5–10(–14) μm, straight or nearly so. .......................................................... 5. G. permundum.
1. Ascospores 4- or 5-septate.
3. Ascospores 5-septate, 22.5–33 × 9–13.5 × 6–9 μm, straight or nearly so; ascomata with sparse hyphae. .......................... 6. G. planisporum.
3. Ascospores 4-septate.
4. Ascospores smaller.
5. Ascomata with sparse hyphae; ascospores 22–35(–38.5) × 10.5–14(–17) × 6.5–11 μm, straight or nearly so. .......................... 4. G. pentamerum.
5. Ascomata surrounded by stiff tomentum; ascospores 19–26 × 8–10 × 6.5–7.5 μm, inequilateral to slightly curved. .......................... 3. G. ipomoeae.

**1. Graphyllium californianum Barr, sp. nov.**

**Fig. 6j.**

2. Graphyllium hysterioides (Ellis & Everh.) Barr, Mycotaxon 29: 504. 1987. Figs. 6c, d.


Ascomata immersed, separate or gregarious, sphaeroid or elongate, 0.5-4 mm long, 117-165 μm wide, 104-140 μm high, with small slitlike opening when elongate; peridium 8-20 μm wide, brown or reddish brown, with sparse brown hyphae into substrate. Asci 44-66(80) × 10-15 μm. Ascospores 13-18(-22) × 6-7.5 × 3-6 μm, yellowish brown to dark brown or reddish brown, obovoid, inequilateral in face view, nearly oblong in side view, 3-septate, with one longitudinal septum in mid cells; wall smooth or verruculose, surrounded by gel coating.

In culms of monocots, Poaceae and Juncaceae, midwestern North America.


N.A.F. 3020 bears also Pleospora scirrhoides Sacc., as Wehmeyer (1949) and Shoemaker (1968) observed. The two fungi are readily separated by ascospore shapes.


Ascomata immersed, gregarious, sphaeroid, 220-330 μm wide, 165-220 μm high; peridium 10-15 μm wide, dark brown, surrounded by tomentum of dark brown hyphae, stiff and setalike above at times. Asci 50-65 × 12-15 μm. Ascospores 19-26 × 8-10 × 6.5-7.5 μm, clear to dark brown, narrowly obovoid, inequilateral to slightly curved below, lower hemisphere strongly tapered to base, (3-)4-septate, with one longitudinal septum in mid cells; wall smooth or verruculose, surrounded by gel coating.

On overwintered stalks, high prairies of western North America.


This narrow-spored species appears to be of infrequent occurrence.

4. Graphyllium pentamerum (Karsten) Barr, comb. nov.

Pleospora pentamera Karsten, Öfvers. K. Svenska Vet.-Akad. Förh. 2: 99. 1872; Clathrospora pentamera...
Ascomata immersed, separate or gregarious, sphaeroid, 127–340 μm wide; peridium narrow, surrounded by brown hyphae. Asci 80–120 × 24–27 μm. Ascospores 22–35–(38.5) × 10.5–14–(17.5) × 6.5–11 μm, yellowish brown to dark brown, obovoid, nearly straight, 4-septate, with one longitudinal septum in mid cells; wall smooth, surrounded by gel coating.

In monocot culms and dicot stalks, common in arctic-alpine regions.


Wehmeyer (1961) added two other species described from North America as synonyms of Platyspora pentamera: Pleospora aurea Ellis and Pleospora quadrisepartata Cooke & Harkness. He studied and included numerous collections under this name.

5. Graphyllium permundum (Cook) Barr, comb. nov.  


Ascomata immersed to erumpent, gregarious, sphaeroid, collabent, 120–275 μm wide, 117–130–(275) μm high; peridium reddish brown, 15–25 μm wide, base at times to 40 μm wide, surrounded by tomentum of dark brown hyphae, at times seta-like above. Asci (50–)70–130 × 18.5–38 μm. Ascospores 21–33 × 9–16–(18) × 6.5–10–(14) μm, obovoid, straight, 3-septate, with one longitudinal septum in mid cells; wall smooth or verruculose, surrounded by gel coating.

On culms of monocots and herbaceous stalks, common especially in arctic-alpine regions.

Material examined: CANADA. BRITISH COLUMBIA: Dewdrop Flat, 20 Apr 1937, V. C. Brink s.n. (UBC 2026); Mt. Munson, Penticton, on Phlox longifolia, 7 May 1940, J. W. Eastham s.n. (UBC 2264); on P. longifolia, 1 Jul 1951, M. E. Barr 111 (UBC 2112). NORTHWEST TERRITORIES: Baffin Island, Head of Clyde Inlet, on Papaver radicatum, 30 Jun 1950, P. Dansereau s.n. (MASS now NY).


Wehmeyer (1961) provided a long list of synonyms for this species, not repeated here, and examined many collections. It seems to be the most common of the species of *Graphyllium*. The description of *Pleospora utahensis* indicated that the ascospores became seven-septate, but this refers to a species of *Pleospora* also on the stems, and most of the description is of *G. permundum*. 

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Ascomata immersed, at times closely aggregated in longitudinal rows, with sides connected and locule elongate, sphaeroid, (82-) 105-275 μm wide; peridium ca. 15 μm wide, with tomentum of brown hyphae. *Asci* (50–)105–126 × 17.5–25.5 μm. *Ascospores* 22.5–33 × 9–13.5 × 6–9 μm, yellowish brown becoming dark brown or reddish brown, obovoid, straight, 5-septate, with one longitudinal septum in mid cells; wall smooth.

In culms of monocots and stalks of dicots, arctic-alpine regions.


This species includes the type species of *Comoclathris; C. planispora* extends the sequence of ascospore seption within *Graphyllium*. *Comoclathris lanata* is sparse on *Crypt. Form. Colorad*. 444.


Ascomata immersed in substrate, often gregarious in small groups and with small raised areas above one or several ascomata of blackened clypeal tissues, globose or sphaeroid, medium sized, papilla short, ostiole often periphysate; peridium of brown, slightly compressed rows of small pseudoparenchymatous cells, internally with pallid compressed cells, usually surrounded by reddish brown hyphae into substrate. *Asci* basal or lateral, clavate with short or elongate stalk or nearly cylindric. Pseudoparaphyses narrowly cellular. *Ascospores* yellowish brown, becoming clear to dark reddish brown, hemispheres symmetric, fusoid or ellipsoid, straight or inequilateral, transversely septe, with one or more longitudinal septa; wall thick, dark, often coarsely verruculose or verrucose, surrounded by gel coating; rounded globule in each cell; overlapping biseriate or uniseriate in the ascus.

Anamorphs not known for the following taxa. On monocotyledonous hosts in warm regions. Lectotype: *M. infernalis* (Niessl) Berlese (Clements & Shear, 1931; Farr et al., 1979).

*Montagnula* was erected by Berlese (1896) for "*Pleospora* stromatica ascsique longe stipitatis" and included *M. infernalis* and *M. gigantea* (Mont.) Berlese. The stromatic tissues are clypeate above ascomata in *M. infernalis* and completely surrounded grouped ascomata in *M. gigantea*. Wehmeyer (1957, 1961) surveyed eight species and considered them to be best disposed as a subgenus of *Pleospora*. Crivelli (1983) reinstated the genus separately from *Pleospora* and arranged five species in subgenus *Montagnula*, six species in subgenus *Rubiginospora*, and kept *M. opaca* (Wegelin) Crivelli separate from these two subgenera in the genus. Subsequently Leuchtmann (1984) added three phragmosporous taxa to subgenus *Rubiginospora*. One of these, *M. hirtula* (Karsten) Leuchtmann, is the lectotype of *Chaetomastia* (Sacc.) Berlese; this genus must be reinstated [and encompasses also *Masariosphaeria* (Müller) Crivelli] as a phragmosporous taxon in the Decampiaceae (Barr, 1989a).

Only three species of *Montagnula* are known at present in warmer regions of North America. These develop in leaf tissues of large monocots, *Fourcroya* (*Furcraea*) and *Yucca*. They are all members of subgenus *Montagnula* in the sense of Crivelli.

**KEY TO SPECIES OF MONTAGNULA TREATED**


1. Ascospores narrower, ellipsoid fusoid with acute ends, 3-septate.
2. Ascospores 16–18 × (5–)6–7.5 μm. 

3. M. thuemeniana.

2. Ascospores 20–23(–30) × 7–10 μm. 

1. M. infernalis.


Figs. 6k, l.


Pleospora pustula Berk. & Sacc., Rev. Mycol. 5: pl. 83. 1889.


Ascomata immersed, usually gregarious, globose, 385–440 μm diam., apex sharply papillate, clypeal tissues dark over apex of one or few ascomata; peridium 25–30 μm wide. Asci 95–105 × 16–20 μm, stipitate. Ascospores 20–23(–30) × 8–10 μm, yellowish brown to dark brown, ellipsoid fusoid, ends acute, 3-septate, with one longitudinal septum in mid cells, rarely into one end cell, constricted at first-formed septum; wall dark, coarsely verrucose.

On Fourcroya spp., southern Europe, Bahamas.

Material examined: S. loc., ex Niessl in Saccardo Herb. (Wehmeyer Herb. in DAOM, slide of holotype).


Crivelli (1983) added Pleospora clypeata Wehmeyer to the synonymy of this species; descriptions and figures provided by Wehmeyer are suggestive of this.

2. Montagnula phragmospora (Dur. & Mont.)

Crivelli, Diss. ETH Nr. 7318: 155. 1983. 

Fig. 6o.

Sphaeria phragmospora Dur. & Mont., Fl. Algiers 520. 1856; Pleospora phragmospora (Dur. & Mont.) Cesati in Rabenhorst, F. Eur. 1543. 1872.


In leaves of Yucca spp., western North America; Agave spp., southern Europe, northern Africa.


An additional small collection assignable to this species was found mixed with other fungi in leaves of Yucca glauca on Mycofl. Saximont. Exs. 126 (WYOMING: Sheridan Co. Big Horn Mts., Big Goose Creek, 24 Aug 1934, W. G. Solheim s.n., NY). My notes indicate that the ascospores were slightly smaller (18–23 × 8.5–10 μm) and smooth, but all other characteristics fit the species.

The ascospores have a distinctive appearance in this species, for the A2 septa are situated closer to the constricted A1 septum than to the ends. A3 septa follow and the last septa formed may be either A4 or B1 septa.

3. Montagnula thuemeniana (Sacc.) Crivelli, 

Diss. ETH Nr. 7318: 155. 1983. 

Figs. 6m, n.

Pleospora thuemeniana Sacc., Michelia 2: 139. 1880.

Ascomata immersed, gregarious, sphaeroid, 220–385 μm wide, 275–330 μm high, papilla short, clypeal tissues blackened; peridium 40–60 μm wide at sides and base, dark brown, to 100 μm above merging with clypeus. Asci 90–120 × 12–15 μm. Ascospores 16–18 × (5–)6–7.5 μm, yellowish brown to dark brown, ellipsoid fusoid, ends somewhat acute, 3-septate, with one longitudinal septum in mid cells, constricted at all septa; wall verrucose, surrounded by gel coating.

In leaves of Yucca spp., South Carolina and California.


Wehmeyer (1957, 1961) described this species from a Ravenel collection made in South Car...
olina. Shoemaker (1968) accepted as an additional synonym *Pleospora cereicola* Speg. (*Fungi chilensis* 85, 1910) from Chile. The ascospores are less sharply acute and somewhat smaller than those of *M. infernalis*.


Ascomata small to medium sized, immersed or erumpent to superficial, sphaeroid or globose and collabent; apex minute or papillate, ostiole often periphysate; surface tomentose, dull and smooth, sometimes collabent; apex minute or papillate, ostiole often periphysate; surface tomentose, dull and shining, often in brown subglobose to sphaeroid or globose ascomata; peridium relatively narrow, soft, of slightly compressed brown or reddish brown, small pseudoparenchymatous cells, with internal, pallid layer of compressed cells. Ascii basal and sometimes lateral, clavate or cylindric, short stipitate. Pseudoparaphyses narrowly cellular, extending into apical pore at times. Ascospores yellowish brown or reddish brown, endoquadrate, asymmetric with a short, wide, upwardly directed dinoquadrate to prostrate, a number of features, particularly collabent ascomata, soft, small-celled peridium and narrow pseudoparaphyses. The coelomycetous anamorph of *C. calvescens* is different from the hyphomycetous anamorph of *P. herbarum* and relatives, but not from anamorphs in species of *Leptosphaeria*. *Chaetoplea* is enlarged here considerably by the addition of species that had been described originally as collabent species of *Teichospora*. The species of *Teichospora* differ in having noncollabent, obpyriform, ovoid or globose ascomata and in peridium structure. Separation from some species of *Strickeria* that may become depressed and somewhat collabent in age calls for discerning the differences in peridium and pseudoparaphyses of these taxa, and may prove troublesome at times.

Crivelli (1983) included in *Paraphaeosphaeria* two dicytosporous species whose ascospores are oblong with the first-formed septum submedian, *P. oblongata* (Niessl) Crivelli and *P. longispora* (Wegelin) Crivelli. *Pleospora oblongata* is the type of *Pleospora* subg. *Cylindrosporae* Wehm. and of *Paraphaeosphaeria* subg. *Cylindrosporae* (Wehm.) Crivelli. Shoemaker and Babcock (1985) did not accept these species in *Paraphaeosphaeria*, citing differences in apex and peridium structure. These are similar in many respects to *Chaetoplea oblongispora* (Ellis & Everh.) Barr so that the subgenus *Cylindrosporae* seems best submerged under *Chaetoplea* and the necessary transfers of species to this genus are proposed below.

The species in *Chaetoplea* are most readily separated by ascospore shape, symmetry and variation in sizes, by arrangement in clavate or cylindric asci, and by position of ascomata in the substrate, which affects vestiture or formation of a clypeus. It has proved possible to reduce the numbers of species by analyzing these characteristics and not relying solely on substrate. Some of the reduction was possible in the series of species (key choices 13 through 16) whose ascospores are asymmetric with a short, wide, upper hemispore and tapered lower hemispore in which additional septa often develop. Five species are recognized in this series and include ten names.
KEY TO SPECIES OF CHAETOPIELEA TREATED

1. Ascospores oblong, ends rounded, first-formed septum submedian; apical papilla conspicuous.
   1. Ascospores ellipsoid fusoid or obovoid, ends tapered, obtuse or acute.
   3. Hemispores of ascospores symmetric or nearly so, similar in size and shape.

   4. Ascospores larger; apical papilla not so conspicuous.
   5. Ascospores fusoid in cylindrical asci; ascomata quite shining in upper parts.
   5. Ascospores ellipsoid in cylindrical-clavate asci; ascoma dull and roughened or beneath clypeus.
   7. Ascospores 20–34(–36) × 10–13(–15) μm, 3–5–(7–9)-septate; ascomata immersed erumpent separately or gregariously or few beneath clypeus. 16. C. umbilicata.
   8. Ascospores narrower, (5–)6–8(–9) μm wide, 3–(4–5–)septate.
   10. Ascomata beneath clypeus; ascospores partially biseriate in clavate asci. ....... 13. C. pusilla.
   10. Ascomata surrounded by tomentum; ascospores uniseriate in cylindrical asci. .. 5. C. carpinicola.

   3. Hemispores of ascospores obviously asymmetric, upper wider and either longer or shorter than lower.
   11. Upper hemispore both wider and longer than lower.
   11. Upper hemispore wider but shorter than lower, lower hemispore tapered strongly to base.
   15. Ascospores ranging larger, biseriate in clavate asci.

1. Chaetoplea amygdaloides (Ellis & Everh.) Barr, comb. nov. Fig. 7u.


Ascomata collabent, 330–440 μm wide, 220–330 μm high; peridium 20–40 μm wide, reddish brown, with brown hyphae in substrate. Asci 80–110 × 15–24 μm. Ascospores 18–25 × 8–11 μm, light brown or reddish brown, straight, 5–6–7-septate, with one longitudinal septum in mid cells, often into end cells; wall smooth, remnants of gel coating present.

In periderm of Salix amygdaloides, known from type locality.


This species is one of a series that includes also C. aspera, C. helenae, C. nubilosa, and C. variabilis, all characterized by ascospore shape and septation. In these the upper hemispore is obtuse, the lower narrower and tapered; the lower hemispore often contains an added septum, as 1:1:2, 2:1:3. All these species develop in decorticated wood or old periderm tissues. Chaetoplea amygdaloides is most closely related to C. variabilis.
which has larger and unequal lateral to curved ascospores. *Teichospora patellarioïdes* Sacc., in Italy on *Populus*, and *T. pomiformis* Karst., in Finland on *Acer*, evidently belong in this series of species also.

2. *Chaetoplea apicirubida* Barr, sp. nov.

Figs. 7p, q.


*Ascomata* immersi, separate, sphaeroid, 385 μm wide, 250 μm high, clypeate over surface, apex with small pore surrounded by minute bril­liant reddish cells; peridium 13–45 μm wide between, 250 μm above, with brown hyphae from lower sides into substrate. *Asci* 75–110 × 18–20 μm. *Ascosporae* 22–25 × 9–12 μm, reddish brown, obovoid, upper hemispore wider and longer than lower, (3–)4–5–(7–) septate, with one longitudinal septum in mid cells, occasionally into one end; wall smooth, surrounded by narrow gel coating.

In wood of *Juniperus virginiana*, known from type locality.


Chaetoplea apicirubida is distinctive in the brightly colored cells that mark the apical pore, and in obovoid ascospores having a long upper hemispore in short clavate asci.

3. *Chaetoplea aspera* (Ellis & Everh.) Barr, comb. nov.

Fig. 7r.


On old wood, widespread in North America.


Chaetoplea aspera is much like *C. nubilosa* in size and may be separated from that species by the dull, roughened surface of ascomata and slightly wider ascospores that are biseriate in clavate asci.

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4. Chaetoplea calvescens (Fr. ex Desm.) Clements in Clements & Shear, Genera of Fungi 275. 1931.

Figs. 7a-c.


Ascomata immersed or erumpent, gregarious or scattered, collabent, 150–300 μm wide, papilla short, abrupt, surface tomentose with brown hyphae, at times as short, stiff, septate setae in upper regions; peridium 15–23 μm wide, brown. Ascii 70–96 × 11–15 μm. Ascospores (13—)15—23 × (5—)6–8–(9) μm, yellowish brown or pale brown, ends obtuse, (1–2)–(4–5)–septate, with one longitudinal septum in mid cells, at times obliquely into one end cell, not always formed; wall smooth.

Anamorph coelomycetous; conidia yellowish, one septe, 9–13 × 4–5(–8) μm (Webster & Lucas, 1959); Microdiplodia henningsii Staritz = Chaetodiplodia caudina Karst. (Sutton, 1980).

On herbaceous stems, north temperate zone.


NEW JERSEY: Gloucester Co. Newfield, on Cheiropodium album, Jan 1877, J. B. Ellis, N.A.F.I 592 (MASS now NY).


The longitudinal septum forms slowly, and often only transversely septate ascospores are present, as Shoemaker (1968) illustrated by outlines of ascospores from the type and other collections. Chaetoplea calvescens and the genus are separated from both Pleospora and Leptosphaeria by the sphaeroid and collabent ascomata and softer peridium lacking sclerotial cells, as well as by anamorph. While C. calvescens is found in herbaceous stems, most of the species added to the genus develop in fibers of wood, or in periderm of woody branches.

5. Chaetoplea carpinicola (Ellis & Everh.) Barr, comb. nov.

Fig. 7m.


Ascomata immersed in and slightly raising periderm in small groups, strongly sphaeroid, 440–550 μm wide, 220–330 μm high, apex short papillate to surface, surrounded by appressed brown hyphae; peridium 25–30 μm wide. Asci 100–115 × 10–12 μm. Ascospores 15–18 × 7–7.5 μm, reddish brown, ellipsoid biconoid, 3-septate, with one longitudinal septum usually in one or both mid cells, constricted at first-formed septum; wall smooth, remnants of gel coating present.

In branches of Carpinus caroliniana, known from type locality.


This species belongs in the group that includes C. calvescens and C. pusilla, the three of which have similar ascospores. Chaetoplea calvescens develops in herbaceous stems, has collabent ascomata surrounded by ample hyphal tomentum, and clavate asci in which the ascospores are usually biseriate. Chaetoplea pusilla has clavate, sphaeroid ascomata in woody substrates and clavate asci in which the ascospores are biseriate. Chaetoplea carpinicola, also in woody substrates, has strongly sphaeroid ascomata surrounded by appressed hyphae, and cylindrical asci in which the ascospores are uniseriate.

Wehmeyer (1949, 1961) referred Pleospora carpinicola to synonymy under Pleospora shepherdiae Peck. Although ascospores are similar in shape, size and septation in both species, the genra differ, and P. shepherdiae is a species of Karstenula (Melanommatales).

6. Chaetoplea crossata (Ellis & Everh.) Barr, comb. nov.

Fig. 7j.


80(-100) × 12–15 µm. Ascospores 13–17(-22) × 7–10 µm, clear brown, broadly ellipsoid to obovoid, ends obtuse, 3–5–(7-)septate, with one longitudinal septum into one or both end cells; wall smooth.

On decorticated wood, widespread in North America.


The wide ascospores characterize this small species which is much like C. stenocarpa in other respects.

7. Chaetoplea ellisii (Sacc. & P. Sydow) Barr, comb. nov.


Ascomata gregarious to crowded, in rows at times, sphaeroid, often collabent, 300–700 µm wide, 220–400–(600) µm high, papilla short, surface smooth and shining above, reddish brown hyphae below; peridium 20–40 µm wide, reddish brown, with dark hyphae into substrate. Ascii 95–130 × 10–13–(15) µm. Ascospores (15–)18–22–(25) × (6–)7–10 µm, clear brown or reddish brown, obbovoid, asymmetric, upper hemisphere obtuse, shorter and wider than tapered lower hemispore, (3–)4–6–(7–)septate, with one longitudinal septum in mid cells, constricted at first-formed septum; wall smooth; obliquely uniseriate in the ascus.

In wood, corticated or decorticated, midwestern and western North America.


The nearest relatives of C. helenae are C. amygdaloides and C. variabilis. The slightly nar-
rower ascospores in cylindric asci set C. helenae apart from the others.

9. Chaetoplea hyphasmatis (Ellis & Everh.) Barr, comb. nov.

Pyrenophora hyphasmatis Ellis & Everh., J. Mycol. 4: 77. 1888; Pleospora hyphasmatis (Ellis & Everh.) Berlese, Icon. Fung. 2: 63. 1896; Pleospora hyphasmatis (Ellis & Everh.) Wehm., A world monograph of the genus Pleospora 42. 1961.

Ascomata separate or gregarious, collabent, 220–330 μm wide, papilla conspicuous, to 110 μm high, 100 μm wide; peridium 15–20 μm wide, tomentum of numerous brown hyphae. Asci 45–60–(90) × 8–12.5–(16) μm. Ascospores 10–16 (–19) × 4–7(–9) μm, brown with reddish tinge, ellipticoid, ends tapered but obtuse, 3–5(–7)–(19) x 4–7(–9) μm, brown with reddish tinge, ellipsoid, ends tapered but obtuse, 3–5(–7)–(19) x 4–7(–9) μm, brown with reddish tinge.


The protologue gives Langlois 1433 but the TYPE packet in NY is 1434, with identical data. This small-spored species has been moved from the genus to genus; Wehmeyer (1961) suggested even more possibilities. It is close in all characters to C. aspera. The rather shining smooth peridium and slightly narrower ascospores, uniseriate in narrow asci, separate this species from the closely related C. aspera.

11. Chaetoplea oblongata (Niessl) Barr, comb. nov.


Ascomata immersed, separate, sphaeroid, 150–275 μm wide, 150–190 μm high, apex erumpent by stout short papilla, 65–75 μm high, 67–80 μm wide, ostiole periphysate; peridium ca. 10 μm wide at sides and base, to 25 μm wide toward apex, brown with reddish tinge above, brown hyphae in substrate. Ascii 70–102 × 10–15 μm. Ascospores 15–22.5 × 5–7(–8) μm, yellowish brown, oblong, ends rounded, straight, (1–4–)5–6(–7)–septate, with one longitudinal septum in mid or into end cell, constricted slightly at submedian first-formed septum and enlarged slightly above this, septation mostly 3–1–1 or 3–1–2 at maturity; wall smooth.

In herbaceous stems, subarctic and alpine Europe, North America.
Material examined: SWITZERLAND. Kt. Glarus, Rautialp, on Anthyllis vulneraria, 2 Jul 1950, E. Müller s.n. (MASS now NY).


This species and C. oblongispora, along with the extralimital Chaetoplea longispora (Wegelin) Barr, comb. nov. (basionym: Strickeria longispora Wegelin, Mitth. Thurgauischen Naturf. Ges. 11: 5. 1894), comprise a group of species whose ascospores are oblong, having the first-formed septum submedian. Chaetoplea longispora has been described as Pleospora wege- 

liniana (Wehmeyer, 1961) and as Paraphaeosphaeria longispora (Wegelin) Crivelli (Crivelli, 1983). The ascospores are long and narrow, 24-37 x 6-8 μm, with seven to ten septa; the species develops in woody substrates. The third species of this series, C. oblongispora, has wider ascospores, 20-27 x 7.5-9 μm, with five to seven septa and also develops in woody substrates.

12. Chaetoplea oblongispora (Ellis & Everh.) Barr, Mycotaxon 29: 504. 1987. Fig. 7e.


Strickeria amelanchieris Earle in Greene, Plantae Bak- 

erianae 2: 14. 1901.

Ascomata separate or gregarious, erumpent, collabent, 274-385-(600) μm wide, 220-330 μm high, papilla short; peridium reddish brown, 30-40 μm wide. Asci 75-110 x 15-18 μm. Ascospores 20-27 x 7.5-9 μm, pale reddish brown, ellipsoid oblong, ends obtuse, inequilateral to slightly curved, 3-5-7-septate, with one longitudinal septum in mid cells, rarely into one end cell; wall smooth.

In decorticated branches, western North America.


These collections are distinctive by the oblong ascospores in which the longitudinal septum is somewhat irregularly placed. Ascospore lengths are intermediate between those of C. oblongata and C. longispora.


Ascomata separate, immersed and slightly raising surface under ellipsoid clypei ca. 440-715 x 260 μm, ascomata 385-550 μm wide, 245-440 μm high, papilla minute; peridium (10-)20-40 μm wide, to 50-80 μm above with clypeus. Asci 60-90 x 10-15 μm. Ascospores 14-18-(20) x 6.5-8(-9) μm, pale brown, ellipsoid or ob- 

void, ends tapered, obtuse or somewhat acute, 3-(4-)septate, with one longitudinal septum in mid cells or into ends; wall smooth.

In decorticated wood, Europe, western North America.

Material examined: FRANCE. Rouen, on Sambu- 
cus, s. coll. (FH, holotype in Theissen Herb.).


Chaetoplea pusilla was treated by Barr (1981a). The species has ascospores similar to those of C. calvescens, but remains immersed in decorticat- 
ed wood beneath a clypeus.

14. Chaetoplea stenocarpa (Ellis & Everh.) Barr, comb. nov.


Ascomata superficial, gregarious or separate, collabent, smooth above and somewhat shining, (220-)-355-550 μm wide, 275-440 μm high; pe- 
ridium 20-40 μm wide, reddish brown, with brown hyphae in substrate from lower sides. Asci 80-120 x 8-12(-15) μm. Ascospores (12-)15-21(-23) x (5.5-)6.5-8(-9) μm, pale brown, yellowish brown, clear brown or reddish brown, symmetric, ends acute, 3-4-5-(7-)septate, with one longitudinal septum in mid cells; wall smooth, gel coating present when young; uniseriate in the ascus.

On decorticated branches and wood, wide- 
spread in North America.

Chaetoplea stenocarpa is somewhat smaller than C. ellisi but they have in common fusoid ascospores in cylindrical asci and smooth, somewhat shining surface of exposed ascomata.

15. Chaetoplea strigosa (Ellis & Everh.) Barr, comb. nov. Figs. 7n, o.


Ascomata gregarious, almost completely superficial, collabent, 275–385 μm wide, 220–275 μm high, apical papilla conspicuous; peridium dark reddish brown, 20–25 μm wide, surrounded by numerous decumbent hyphae. Asci 80–100 × 15–20–(23) μm. Ascospores 20–26 × 8–11 μm, dark reddish brown, obovoid, upper hemispore longer and wider than lower, 5–7-septate, with one longitudinal septum in mid cells, occasionally obliquely into end cells; wall smooth, surrounded by gel coating.

On decorticated branches, western North America.


Like C. apicirubida, this species has ascospores whose upper hemispore is both wider and longer than the lower. Chaetoplea strigosa differs in profuse hyphae and lack of any clypeal development or reddish cells around the apical pore.

16. Chaetoplea umbilicata (Ellis) Barr, comb. nov. Fig. 7i.


Ascomata separate or gregarious, immersed erumpent, at times beneath slight clypeal tissues, spheraoid, 300–550 μm wide, 250–495 μm high; peridium 20–40 μm wide, to 60–70 μm above when clypeus formed, dark brown, roughened externally, with brown hyphae into tissues. Ascii 90–110 × (14.5–)20–30 μm. Ascospores 20–34–(36) × 10–13–(15) μm, dark yellowish brown or reddish brown, ends obtuse, 3–5–7-septate, with one longitudinal septum in mid cells and obliquely into end cells, at times partial second longitudinal septum; wall verruculose, surrounded by gel coating.

In old wood, western North America.


The collections from Arizona are in accord with that from Utah. Large ascospores aid to identify the species.

17. Chaetoplea variabilis (Ellis & Everh.) Barr, comb. nov. Fig. 7v.


On old Artemisia, known from type locality.

Ellis indicated in a note on the packet that this species was close to *Teichospora helenae*, but the ascospores are slightly larger, more inequilateral to curved, and biseriate in the ascus. *Chaetoplea amygdaloides* seems even more closely related but has straight and slightly smaller ascospores.

**J. LOPHIOSTOMATEACEAE**

*Lophidiopsis nuculoides* (Rehm) Berlese, a dictyosporous taxon with compressed apical papilla to the ascoma, is not yet known from North America. This fungus is retained in *Lophiostoma* by Holm and K. Holm (1988). *Cilioplea* is accepted as dictyosporous.


*Ascomata* immersed erumpent, usually gregarious, sphaeroid, collabent, apex short papillate, of short brown or dark, blackish brown setae, pore rounded; peridium narrow, of small, brown, pseudoparenchymatous cells, few internal rows of compressed, pallid cells, surrounded by brown hyphae into substrate. *Asci* basal, clavate to cylindric. *Pseudoparaphyses* narrowly cellular, numerous. *Ascospores* hyaline, soon yellowish brown, clear brown or reddish brown, usually narrowly obovoid, asymmetric, upper hemisphere shorter and wider than lower, apex obtuse or acute, base acute, three to many septate, with one longitudinal septum in mid cells, rarely into end cells, usually constricted at first-formed septum; wall smooth, often surrounded by narrow gel coating; one globule per cell; biseriate in the ascus.

Anamorphs not known.

Saprobic in herbaceous stalks, monocot culms, old decorticated wood.

Type: *C. coronata* (Niessl) Munk

*Cilioplea* was segregated in *Pleospora* as a subgenus (Müller, 1951) and then as a separate genus (Munk, 1953), based upon *C. coronata*. Later Munk (1957) reduced it again to sectional status in *Pleospora*. Wehmeyer (1961) retained this species in *Pleospora*. Crivelli (1983) recognized four species in the genus, separated from his narrow concept of *Pleospora*. *Cilioplea coronata* is typically European, although an Argentinian collection is known (Wehmeyer, 1961; Crivelli, 1983). North American collections, from *Artemisia* in Colorado and *Populus* and *Robinia* in mountains of Arizona, comprise a separate subspecies whose ascomata attain somewhat larger sizes and whose ascospores are wider and more obtuse above than in the typical subspecies. Crivelli (1983) included *C. kansensis* in the genus, as well as other European species. Another North American taxon is added: *Teichospora fulgurata* was described from a decorticated cottonwood log in Kansas, and has collabent ascomata whose papillae are composed of short dark setae. Rehm (1915) included as synonyms of this species *T. aspera* Ellis & Everh., *T. populina* Ellis & Everh., and *T. populi* (Earle) Sacc. *Teichospora fulgurata* differs from these species, in the present study arranged in *Chaetoplea*, by the formation of apical setae and the presence of numerous, narrowly cellular pseudoparaphyses above the asc. It is thus assigned to *Cilioplea* despite its occurrence on woody rather than herbaceous substrates.

**Key to Species of *Cilioplea* Treated**


*Ascomata* immersed, gregarious, sphaeroid, 245—330(—400) μm wide, 165—220 μm high; setae short and blackish; peridium 20—40 μm wide. *Asci* 50—70(—120) × 10—15 μm. *Ascospores* (20—
25–30(–36) × (5–)6–8(–10) μm, pale reddish brown, ends acute, 5–9(–11)-septate, with one longitudinal septum in some cells.

In stalks of herbs, Europe.

Material examined: GERMANY. Kalkfelsen bei Walthallastrasse/Regensburg, on Daucus carota, Jun 1880, Rehm, Ascomyc. 591 (FH, NY).

HUNGARY: In der "Marktau" bei Ung.-Altenburg, on Centarea scabiosa, Jul 1885, Linhart. F. Hung. 468 (NY, with notation "Best. v. Niessl").

1b. Cilioplea coronata subsp. montana Barr, subsp. nov.

Ab subsp. coronata differt: ascomata 275–495 μm lata, 245–330 μm alta; setae breves; peridia (10–)25–40 μm lata; ascii bitunicati, 75–100 (–160) × (12–)15–24 μm; ascospores 18–30 × (7–)9–11(–12.5) μm obtusae vel acutae. Holo-
typus in Artemisia caule, “Colorado, Grand Co., Granby, County Road 63, 11 Aug 1984” a M. Blackwell n. 1915a lectus in Herb. MASS (nunc NY) depositus.


In fibers of old, decorticated Populus, mostly P. deltoides (cottonwood), mid and western North America.


Ascomata immersed, separate or gregarious, sphaeroid, 220–385 μm wide, 220–275 μm high, apical setae brown and inconspicuous; peridium narrow. Asci (50–)60–72 × 12–15(–20) μm. Ascospores 15–24(–28) × 5–8(–9.5) μm, pale brown, apex obtuse, tapered and more acute at base, 3–4–5(–7)-septate, with one longitudinal septum in most cells.

In stalks of Melilotus alba, known from type locality.


Wehmeyer (1953) added Pyrenophora antarctica Speg., a species from Patagonia on Azorella, to the synonymy.

K. ARTHOPYRENIACEAE


Polyblastiospis Zahlbruckner in Engler & Prantl, Naturl. Pflanzenfam. 1(1*): 37. 1907, nom. nov. for Polyblastias Müller Arg., 1882, hom. illeg., non Lonnroth, 1858.
Ascomata immersed, separate or few grouped beneath and raising darkened clypeus, sphaeroid, small to medium sized; apex rounded, opening by short inconspicuous papilla; peridium relatively soft, of reddish brown, compressed rows of cells externally, pallid internally, with brown hyphae into substrate, condensing above into a shallow clypeus. Asci basal, oblong clavate, short stipitate, 1—2—4—8-spored. Pseudoparaphyses narrowly cellular, numerous. Ascospores hyaline, oblong, ellipsoid or somewhat obovoid, ends obtuse, with several transverse septa and one or more longitudinal septa; wall smooth, surrounded by narrow gel coating; guttulate; uniseriate or biseriate in the ascus.

Anamorphs not known.

In woody substrates.

Type: J. buxi Fabre

Barr (1985) redescribed J. buxi, known from Europe, and reviewed the history of this and the other two genera she regarded as synonyms of Julella. Peltosphaeria was typified by P. vitrispora (Cooke & Harkness) Berlese, a species that develops in decorticated branches in California. Riedl (1961) described this and other species in Peltosphaeria. Riedl observed that Polyblastiosis lactea (Massai.) Zahlbr. was morphologically identical to species of Peltosphaeria; Barr (1985) transferred this taxon to Julella. Riedl (1971) redescribed P. lactea with two varieties, var. lactea and var. naegelii, the type of Polyblastiosis. Harris (1973) described P. fallactosa (Stizem. ex Arn.) Zahlbr. as well as P. lactea from North American specimens. Eriksson and Hawksworth (1987) united Polyblastiosis under Peltosphaeria, but retained this taxon separately from Julella, both under Dothideales, inc. sed.

Catharinia (Sacc.) Sacc., with lectotype Pleospora hyalospora Sacc., has been included under Julella by Clements and Shear (1931), von Arx and Müller (1975), Hawksworth et al. (1983), and Eriksson and Hawksworth (1987). The description of this fungus suggests that the disposition is correct, but type material seems no longer to exist (Wehmeyer, 1961).

Mayrhofer (1987) mentioned Julella, Peltosphaeria and Polyblastiosis briefly in his monograph of Thelenella. Harris (in litt.) has a different disposition for Julella. Only two species are included here, for detailed studies are needed to determine the variations within taxa, and J. buxi is known only from Europe at present. Riedl (1961) included Peltosphaeria californica Petrak with small ascospores, 13—19 × 5.5—7.5 μm, and P. sandwicensis Petrak with ascospores 20—25 × 10—15 μm, both in ascomata that are grouped under a clypeus. A collection from Baja California, Mexico (Guadalupe Island, 18—29 Apr 1963, W. A. Weber & C. J. McCoy s.n., NY) is close to P. sandwicensis, but the ascospores measure 24.5—30 × 10—12 μm and are lightly pigmented.

**KEY TO SPECIES OF JULELLA TREATED**


   Ascomata 220—250 μm wide, clypeus rounded, extending up to 385 μm wide, somewhat shining; peridium below ca. 15 μm wide. Asci 70—90 (—100) × 18—22 μm, 4—(5—6—8)—spored. Ascospores 22—32 × 9—12 μm, hyaline, 7—9-septate, with one to two longitudinal septa, surrounded by gel coating.

   In decorticated wood, north temperate zone.

   Material examined: U.S.A. Massachusetts: Bristol Co. New Bedford, Willey s.n. (MASS now NY).


   Ascomata 385—550 μm wide, clypeus 1—1.5 mm long, over one or two ascomata, dull black; peridium 25—40 (—60) μm wide. Asci (115—130—182 × 13—24 μm, 8—spored. Ascospores (21—)25—33 × (7.5—)10—13 μm, hyaline, ellipsoid obovoid, 7—11-septate, with (one) two to three longitudinal septa; surrounded by gel coating.

   In decorticated branches and wood, known from California.

L. MICROPELTIDACEAE


Ascomata superficial, separate to gregarious, dimidiate scutate, apex rounded, opening by rounded pore, somewhat collateral at times; peridium relatively thin, soft, of few rows of greenish or bluish tinged, pseudoparenchymatous cells, often somewhat textura epidermoidea in surface view, base at times thin, pallid, surrounded by delicate weft of bluish, greenish or brownish hyphae, occasionally beneath clypeal tissues. Asci basal, oblong cylindric. Pseudoparaphyses narrowly cellular, often deliquescent at maturity. Ascospores hyaline to pale yellowish brown, obovoid, ellipsoid or fusoid, often tapering to base, at times acuminate, with several transverse septa and often one (two) longitudinal septa; wall smooth, without gel coating; guttulate; biseriate or partially uniseriate in the ascus.

Anamorphs not known.

Epiphytic saprobes on periderm or on leaf sheaths of conifers.

Type: M. subcoerulescens (Nyl.) von Höhnel.

Riedl (1971) differentiated Mycoglaena as nonlichenized or facultatively lichenized. Harris (1973) described three nonlichenized species from North America: M. meridionalis (Zahlbr.) Szat., M. myricae (Nyl.) Harris, and M. quercicola Harris. Their ascospores are transversely sepatate or muriform, and they form a continuum of ascospores having increased septation.

The genus Winteria (Rehm) Sacc. 1883 non Sacc. 1878 has been utilized for some of the taxa included in Mycoglaena. Winteria has been misunderstood over many years. Only recently (Sherwood-Pike & Boise, 1986) have the problems been clarified; the new name Mycowinteria was proposed for M. anodonta (Nyl.) Sherwood & Boise which includes Winteria lichenoides (Rehm ex Sacc.) Sacc. Xylopezia was expanded to include X. excellens (Rehm ex Sacc.) Boise for Winteria excellens (Rehm ex Sacc.) Sacc.

A few species are included here, and additional ones require more study. Eriksson and Hawksworth (1987) did not dispose of Mycoglaena to family, but the genus has the attributes of the Micropeltidaceae.

Key to Species of Mycoglaena Treated

1. Ascospores tapered to acute base.
2. Ascomata thickened above by bluish-brown clypeal tissues; ascospores 20–27 × 8–10 μm. ... 3. M. canadensis.
2. Ascomata lacking clypeal tissues.
3. Ascomata bluish black; ascospores tapered from above, not noticeably constricted.
4. Ascospores relatively wider, 15–20 × 7–9 μm; on leaf sheaths of conifers. 4. M. elegans.


Fig. 80.


Ascomata 130–275 (–330) μm wide, shining bluish brown; peridium 10–30 μm wide. Asci (47–)80–90 × 12–17 μm. Ascospores 15–24 × 5–7 μm, fusoid, tapered to one or both acute ends, at times acuminate to 12 μm long, 3–7–(9)-septate, with one (two) longitudinal septum in mid cells.

On conifer periderm, north temperate zone.

2. *Mycoglaena alni* (Dearness & House) Barr, comb. nov. Figs. 8q, r.


*Ascomata* 200-330 μm wide, brownish; peridium 10-20 μm wide. *Asci* 40-60 × 16.5-30 μm. *Ascospores* 17.5-24 × 6-7.5 μm, obovoid, upper hemispor e shorter and wider than lower, (4-)5-(6-)septate, with one longitudinal septum in mid cells, often into upper end cell.

On branches of *Alnus*, northeastern North America.

**Material examined:** U.S.A. NEW YORK: Delaware Co. Stamford, Sep, S. H. Peck s.n. (NYS, isotype).

**Vermont:** Lamoille Co. Stowe, Goldbrook Road, 18 Sep 1964, M. E. Ban 4680d (MASS now NY).

3. *Mycoglaena canadensis* (Ellis & Everh.) Barr, comb. nov. Figs. 8l, m.


*Ascomata* 190-250 μm wide, beneath ellipsoid clypeus to 1 mm × 440 μm, bluish brown, 55-65 μm wide; peridium bluish brown, 20 μm wide. *Asci* 120-145 × 14-15 μm. *Ascospores* 20-27 × 8-10 μm, obovoid, obtuse above, tapered and acute below, 7-(8-)septate, with one or two longitudinal septa.

On cedar logs, known from type locality.

**Material examined:** CANADA. ONTARIO: Lake Nipigon, J. Macoun 65 (NY, presumed isotype, as *Thyridium lividum*).

Harris (in litt.) suggested assignment of this species to *Mycoglaena*.


*Ascomata* 275 μm wide, bluish black; peridium 15-20 μm. *Asci* 60-65 × 18-25 μm. *Ascospores* 15-20 × 7-9 μm, obovoid, obtuse above, tapered to acute base, 3-7-septate, with one or two longitudinal septa in mid cells, occasionally into end cells.

On leaf sheaths of *Pinus taeda*, known from type locality.

**Material examined:** U.S.A. SOUTH CAROLINA: S. loc., Ravenel, F. Carol. 47 (MASS now NY).


*Ascomata* 150-200 μm wide, shining bluish black; peridium thin. *Asci* 35-60 × 13-19 μm. *Ascospores* 14-23 × 4.5-8 μm, ellipsoid, finally obovoid, tapering from obtuse apex to somewhat acute base, 3-5-(6-)septate, with one longitudinal septum in mid cells.

On twigs of conifers, north temperate zone.

**Material examined:** CANADA. BRITISH COLUMBIA: Garibaldi Prov. Park, Mimulus Lake, on *Abies amabilis*, 2 Aug 1952, M. E. Barr 615 (MASS now NY).

Von Höhnel (1909a) included in the synonymy of this species *Verrucaria acuminans* Nyl. which is kept as a separate species in this study. He later (1909b) concluded that *M. elegans* was the earlier name for the taxon, including both *V. acuminans* and *V. subcoerulescens*.

**Acknowledgments**

I am grateful to the directors of the following herbaria for the loan of specimens in their keeping: BPI, CUP, DAOM, DAVFP, F, FH, L'Har, mas, NY, NYS, UBC, UPS, WSP. Collections originally deposited in MASS are now in NY, and are so designated. It is a pleasure to thank Dr. Rupert Barneby for correcting the Latin diagnoses, Dr. William Buck for editing the manuscript, and the reviewers for their valuable comments and suggestions. The specimens provided by a number of mycologists added greatly to my understanding of several species and I thank these persons.

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