Some Dictyosporous Genera and Species of Pleosporales in North America

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Some Dictyosporous Genera and Species of Pleosporales in North America

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Contents

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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, ***Phaeosphaeria vitalbae*** (DeNot.) Barr, ***Graphyllium pentamerum*** (Karsten) Barr, ***G. permundum*** (Cooke) Barr, ***Chaetoplea amygdaloides*** (Ellis & Everh.) Barr, ***C. aspera*** (Ellis & Everh.) Barr, ***C. carpinicola*** (Ellis & Everh.) Barr, ***C. crossata*** (Ellis & Everh.) Barr, ***C. ellisii*** (Sacc. & P. Sydow) Barr, ***C. helenae*** (Ellis & Everh.) Barr, ***C. hyphasmatis*** (Ellis & Everh.) Barr, ***C. longispora*** (Wegelin) Barr, ***C. nubilosa*** (Ellis & Everh.) Barr, ***C. oblongata*** (Niessl) Barr, ***C. stenocarpa*** (Ellis & Everh.) Barr, ***C. strigosa*** (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, ***Tryblidaria 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

Dictyospory is prevalent and 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 × 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 *Polypyrenula 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 hemispores that are quite similar or are dissimilar. Septation continues with two A2 septa, one in each hemispore. 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 asci 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, Ascomycetes Exsiccati
Ascomyc. & L. F. = Seaver & Wilson, Ascomycetes & Lower Fungi
Canad. F. = Macoun, Canadian Fungi
Cryptog. Form. Colorad. = Clements, Cryptogamae 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 Exsiccata
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 cylindric, 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. Coprophilous or in plant debris. ..... G. Phaeotrichaceae.
               9. In woody or herbaceous substrates.
                  10. Ascomata usually clypeate, in uppermost layers of periderm of woody substrates. ..... K. Arthopyreniaceae.
                  10. Ascomata not clypeate, immersed in herbaceous or woody substrates.
                     11. Ascospores constricted at primary septum and in each hemispore; pseudoparaphyses numerous, sheetlike above asci. ..... J. Lophiostomataceae.
                     11. Ascospores constricted or not at primary septum, not usually in each hemispore; pseudoparaphyses sparse above asci. ..... I. Phaeosphaeriaceae.

KEY TO DICTYOSPOROUS GENERA MENTIONED[2]

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.*
   2. Epiphytic or hyperparasitic; asci overarched by pseudoparenchymatous cells.
      3. Epiphytic on branches over scale insects or insect secretions, forming stromatic basal tissues. ..... *Myriangium.*
      3. Hyperparasitic on other fungi, not forming stromatic basal tissues, soft and delicate.
         4. On hyphomycetes. ..... *Cookella.*
         4. On foliicolous ascomycetes. ..... *Uleomyces.*
1. Ascomata determinate in growth, regular in shape and margin; asci forming hymenial layer.
   5. Asci unitunicate.
      6. Ascomata immersed erumpent in valsoid groups surrounded by interwoven hyphal stroma.
         7. Asci wide, floating free in centrum, lacking true paraphyses. ..... *Dictyoporthe.*
         7. Asci cylindric, remaining attached to subhymenium among narrow paraphyses. .... *Thyridium.*
      6. Ascomata erumpent superficial, separate or grouped on hyphal subiculum.
         8. Ascomata black under low magnification; asci cylindric among narrow paraphyses; ascospores infrequently muriform. ..... *Discostroma.*
         8. Ascomata brightly pigmented to yellowish brown under low magnification; asci various, lacking paraphyses; ascospores usually muriform.
            9. Stromatic tissues present. ..... *Nectria* (*Thyronectria*).
            9. Stromatic tissues lacking. ..... *Calyptronectria.*
   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 globose, small; asci few, ovoid or saccate. ..... *Leptosphaerulina.*
            12. Ascomata pulvinate or sphaeroid, medium sized; asci numerous, oblong to clavate.
               13. Asci polysporous. ..... *Sydowia.*
               13. Asci octosporous. ..... *Dothiora.*
         11. Ascomata superficial in subiculum of cylindric hyphae.
            14. Ascomata ovoid or vertically elongate; peridium and hyphae of subiculum usually surrounded by gel coating, subiculum often forming spongy masses. ..... *Capnodium.*
            14. Ascomata globose, ovoid or sphaeroid; peridium and hyphae not surrounded by gel coating.
               15. Ascomata minute to small, as locules in stroma at times, surface roughened by short setae or protruding cells; ascospores grayish brown. ..... *Berlesiella.*
               15. Ascomata small to medium sized, surface bearing long hyphal appendages or glabrous; ascospores hyaline or reddish to dark brown.
                  16. Ascospores dark brown; ascomata in well-developed subiculum. ... *Strigopodia.*
                  16. Ascospores hyaline to reddish brown; ascomata in slight subiculum.
                     17. Ascospores hyaline to light brown; on leaves. ..... *Limacinula.*
                     17. Ascospores reddish brown; on branches and periderm. ..... *Coccodinium.*
      10. Hamathecium present as cellular pseudoparaphyses or trabeculae, asci oblong, clavate or cylindric.
         18. Ascomata opening widely, apothecioid or hysterothecioid; tips of pseudoparaphyses enlarged and darkened as pseudoepithecium.
            19. Ascospores, large, multiseptate, in clavate asci. ..... *Tryblidaria.*
            19. Ascospores medium sized (15–35 μm long), few septate.
               20. Ascospores hyaline to light brown in clavate asci; ascomata apothecioid. ..... *Teichosporella.*
               20. Ascospores brown; ascomata hysterothecioid.
                  21. Hymenial surface orange to red or bright brown; asci cylindric. . *Rhytidhysteron.*
                  21. Hymenial surface brownish black; asci oblong. ..... *Melittosporium.*
         18. Ascomata perithecioid or hysterothecioid; tips of pseudoparaphyses not enlarged and darkened.
            22. Ascomata erumpent superficial, elongate, hysterothecioid, opening by long slit.
               23. Rounded apex of ascoma containing slit; peridium of pseudoparenchymatous cells.

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[2] Numbered genera are those treated in this work.

24. Ascospores hyaline to pale brown; peridium soft. ..... 6. *Gloniopsis.*
24. Ascospores brown; peridium firm, stout. ..... 7. *Hysterographium.*
23. Cristate (keeled) apex of ascoma containing slit; peridium brittle, of compressed rows of cells.
25. Ascospores medium sized (to 30 μm long), few septate. ..... *Ostreola.*
25. Ascospores large (over 30 μm long), many septate. ..... *Ostreichnion.*

22. Ascomata rounded, perithecioid, opening by rounded pore or short slit.
26. Ascomata coprophilous; ascospores separating readily at septa. ..... 13. *Pleophragmia.*
26. Ascomata not coprophilous; ascospores not separating readily at septa.
27. Ascomata grouped on stromatic crust over scale insects on conifers. ..... 11. *Cucurbidothis.*
27. Ascomata not grouped on stromatic crust over scale insects.
28. Ascomata superficial, dimidiate; ascospores greenish brown. ..... 21. *Mycoglaena.*
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. ..... 3. *Clathrospora.*
30. 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, euseptate.
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. *Pyrenophora.*
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. ..... 5. *Macrospora.*
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 cylindric, endotunica narrow. ..... 2. *Lewia.*
39. Peridium relatively firm and wide; asci usually clavate or oblong, endotunica wide. ..... 1. *Pleospora.*
34. Peridium of small pseudoparenchymatous cells or compressed cells.
40. Ascomata sphaeroid, short setae in apical region. ..... 19. *Cilioplea.*
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.*
            46. Ascomata separate or grouped, often in subiculum or beneath clypeus; ascospores usually muriform.
                47. Peridium relatively soft; pseudoparaphyses narrowly cellular. ..... 18. *Chaetoplea.*
                47. Peridium firm; pseudoparaphyses trabeculate. ..... *Karstenula.*
        45. Ascomata globose, turbinate, ovoid or obpyriform.
            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.*
                49. Ascomata with short or nearly beaklike papilla, separate or grouped.
                    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.*

Pleosporales

A. Pleosporaceae

1. Pleospora Rabenhorst ex Ces. & DeNot., Comment. Soc. Crittog. Ital. **1**: 217. 1863, nom. cons.; Rabenhorst *in* Klotzsch, Herb. Mycol. ed. 2, no. 547 a–e, 548 in sched. 1857, nom. nud.

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 *Dacampia, D. hookeri* (Borr.) Massal. and *D. engeliana* (Saut.) Massal. (Crivelli, 1983). *Pleospora amelanchieris* Wehm. is a synonym of *Strickeria insecura* (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 ascomata that develop in decorticated wood or old periderm and have broadly clavate asci among cellular pseudoparaphyses. The ascomata 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 asci and smaller brownish ascospores from the 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 ovoid, lower hemispore narrow, tapered. ..... 2. *P. pygmaea.*
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[1890]. Figs. 1a, b.

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

Ascomata 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 symmetric, 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). New Jersey: Gloucester Co., Newfield, in *Carya*, Nov 1877, *J. B. Ellis 2834*; in *Azalea* (as "Aralia"), Dec 1877, *J. B. Ellis 2834a* (NY, isotypes).

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 specc. 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. 1c–e.

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

Teichospora kansensis Ellis & Everh., Proc. Philadelphia Acad. 42: 243. 1890; *Strickeria kansensis* (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.

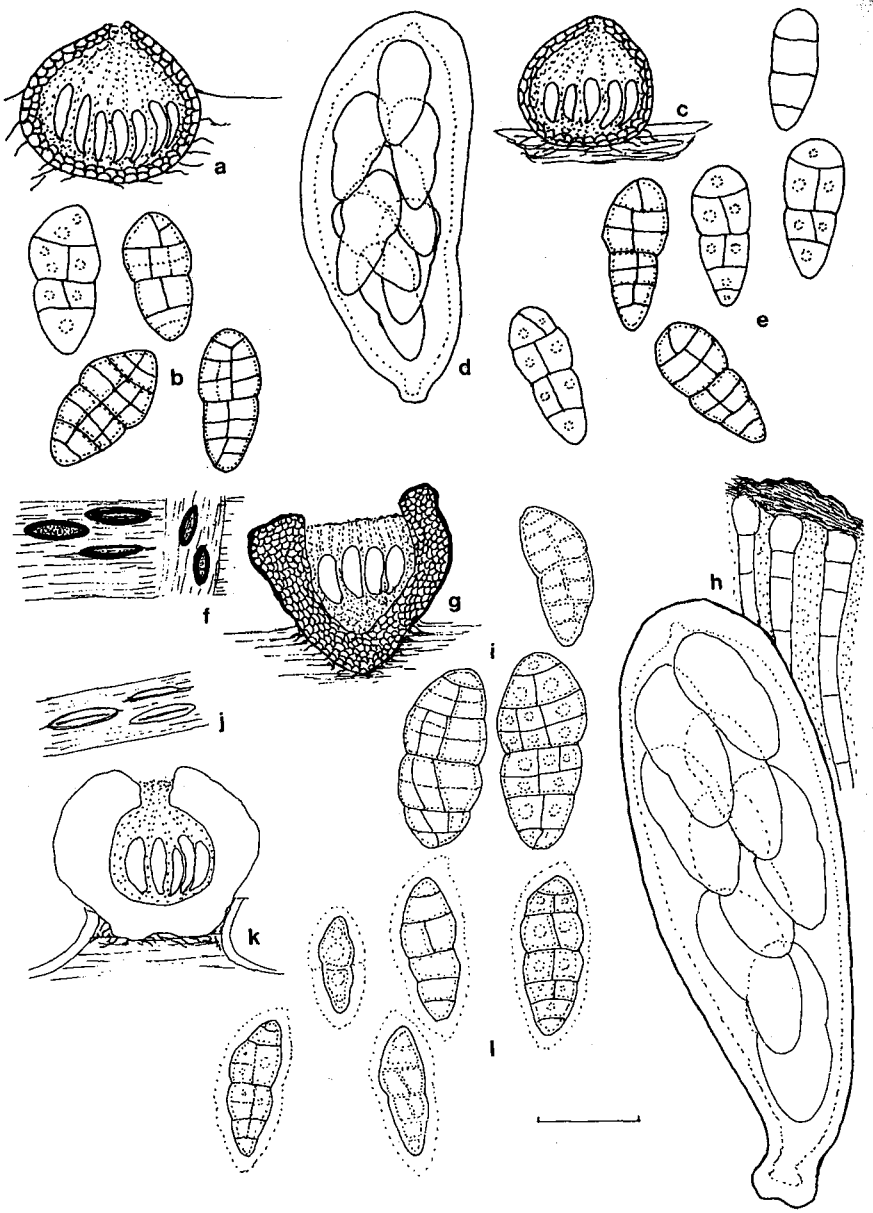
On old periderm, eastern and midwestern North America.

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*). Oklahoma: Payne Co. East side Lake Carl Blackwell, W of Stillwater, in *Juniperus*, 11 Aug 1979, *M. E. Barr 6678* (MASS now NY). 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*.

→

Fig. 1. a–b. *Pleospora ambleia:* **a,** ascoma in vertical section, **b,** ascospores. **c–e.** *P. pygmaea:* **c,** ascoma in vertical section, **d,** ascus, **e,** ascospores. **f–i.** *Gloniopsis praelonga:* **f,** habit, **g,** ascoma in vertical section, **h.** ascus and tips of pseudoparaphyses, **i,** ascospores. **j–l.** *G. smilacis:* **j,** habit, **k,** ascoma in vertical section, **l.** ascospores. Standard line = 15 μm for asci and ascospores, 150 μm for ascomata. Habit sketches not to scale.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2. **Lewia** Barr & Simmons, Mycotaxon **25:** 289. 1986.

See Simmons, 1986.

3. **Clathrospora** Rabenhorst, Hedwigia **1:** 115. 1857.

See Wehmeyer (1961), Eriksson (1967).

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

4. **Pyrenophora** Fries, Summa Veget. Scand. **2:** 397. 1849.

See Wehmeyer (1961), Shoemaker (1961, 1962), Crivelli (1983), Sivanesan (1987).

5. **Macrospora** Fuckel, Jahrb. Nassauisschen Vereins Naturk. **23-24:** 139. 1870.

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.

6. **Gloniopsis** DeNot., Giorn. Bot. Ital. **2(2):** 12, 23. 1847.

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, obovoid, 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.

Lectotype: *G. decipiens* DeNot. = *G. praelonga* (Schwein.) Zogg (Zogg, 1962).

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. *Glonioposis praelonga* has widely ovoid ascospores that are obtusely ended, typically with two or three longitudinal septa. *Gloniopsis smilacis* has narrowly obovoid ascospores that are acutely ended and develop only one longitudinal septum.

Key to Species of *Glonioposis* Treated

1. Ascospores with obtuse ends, 5–7-or more septate, with 2–3 longitudinal septa, 20–30 × 9–12 μm. ..... 1. *G. praelonga.*
1. Ascospores with acute ends, 3–5-(7-)septate, with one longitudinal septum, 15–26(–31) × 5–9 μm. ..... 2. *G. smilacis.*

1. **Gloniopsis praelonga** (Schwein.) Zogg, Beitr. Kryptogamenfl. Schweiz **11(3):** 50. 1962. 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. *Asci* 60–120 × 15–25 μm. *Ascospores* 20–30 × 9–12 μm, hyaline or slightly reddish in age, obovoid, 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 decipiens*).

U.S.A. PENNSYLVANIA: on *Verbascum*, ex Herb. L. v. Schweinitz in Herb. Fries (UPS, isotype *Hysterium verbasci*).

2. Gloniopsis smilacis (Schwein.: Fr.) Underwood & Earle, Bull. Alabama Agric. Exp. Sta. **80:** 196. 1897. Figs. 1j–l.

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* 75–120 × 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.

Material examined: U.S.A. FLORIDA: Duval Co. Jacksonville, on *Sabal serrulata*, Winter 1887, *W. W. Calkins, N.A.F. 2063* (MASS now NY as *Hysterium lineolatum*). **MASSACHUSETTS:** Nantucket Co. Nantucket, Hidden Forest, 31 May 1936, *E. F. Guba, Nantucket F. 245*; Brant Point, 23 Apr 1939, *E. V. Seeler, Nantucket F. 244*; Hampshire Co. Hadley, on *Smilax glauca*, 26 Mar 1978, *H. E. Ahles s.n., M. E. Barr 6419* (all MASS now NY). **MICHIGAN:** Washtenaw Co. Ann Arbor, Eber White Woods, 4 May 1953, *M. E. Barr 714* (MASS now NY). **NEW JERSEY:** Gloucester Co. Newfield, on *Rubus villosus, J. B. Ellis N.A.F. 1, 78* as *Hysterium viticolum*; on *Smilax*, Sep 1889, *J. B. Ellis N.A.F. 2375* as *Hysterium smilacis* (both MASS now NY). **NEW YORK:** Bronx Co. Bronx, on *Smilax*, Winter 1907, *F. J. Seaver & Wilson, Ascomyc. & L. F. 5* (MASS now NY). **OKLAHOMA:** Payne Co. Ripley Bluffs, on *Quercus*, 11 Aug 1979, *M. E. Barr 6591*, 16 Aug 1979, *M. E. Barr 6725* (both MASS now NY). **SOUTH CAROLINA:** s. loc., on *Smilax, Ravenel F. Carol. 2: 49* as *Hysterium smilacis* (MASS now NY).

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 ellisii* 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. ellisii* 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.

7. Hysterographium Corda, Icon. Fung. **5:** 34. 1842, emend. DeNot., Giorn. Bot. Ital. 2(2): 21, 22. 1847.

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* basal, clavate. Pseudoparaphyses narrowly cellular. *Ascospores* brown, obovoid or ellipsoid fusoid, ends obtuse or acute, straight or inequilateral, several septate, with one to three longitudinal septa, usually constricted at first-formed septum, less so or not constricted at later septa; wall thin or thick, smooth or verruculose; with one globule per cell; overlapping biseriate in the ascus.

Anamorphs coelomycetous where known.

Saprobic or hemibiotrophic on woody plants.

Type: *H. elongatum* (Wahl.: Fr.) Corda = *H. fraxini* (Pers.: Fr.) DeNot. (Zogg, 1962).

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.

KEY TO SPECIES OF *HYSTEROGRAPHIUM* TREATED

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.*
      3. Ascospores (30–)40–65(–80) × 10–18 μm, 7–15-septate, ellipsoid fusoid, ends acute; ascoma surface longitudinally striate. ..... 1. *H. flexuosum.*

1. Hysterographium flexuosum (Schwein.: Fr.) Sacc., Syll. Fung. **2**: 781. 1883. Figs. 2d–f.

Hysterographium acerinum Peck, Bull. New York State Mus. **167**: 43. 1913.

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).

U.S.A. CALIFORNIA: San Francisco Co. San Francisco, on *Salix lasiolepis,* Feb, *H. W. Harkness, N.A.F. 2064* as *Hysterium prominens* (MASS now NY); San Mateo Co. Boulder Creek Road, 9 Dec 1971, *M. E. Barr s.n.* (MASS now NY). **COLORADO:** Boulder Co. Boulder, on *Acer glabrum,* 11 Aug 1911, *E. Bartholomew s.n.* (NYS, holotype of *H. acerinum*). **NEW JERSEY:** Gloucester Co. Newfield, *J. B. Ellis, N.A.F.1, 76* (MASS now NY).

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.*

2. Hysterographium fraxini (Pers.: Fr.) DeNot., Giorn. Bot. Ital. **2(2)**: 22. 1847. Figs. 2a–c.

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. *Asci* 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* Hilitzer, Lohman, 1932).

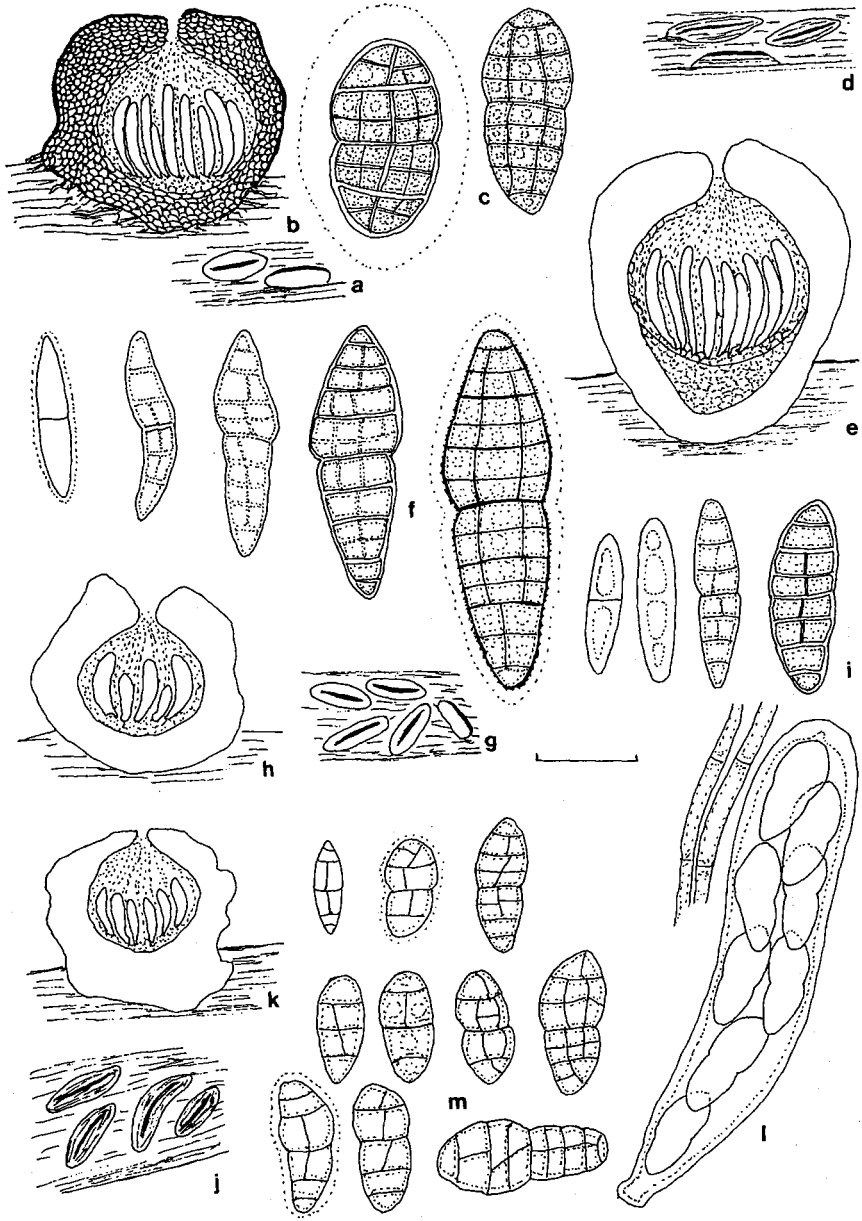
On woody branches, chiefly *Fraxinus,* cosmopolitan.

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

U.S.A. IOWA: Winneshiek Co. Decorah, *E. W. Holway s.n., N.A.F. 997*; Mt. Pleasant, Summer 1905, *F. J. Seaver, Ascomyc. & L. F. 58* as *H. kansense* (both MASS now NY). **KANSAS:** Rooks Co. Rockport, May 1893, *E. Bartholomew s.n., N.A.F. 3037*; Stockton, 18 Mar 1910, *E. Bartholomew s.n., F. Col. 3137* (both MASS now NY). **MASSACHUSETTS:** Franklin Co. Conway, Pine Hill, 28 Oct 1979, *M. E. Barr 6620* (MASS now NY). **NEW JERSEY:** Gloucester Co. Newfield, on *Quercus coccinea,* 15 Apr 1888, *J. B. Ellis s.n.* (MASS

→

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.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now NY as *Hysterium hiascens* and on old *Dichaena*). NEW YORK: Tompkins Co. Alcove, Mar 1893, *C. L. Shear, N.Y.F. 185* (MASS now NY).

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.

3. Hysterographium mori (Schwein.) Rehm, Ascomyc. Fasc. 7, n. 26; Ber. Nat. Hist. Verein Augsburg **26**: 76. 1881. 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. *Asci* (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 verruculose.

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

On periderm and decorticated wood, cosmopolitan.

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). **U.S.A. ARIZONA:** Pinal Co. Pinal Parkway, 16 Jan 1977, *J. P. Lindsey 555*; Pima Co. Base Santa Rita Mts., 2 Aug 1980, *M. E. Barr 6831* (both MASS now NY). **CALIFORNIA:** San Mateo Co. Boulder Creek Road, on *Lupinus*, 9 Dec 1971, *M. E. Barr 5975c* (MASS now NY). **COLORADO:** Larimer Co. Roosevelt Nat'l Forest, Redfeather Lakes, 4 Aug 1984, *M. E. Barr 6997* (MASS now NY). **GEORGIA:** Clarke Co. Athens, Botanical Garden, 25 Aug 1978, *M. E. Barr 6460* (MASS now NY). **IOWA:** Winneschiek Co. Decorah, on *Quercus*, Aug 1882, *E. W. Holway s.n., N.A.F. 1286b*; Mt. Pleasant, Spring 1906, *F. J. Seaver, Ascomyc. & L. F. 11* (both MASS now NY). **MAINE:** Franklin Co. Jerusalem Twp., Hammond Pond, 1 Sep 1971, *M. E. Barr 5872a* (MASS now NY). **MASSACHUSETTS:** Franklin Co. Mt. Toby, 16 Sep 1973, *M. E. Barr 6166*, Conway, Pine Hill, 7 Dec 1975, *M. E. Barr 6277*, Conway, Baptist Hill, 27 Jun 1971, *M. E. Barr 5780*, 11 Mar 1979, *M. E. Barr 6534*, 23 Dec 1979, *M. E. Barr 6647*, 10 Feb 1980, *M. E. Barr 6698*, 14 Dec 1986, *M. E. Barr 7117*, 1 Nov 1987, *M. E. Barr 7130*, 31 Jan 1988, *M. E. Barr 7138* (all MASS now NY). **MICHIGAN:** Oakland Co. Rifle River Conservation Area, 9 May 1953, *M. E. Barr 723*; Emmet Co. Colonial Point, Burt Lake, 6 Sep 1969, *M. E. Barr 5381*, Gill-Elder roads, Carp Lake, on *Populus*, 11 Sep 1969, *M. E. Barr 5522* (all MASS now NY). **NEW JERSEY:** Gloucester Co. Newfield, *J. B. Ellis, N.A.F.1, 75, 77, 458* (all MASS now NY). **NEW YORK:** Rensselaer Co. Greenbush, May, *C. H. Peck s.n.* (NYS, isotype of *Hysterium variabile*), Greenbush, on *Vitis, C. H. Peck s.n.* (NYS, isotype of *H. viticolum*); Albany Co. Knowersville, on *Castanea*, May, *C. H. Peck s.n.*, Guilderland, May, *C. H. Peck s.n.* (all NYS as *H. variabile*); Dutchess Co. Poughkeepsie, on *Castanea, W. R. Gerard s.n.* (NYS, isotype of *Hysterium gerardii*). **PENNSYLVANIA:** Chester Co. West Chester, on *Salix*, Aug 1882, *B. M. Everhart & Haines, N.A.F. 1286a* (MASS now NY). **UTAH:** Iron Co. Cedar Mt., 17 Aug 1973, *M. E. Barr 6078* (MASS now NY). **VERMONT:** Lamoille Co. Ranch Brook, 1 Sep 1964, *M. E. Barr 4616* (MASS now NY).

4. Hysterographium subrugosum (Cooke & Ellis) Sacc., Syll. Fung. **2**: 780. 1883. Figs. 2g–i.

Ascomata to 1 mm long, 275–330 μm diam.; surface smooth; peridium 50 μm wide. *Asci* (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; conidiogenous cells 5–8 × 1 μm; conidia 2–2.5 × 0.7 μm (Lohman, 1932 as *H. minutum*).

In woody branches, north temperate zone.

Material examined: U.S.A. ARIZONA: Pima Co. Coronado Nat'l Forest, Soldier Canyon, Santa Catalina Mts., in *Vauquelinia californica*, 15 Aug 1976, *R. L. Gilbertson 11545*, Organ Pipe Cactus Nat'l Mon., Alamo Canyon, 1 Apr 1979, *R. L. Gilbertson 11928*, Saguaro Nat'l Monument, West Unit, on *Prosopis julifolia*, 29 Jul 1980, *R. L. Gilbertson s.n., M. E. Barr 6753*, base of Santa Catalina Mts., on *P. julifolia*, 2 Aug 1980, *M. E. Barr 6754*, Santa Rita Exp. Range, on *P. julifolia*, 11 Aug 1980, *M. E. Barr 6755* (all MASS now NY). **KANSAS:** Rooks Co. Rockport, on *Quercus*, May 1893, *E. Bartholomew, N.A.F. 3037* as *H. kansense* (MASS now NY). **MASSACHUSETTS:** Franklin Co. Conway, Baptist Hill, on *Malus*, 29 Dec 1984, *M. E. Barr 7023* (MASS now NY).

Lohman (1931) described ascospore germination 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-*

phium 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

8. Pleomassaria Speg., Anales Soc. Sci. Argentina **9**: tab. post 192. 1880.

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 ascospores as in *P. carpini* (Fuckel) Sacc., *P. siparia* (Berk. & Broome) Sacc., and *P. acericola* Petrak. Ascospore numbers in the ascus may be variable, but the ascospores 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 ascospores 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. Ascomata 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 obovoid, (30–)35–52 × 13–20 μm, surface foveolate; on *Carpinus*. ..... *P. carpini.*
         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.*
      6. Ascospores obovoid, 65–80(–94) × 20–26 μm; on *Magnolia*. ..... *P. maxima.*

1. Pleomassaria hesperia Barr, sp. nov.
Figs. 3a–c.

Ascomata immersa erumpentia globosa vel elongata 660–880(–1000) μm diametro, papillae breves, peridia basin versus 50–65 μm vel apicem versus 80–220 μm lata. *Asci* bitunicati basales 130–200 × 15–20(–26) μm duo- quatuor- sex- octospori. Pseudoparaphyses cellulosae. *Ascosporae* 32–46 × 12–15 μm luteobrunneae vel umbrinae fusiformes vel obovoideae transversaliter 7–11-septatae et longitudinaliter 1-(2-)septatae, tunica gelatinosa circumcinctae. Holotypus in *Populi tremuloidi* Michx. ligno decorticato, "Colorado, Larimer Co., Roosevelt Nat'l. Forest, Redfeather Lakes, 4 Aug 1984" a *M. E. Barr 7000* lectus in Herb. MASS (nunc NY) depositus; paratypus in *Salicis* sp. ligno decorticato, "Oregon, Lake Co., Paisley, 9 Jun 1984" a *M. Sherwood-Pike s.n.* lectus in Herb. MASS (nunc NY) depositus.

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. LEPTOSPHAERIACEAE

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. Figs. 3d, e.

Homostegia conorum Fuckel, Jahrb. Nassauischen Ver. Naturk. 29-30: 25. 1875; *Cucurbitaria conorum* (Fuckel) Petrak, Ann. Mycol. 38: 216. 1940; *Pleospora conorum* (Fuckel) Barr, Mycologia 73: 601. 1981.

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).

U.S.A. OREGON: Marion Co., on *Abies concolor,* 29 Mar 1966, *J. F. Boch s.n.*; Yamhill Co., Chehalem Mt., Winter 1969–1970, on *A. grandis,* 16 Apr 1970, *L. B. Loring s.n.* (all MASS now NY).

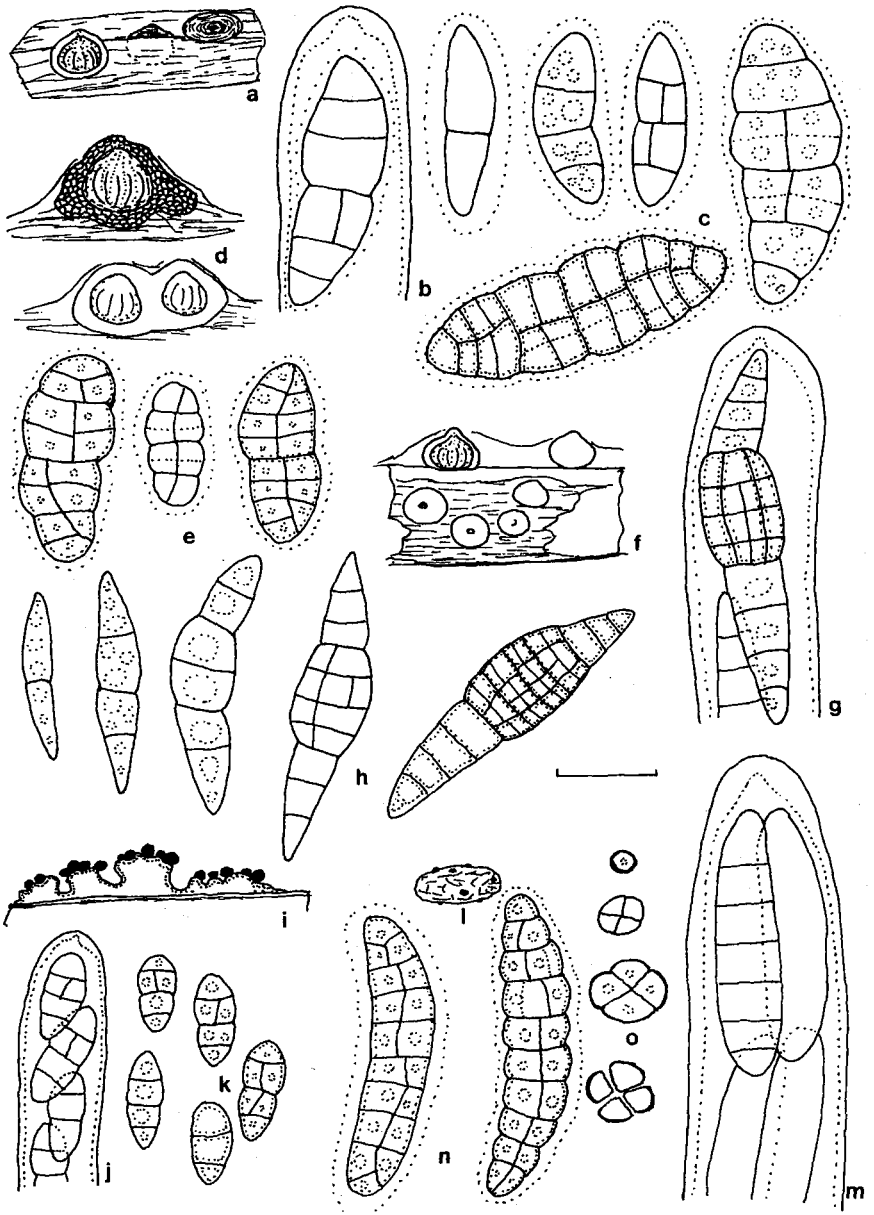
10. Heptameria Rehm & Thümen, Inst. Rev. Sci. Lett. 27: 252. 1879 (Dec) (Mycol. Lusit. n. 292, Mar 1878 sec Saccardo, 1883).

Verlotia Fabre, Ann. Sci. Nat. Bot. VI, 9: 108. Late 1879 or 1880 (Saccardo: Oct 1879).

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,

→

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.** *Cucurbidothis 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.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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.

1. Heptameria obesa (Dur. & Mont.) Sacc., Syll. Fung. **2**: 88. 1883. Figs. 3f–h.

Sphaeria obesa Durieu & Montagne, Flore d'Algerie 526. 1846–1849; *Leptosphaeria obesa* (Dur. & Mont.) Sacc., F. Ital. t. 284. 1878.

Sphaeria mesoedema Berk. & Curtis, Grevillea **4**: 151. 1876; *Heptameria mesoedema* (Berk. & Curtis) Sacc., Syll. Fung. **2**: 88. 1883; *Leptosphaeria mesoedema* (Berk. & Curtis) Ellis & Everh., North Amer. Pyrenomyc. 365. 1892.

Heptameria elegans Rehm & Thümen *in* Thümen, Inst. Rev. Sci. Lit., Coimbra **27**: 252, n. 292. 1879, Contr. Mycol. Lusit. 1, ser. VI, n. XXIV. 1878.

Verlotia helichrysi Fabre, Ann. Sci. Nat. Bot. VI, **9**: 108. 1879 [1880]; *Heptameria helichrysi* (Fabre) Sacc., Syll. Fung. **2**: 89. 1883.

Leptosphaeria thuemaniana Niessl *in* Thümen, Contr. Mycol. Lusit. Inst. Rev. Sci. Lit., Coimbra **28**: n. 528. 1880; *Heptameria thuemaniana* (Niessl) Sacc., Syll. Fung. **2**: 89. 1883.

Ascomata immersed beneath epidermis, superficial on cortex after epidermis sloughed, separate to gregarious, conoid, bases applanate, 495–660 μm 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 narrowed 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 muticum*, *Ravenel, F. Carol. 640* (MASS now NY, isosyntype of *Sphaeria mesoedema*).

F. CUCURBITARIACEAE

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

11. Cucurbidothis Petrak, Ann. Mycol. **19**: 201. 1921.

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 *Cucurbidothis* 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 *Cucurbidothis* 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.

1. Cucurbidothis pithyophila (Schmidt & Kunze: Fr.) Petrak, Ann. Mycol. **19**: 201. 1921, var. **pithyophila**. Figs. 3i–k.

Sphaeria pithyophila Schmidt & Kunze: Fr., Syst. Mycol. 2: 425. 1823; *Cucurbitaria pithyophila* (Schmidt & Kunze: Fr.) DeNot., Sferiacei Italici 60. 1863; *Gibberidea pithyophila* (Schmidt & Kunze: Fr.) Kuntze, Rev. Gen. Pl. 3: 481. 1898; *Curreya pithyophila* (Schmidt & Kunze: Fr.) von Arx & Müller, Stud. Mycol. Baarn 9: 80. 1975.

Melogramma spraguei Berk. & Curtis, Grevillea 4: 99. 1876; *Thyridium spraguei* (Berk. & Curtis) Sacc., Syll. Fung. 2: 325. 1883.

Ascomata developing from and gregarious over crustose, superficial stromatic tissues over scale insects, stromatic tissues blackened externally, whitish internally, of scleroplectenchymatous cells; ascomata globose or ovoid, 385–440(–600) μm diam.; apex rounded, short papillate, opening by small pore; surface smooth; peridium of scleroplectenchymatous cells as in stroma, to 60 μm wide, blackened externally. *Asci* 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 5750, DAOM 26771). U.S.A. CALIFORNIA: Siskiyou Co. Siskiyou Nat'l Forest, Camp Victoria, on *Pinus lambertiana,* 15 Aug 1936, *s. coll.* (MASS now NY ex For. Dis. Herb. Berkeley *98687* as *Pleospora* sp.). COLORADO: Clear Creek Co. Empire, on *P. flexilis,* 14 Aug 1919, *E. Bethel s.n.* (DAOM). IDAHO: Baeth's, on *P. flexilis,* 10 Sep 1917, *V. Simmons & J. R. Weir s.n.* (BPI). NEW YORK: Albany Co. W. Albany, on *Pinus,* May, *C. H. Peck s.n.* (NYS). WASHINGTON: Columbia Co. Columbia Nat'l. Forest, base of Red Mt., on *P. monticola,* 13 Aug 1924, *E. P. Meinecke & J. S. Boyce s.n.* (BPI).

12. Cucurbitaria S. F. Gray, Nat. Arr. Brit. Pl. 1: 519. 1821.

Crotonocarpia Fuckel, Jahrb. Nassauischen Ver. Naturk. 23-24: 163. 1870.

Gemmamyces Casagrande, Phytopathol. Z. 66: 119. 1969, nom. nov. for *Megalospora* Naumov, Mater. Mik. Fitopatol. 6(1): 9–10. 1927, hom. illeg., non Meyen, 1843; *Cucurbitariopsis* Vassilkov, Bot. Zurn. (Moscow & Leningrad) 45: 1369. 1960, hom. illeg., non R. Beck, 1882, nec Massalongo, 1889.

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. *Asci* basal and at times lateral, cylindric or somewhat clavate. Pseudoparaphyses cellular, extending into pore area. *Ascospores* brown, ellipsoid, fusoid or oblong and symmetric or obovoid 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 annelidic; conidia brown, muriform (*Camarosporium, Pseudodichomera*), or conidiogenous cells enteroblastic phialidic; conidia hyaline, elongate, several septate (*Megaloseptoria*), or minute (*Phoma*-like).

Hemibiotrophic 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 ascomata 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 turbinate 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 generically 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.*
      3. Ascospores 15–22 μm long, 3–5–7-septate.
         5. Ascospores 20–22 × 9–10 μm, ends obtuse. ..... 2. *C. arizonica.*
         5. Ascospores 15–18(–20) × 6–8 μm, ends acute. ..... 9. *C. rhamni.*
   2. Ascomata ovoid or globose in side view, widest in mid region or toward base.
      6. Ascomata ovoid; ascospores 20–30 × 7–13 μm, ends obtuse. ..... 8. *C. obducens.*
      6. Ascomata globose.
         7. Surface of ascoma coarsely warted; ascospores 25–36 × 10–15 μm, 7–13-septate, with two to three longitudinal septa, ends acute. ..... 7. *C. moriformis.*
         7. Surface of ascoma slightly roughened or smooth; ascospores narrower, with one longitudinal septum, ends obtuse.
            8. Ascospores 24–33 × 9–12 × 7.5 μm, slightly compressed, 3–5-(7-)septate. ..... 6. *C. longitudinalis.*
            8. Ascospores 18–28 μm long, not compressed, 3–5–7-septate.
               9. Ascospores 20–28 × 8–11 μm, inequilateral to slightly curved. ..... 11. *C. tenacella.*
               9. Ascospores 18–24 × 7–11 μm, straight. ..... 1. *C. ailanthi.*
1. Ascospores asymmetric, upper hemispore wider than lower.
   10. Ascomata turbinate in side view, surface roughened; ascospores 27–48 × 12.5–16 μm, upper hemispore short and wide, lower hemispore tapered to base. ..... 10. *C. staphula.*
   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.*

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

Gibberidea ailanthi (Rabenh.) Kuntze, Rev. Gen. Pl. **3:** 481. 1898.

Cucurbitaria negundinis Winter *in* Rabenh., Kryptogamenfl. **1(2):** 329. 1885; *Gibberidea negundinis* (Winter) Kuntze, Rev. Gen. Pl. **3:** 481. 1898.

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 μm 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, hemispores 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. Griffiths, 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.

3. Cucurbitaria berberidis (Pers.: Fr.) S. F. Gray, Nat. Arr. Brit. Pl. **1:** 519. 1821. Figs. 4a–c.

Sphaeria berberidis Pers.: Fr., Syst. Mycol. **2:** 415. 1823; *Gibberidea berberidis* (Pers.: Fr.) Kuntze, Rev. Gen. Pl. **3:** 481. 1898.

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*) spp., 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).

U.S.A. COLORADO: La Plata Co. Hermosa, on *B. fendleri*, Mar 1899, *C. F. Baker s.n.*; Durango, 19 Mar 1899, *C. F. Baker s.n.* (both NY). **MASSACHUSETTS:** Essex Co. Manchester, Mar 1889, May 1889, *W. C. Sturgis s.n.*, Waverley, 15 Jul 1882, *R. A. Harper s.n.*, 13 Apr 1898, *C. A. King s.n.*, Arlington, 10 Mar 1892, *L. N. Johnson s.n.* (all NY). **OREGON:** Benton Co. Corvallis, on *B. aquifolium*, s. coll. (NY). **PENNSYLVANIA:** Chester Co. West Chester, *B. M. Everhart s.n.* (NY). **WASHINGTON:** Snohomish Co. Marysville, Aug 1924, *J. M. Grand s.n.* (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.

Sphaeria amorphae Wallroth, Fl. Cryptog. Germ. **4:** 781. 1833; *Cucurbitaria amorphae* (Wallr.) Fuckel, Jahrb. Nassauischen Ver. Naturk. **23–34:** 174. 1870; *Gibberidea amorphae* (Wallr.) Kuntze, Rev. Gen. Pl. **3:** 481. 1898.

Sphaeria coluteae Rabenhorst, Herb. Mycol. n. 1239. 1849; *Cucurbitaria coluteae* (Rabenh.) Auerswald *in* Fuckel, Jahrb. Nassauischen Ver. Naturk. **23–24:** 174. 1870; *Gibberidea coluteae* (Rabenh.) Kuntze, Rev. Gen. Pl. **3:** 481. 1898.

Ascomata immersed to erumpent, gregarious in subiculum of brown hyphae, 450–600 μm

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 *Colutea arborescens,* 28 May 1931, *J. Dearness, F. Col. 4115* (MASS now NY).

U.S.A. KANSAS: Rooks Co. Rockport, on *Amorpha,* Jul 1894, *E. Bartholomew, N.A.F. 3221, F. Col. 1524* (MASS now NY). **MASSACHUSETTS:** Essex Co. Arlington, 28 Feb 1898, *J. G. Hall s.n.* (NY). **MICHIGAN:** Washtenaw Co. Ann Arbor, 4 May 1893, *L. N. Johnson s.n.*; Cheboygan Co. U. Michigan Biological Station, 12 Aug 1971, *C. T. Rogerson s.n.* (both NY). **NEW JERSEY:** Gloucester Co. Newfield, 10 Aug 1879, *J. B. Ellis s.n.* (NY). **NEW YORK:** Orleans Co. Lyndonville, Mar 1888, *C. E. Fairman s.n.*; Bronx Co. Bronx Park, 23 May 1976, *C. T. Rogerson s.n.* (both NY). **NORTH CAROLINA:** s. loc., *Ravenel, F. Carol. 56* (NY). **PENNSYLVANIA:** Chester Co. West Chester, on *Robinia pseudoacacia, B. M. Everhart s.n., N.A.F. 1955* (MASS now NY); West Chester, *B. M. Everhart s.n.* (NY). **SOUTH DAKOTA:** Jun 1925, *J. F. Brenckle, F. Dakot. 603* (NY). **VERMONT:** Windham Co. Brattleboro, on *Robinia pseudoacacia, C. C. Frost s.n., W. W. Denslow 151* (MASS now NY). **WEST VIRGINIA:** Fayette Co., 15 Jan 1894, s. coll. (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.

5. Cucurbitaria interstitialis (Cooke & Peck) Barr *in* Barr et al., New York State Mus. Bull. **459:** 26. 1986. Fig. 4q.

Sphaeria interstitialis Cooke & Peck, Rep. New York State Mus. **29:** 61. 1878; *Teichospora interstitialis* (Cooke & Peck) Sacc., Syll. Fung. **2:** 293. 1883; *Strickeria interstitialis* (Cooke & Peck) Kuntze, Rev. Gen. Pl. **3:** 534. 1898.

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.

Material examined: U.S.A. NEW YORK: Rensselaer Co. Greenbush, Nov, *C. H. Peck s.n.* (NYS, holotype, isotype).

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.

Gibberidea longitudinalis (Peck) Kuntze, Rev. Gen. Pl. **3:** 481. 1898.

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.

Material examined: U.S.A. New York: Albany Co. Center, May 1879, *C. H. Peck s.n.* (NYS, holotype).

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 *Clathrospora.* The ascomata and other features suggest affinity to other species in *Cucurbitaria.*

7. Cucurbitaria moriformis (Fuckel) Barr, Mycotaxon **29:** 503. 1987. Figs. 4j, k.

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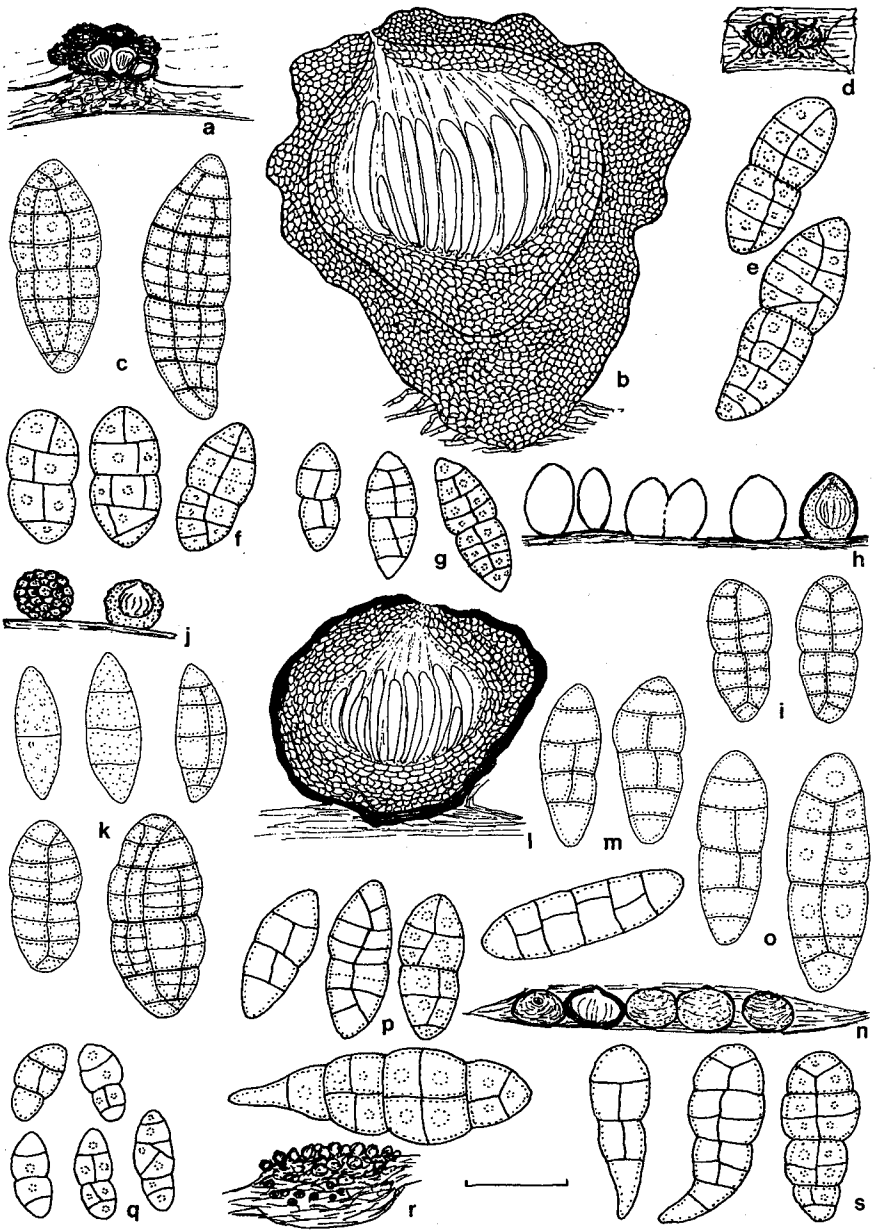
Fig. 4. Species of *Cucurbitaria.* **a–c.** *C. berberidis:* **a,** habit, **b,** ascoma in vertical section, **c,** ascospores. **d, e.** *C. elongata:* **d,** habit, **e,** ascospores. **f.** *C. arizonica,* ascospores. **g.** *C. rhamni,* ascospores. **h, i.** *C. obducens:* **h,** habit, **i,** ascospores. **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.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Crotonocarpia moriformis Fuckel, Jahrb. Nassauischen Ver. Naturk. 23-24: 163. 1870.

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. *Asci* 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).

U.S.A. MASSACHUSETTS: Franklin Co. Conway, Baptist Hill, on *Berberis vulgaris*, 27 Jan 1980, *M. E. Barr 6685* (MASS now NY).

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.

8. Cucurbitaria obducens (Fr.) Petrak, Ann. Mycol. 25: 226. 1927. Figs. 4h, i.

Sphaeria obducens Fr., Syst. Mycol. 2: 456. 1823; *Teichospora obducens* (Fr.) Fuckel, Jahrb. Nassauischen Ver. Naturk. 23-24: 161. 1870; *Strickeria obducens* (Fr.) Kuntze, Rev. Gen. Pl. 3: 533. 1898.

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. *Asci* 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.

Material examined: ENGLAND. On *Fraxinus, C. B. Plowright, Sphaer. Brit. I, 71*; 1871, *C. B. Plowright*; 1873, *Rev. Bloxam* (all NY).

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 lentago*, 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).

U.S.A. COLORADO: Grand Co. Sulfur Springs, on *Amelanchier oreophila*, 23 Jul 1907, *F. E. & E. S. Clements, Cryptog. Form. Colorad. 456* (NY as *Tichospora praestipa* ined.); Larimer Co. Vicinity of Tolland, 24–26 Aug 1910, *F. J. Seaver & E. Bethel s.n.* (NY).

The unpublished *'Tichospora' 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.

Sphaeria rhamni Nees: Fr., Syst. Mycol. 2: 417. 1823; *Gibberidea rhamni* (Nees: Fr.) Kuntze, Rev. Gen. Pl. 3: 481. 1898.

Ascomata erumpent, gregarious in brown subiculum, turbinate, 440–495 μm diam.; surface smooth or roughened; peridium 50–60 μm wide. *Asci* 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.

Material examined: ENGLAND. Lynn, on *R. frangula*, 1875, *C. B. Plowright, Sphaer. Brit. III, 25* (NY).

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

CANADA. ONTARIO: Wilcox Lake, on *R. cathartica*, 28 Apr 1933, *H. S. Jackson s.n. ex Herb. R. F. Cain 1915* (NY).

10. Cucurbitaria staphula Dearness ex R. H. Arnold & R. C. Russell, Mycologia 52: 501. 1960. Figs. 4r, s.

Ascomata erumpent, densely gregarious over gall-like enlargements of branches, turbinate,

185–300 μm wide, 335–470 μm high; surface dull black, roughened; peridium wide. *Asci* 144–240 × 17.5–25.5 μm. *Ascospores* 27–48 × 12.5–16 μm, brown, obovoid, lower hemispore strongly tapered, 3–7-septate, with one longitudinal septum in mid cells, constricted at first-formed septum.

Anamorph coelomycetous; conidiomata as locules in stromatic projections, 75–295 μm wide, 100–300 μm high; conidia 12.5–16 × 8–10.5 μm brown, 1–3-septate, with one longitudinal septum in one or two or all cells; described as *Pseudodichomera* (Arnold & Russell, 1960). Microconidial state with conidia 3–6(–8) × 1–2(–3.5) μm, hyaline, cylindric, or 2 × 1–1.5 μm, pale olivaceous, ovoid (Zalaskey, 1964).

On galls on branches of *Populus balsamifera* L., *P. tremuloides* Michx., known from central Saskatchewan.

Material examined: CANADA. SASKATCHEWAN: Beaver Creek, Saskatoon, 7 Sep 1929, *R. C. Russell s.n.* (DAOM 14544, UPS, isotype).

The details of development of this species, found on galls or "rough bark" in association with *Macrophoma tumefaciens* Shear [=*Diplodia tumefaciens* (Shear) Zalaskey], were provided by Arnold and Russell (1960). The ascospores of *C. staphula* are similar in shape to those of the *Chaetoplea aspera* series of species (see under that genus), but are larger. The ascomata are turbinate, not collabent, with minute apical papilla and wide peridium and thus quite different from those of species of *Chaetoplea*. Both the anamorphs and teleomorphs develop over galls caused by *Diplodia tumefaciens* (Shear) Zalaskey, whose teleomorph, found on infected roots, was described by Zalasky (1974) under the name *Keissleriella emergens* (Karsten) Bose.

11. Cucurbitaria tenacella (Fr.) Barr, comb. nov. Figs. 4l, m.

Sphaeria tenacella Fr., Syst. Mycol. **2**: 492. 1823; *Teichospora tenacella* (Fr.) Ellis & Everh. Proc. Acad. Nat. Sci. Philadelphia **47**: 25. 1895; *Strickeria tenacella* (Fr.) Kuntze, Rev. Gen. Pl. **3**: 534. 1898.

Ascomata scattered or gregarious on thin blackened stromatic layer, 330–495 μm diam., globose; surface dull, smooth, peridium 40–45 μm wide, to 65 μm wide at base. *Asci* 100–120 × 12–15 μm. *Ascospores* 20–28 × 8–11 μm, clear brown or dull brown, obovoid, ends obtuse, (3–4–)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.

Material examined: U.S.A. NEW YORK: Genessee Co. Bergen Swamp, on *Spiraea salicifolia*, Jul, *C. H. Peck s.n.* (NYS as *Teichospora opulastri* Dearness & House, ined.). **PENNSYLVANIA:** Northampton Co. Bethlehem, *ex Herb. Schweinitz* (NY).

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

13. Pleophragmia Fuckel, Jahrb. Nassauischen Ver. Naturk. **23–24**: 243. 1870 (nom. nud. F. Rhen. 2272. 1869).

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.

1. Pleophragmia leporum Fuckel, Jahrb. Nassauischen Ver. Naturk. **23–24**: 243. 1870. Figs. 3l–o.

Pleospora leporum (Fuckel) von Höhnel, Sitzungsber. Kaiserl. Akad. Wiss. Math.-Naturwiss. Kl., Abt. 1, **129**: 163. 1920.

Ascomata 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 partspores; 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).

U.S.A. NEW YORK: Essex Co. Adirondacks, Seventh Lake, on deer dung, 11 Aug 1934, *R. F. Cain 5702* (NY).

Cain (1934) described and illustrated this species from Ontario, and a larger-spored species *P. ontariensis* Cain, whose ascospores measure 55–68 × 15–19 μm. *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. rufescentis* (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.

14. Teichospora Fuckel, Jahrb. Nassauischen Ver. Naturk. **23–24:** 169. 1870.

Ascomata 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, biconoid 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 ascomata 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 ascomata. Rehm (1879) examined Körber's fungus and declared that it did not form a thallus, further that *Teichospora pezizoides* Sacc. & Speg. was identical with *S. kochii*, and that *Strickeria* belonged in the "Sphaeriaceae." Saccardo (1883) and others subsequently utilized *Teichospora*, and recognized subg. *Eu-Teichos-*

pora to include species with noncollabent ascomata, subg. *Strickeria* to include species with collabent ascomata. Winter (1885) and Kuntze (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 asci develop basally, pseudoparaphyses are narrowly cellular, 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 *Teichospora* 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 × 7.5–10 μm, 5–10-septate; ascomata immersed in abundant tomentum. . . . . 17. *T. sambuci.*
      3. Ascospores 28–40(–46) × 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) × 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. Ascomata bearing short radiating hyphal appendages over upper surface; ascospores (25–)30–40 × 12–18 μm, 11–15-septate. . . . . 21. *T. zabriskieana.*
         5. Ascomata glabrous or when tomentose, hyphae recumbent.
            6. Hyphae, peridium, and apical cells reddened; ascospores red brown, (15–)20–32 × (6–)8–10 μm. . . . . 2. *T. bartholomewii.*
            6. Hyphae, peridium, and apical cells brown; ascospores brown, 28–33(–40) × 10–13(–16) μm. . . . . 1. *T. aridophila.*
1. Ascospores symmetric or slightly asymmetric, the two hemispores nearly equal in length and width.
   7. Ascomata bearing short radiating hyphal appendages over upper surface; ascospores (15–)18–22 × 7–10 μm,(3–)5–7-septate. . . . . 8. *T. hispida.*
   7. Ascomata glabrous or hyphae recumbent.
      8. Ascomata superficial on pericarps of *Carya*, shining black above, appressed recumbent hyphae

below forming brown weft around bases; ascospores 18–23 × 6–7.5(–8) μm, 5–7-septate. ..... 12. *T. nucis.*

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.
      10. Ascospores 13–21(–23) × 6–8(–9) μm, 3–5–7-septate. ..... 11. *T. nigrobrunnea.*
      10. Ascospores (17–)20–27(–32) × (7.5–)9–11(–13) μm, (3–5)7–(9-)septate. ... 20. *T. winteriana.*
   9. Ascomata not usually associated with other ascomycetes, surface dull with tomentum or roughened by protruding cells and short hyphae.
      11. Ascospores (10–)12–23(–25) μm long.
         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.
            13. Ascospores 12–15 × 6–7(–7.5) μm, ellipsoid oblong with obtuse ends, 3–(4-)septate; ascomata ovoid. ..... 13. *T. opuntiae.*
            13. Ascospores 15–23(–25) μm long, ellipsoid fusoid with acute or somewhat obtuse ends.
               14. Ascospores deeply constricted at first-formed septum, biconoid, 6.5–10 μm wide, reddish brown; ascomata widely erumpent. ..... 14. *T. quercina.*
               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 immersed in little pustules, apices pallid. ..... 9. *T. juglandis.*
                  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.
                        17. Ascomata small, 165–330 μm diam., obpyriform. ..... 15. *T. rhypodes.*
                        17. Ascomata medium sized, 330–495 μm diam., ovoid. ..... 10. *T. minimispora.*
      11. Ascospores (17–)20–30(–36) μm long.
         18. Ascospores 21–30 × 8–10 μm, fusoid with acute ends. ..... 7. *T. coremae.*
         18. Ascospores (17–)20–30(–36) × (8–)9–14(–15) μm, broadly ellipsoid or oblong with obtuse ends.
            19. Ascomata immersed erumpent in ample tomentum. ..... 3. *T. borealis.*
            19. Ascomata erumpent superficial, hyphae sparse.
               20. Ascomata densely gregarious on wood, surface roughened and irregular with protruding cells. ..... 6. *T. congesta.*
               20. Ascomata separate to gregarious, erumpent through fibers, surface slightly roughened with hyphae or protruding cells. ..... 18. *T. solitaria.*

1. Teichospora aridophila Peck, Bot. Gaz. 7: 57. 1882. Fig. 5i.

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, obovoid, ends obtuse, asymmetric, upper hemispore wider and longer than lower, inequilateral to curved, 7–9-(11-)septate, with one or two (three) longitudinal

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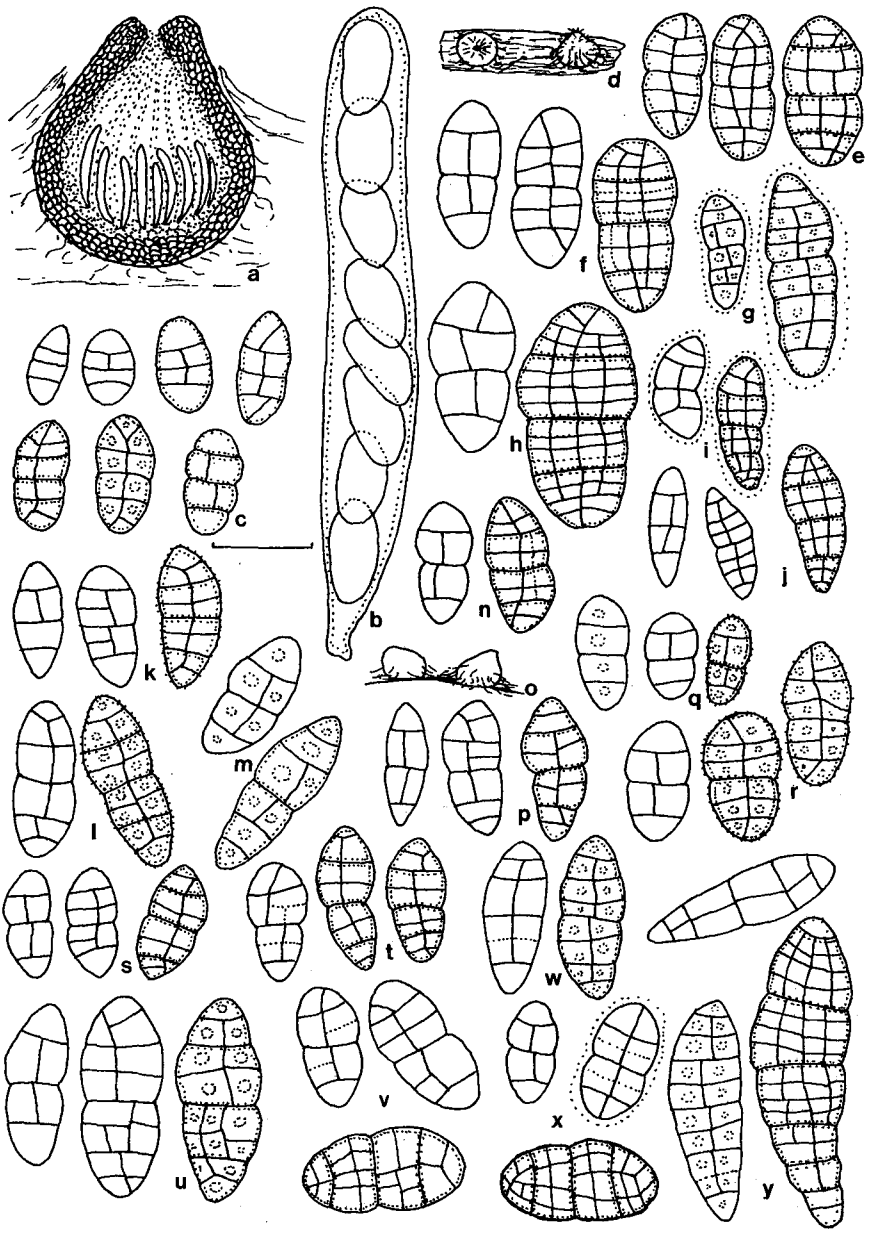
Fig. 5. Species of *Teichospora.* **a–c.** *T. trabicola:* **a,** ascoma in vertical section, **b,** ascus, **c,** ascospores. **d, e.** *T. hispida:* **d,** habit, **e,** ascospores. **f.** *T. borealis,* ascospores. **g.** *T. sambuci,* ascospores. **h.** *T. zabriskeana,* ascospores. **i.** *T. aridophila,* ascospores. **j.** *T. bartholomewii,* ascospores. **k.** *T. comptoniae,* ascospores. **l.** *T. coremae,* ascospores. **m.** *T. juglandis,* ascospores. **n.** *T. nigrobrunnea,* ascospores. **o, p.** *T. nucis:* **o,** habit, **p.** ascospores. **q.** *T. opuntiae,* ascospores. **r.** *T. quercina,* ascospores. **s.** *T. rhypodes,* ascospores. **t.** *T. ribis,* ascospores. **u.** *T. solitaria,* ascospores. **v.** *T. winteriana,* ascospores. **w.** *T. minimispora,* ascospores. **x.** *T. congesta,* ascospores. **y.** *T. clavispora,* ascospores. Standard line = 15 μm for ascus and ascospores, 150 μm for ascoma. Habit sketches not to scale.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septa, oblique when in end cell; wall smooth or finely verruculose.

On decorticated wood, arid western North America.

Material examined: U.S.A. ARIZONA: No locality given, on wood, 13 Apr 1881, *C. G. Pringle 43* (NYS, labelled syntype but declared lectotype by Barr et al., 1986). UTAH: Iron Co. Road to Lunt, on *Artemisia tridentata,* 22 Aug 1973, *M. E. Barr 6154a* (MASS now NY).

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 hemispore both longer and wider as in those of *T. bartholomewii* which differs especially in cylindric asci and strong reddish pigmentation to peridium, hyphae and ascospores.

2. Teichospora bartholomewii Barr, sp. nov. Fig. 5j.

Ascomata erumpentia superficialia globosa 330–550 μm diametro, apice rubra, hyphae superficiales rubrae, peridia 39–60 μm lata rubrobrunnea. *Asci* bitunicati (60–)100–120 × (10–)15–16 μm. Pseudoparaphyses cellulosae. *Ascosporae* (15–)20–32 × (6–)8–10 μm rubrobrunneae obovoideae, hemispora supera infernae longiori et latiori, transversaliter 3–5–7–9-septatae et longitudinaliter 1–2-septatae. Holotypus in *Querci* cortice, "Kansas, Rooks Co., Stockton, 4 Nov 1912," a E. Bartholomew lectus in Herb. NY depositus; isotypi "*F. Col. 4989*" sub nomine *Teichosporae obducentis* (MASS, NY).

Ascomata scattered, erumpent superficial, 330–550 μm diam., nearly globose with wide papilla, apex pale reddish, surface reddish, roughened by short reddish brown hyphae; peridium 39–60 μm wide, bright reddish brown. *Asci* (60–)100–120 × (10–)15–16 μm. *Ascospores* (15–)20–32 × (6–)8–10 μm, reddish brown, narrowly obovoid, ends acute, asymmetric, upper hemispore wider and longer than lower, 3–5–7–9-septate, with one or two longitudinal septa; 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. obducens*). 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 hemispore is both wider and longer than the lower are similar to those of *T. aridophila,* but other features differ. The original determination as *T. obducens* 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 asci and ascospores, but has identical ascomata with reddened surface and reddish brown hyphae.

3. Teichospora borealis (Ellis & Everh.) Barr, comb. nov. Fig. 5f.

Cucurbitaria borealis Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia 46: 334. 1894; *Gibberidea borealis* (Ellis & Everh.) Kuntze, Rev. Gen. Pl. 3: 481. 1898.

Ascomata immersed to erumpent 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 × 10–20 μm. *Ascospores* 20–30(–35) × (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. Dearness 986* (NY; one collection as *Thyridium ambleium*); Parkhill, 24 May 1892, *J. Dearness 1847* (NY as *Fenestella minor*).

U.S.A. MASSACHUSETTS: Franklin Co. Conway, Baptist Hill, on *Salix,* 26 Apr 1978, *M. E. Barr 6429,* 11 Mar 1979, *M. E. Barr 6535* (both MASS now NY). NEW YORK: Tompkins Co. Alcove, on *Salix,* Dec 1893, *C. L. Shear, N.Y.F. 216* (NY, holotype).

Teichospora borealis has well-developed tomentum surrounding globose ascomata, large cy-

lindric asci and wide, often oblong ascospores. Welch (1926) excluded the species from *Cucurbitaria,* and included it in his grouping of "A. Amphisphaeriaceae" where at least some of the taxa have been transferred to *Teichospora.*

4. Teichospora clavispora Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia **46:** 330. 1894. Fig. 5y.

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

Teichospora piriospora Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia **46:** 331. 1894; *Strickeria piriospora* (Ellis & Everh.) Kuntze, Rev. Gen. Pl. 3: 534. 1898.

Lophidium pachystomum Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia **46:** 333. 1894.

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.

Material examined: U.S.A. KANSAS: Rooks Co., on *Negundo aceroides (=Acer nedungo),* 14 Jul 1894, *E. Bartholomew, Kansas F. 1509* (NY, holotype of *T. clavispora,* 3 packets), Rockport, on *Fraxinus viridis,* 1 Mar 1894, *E. Bartholomew 1233 part* (NY, holotype of *T. piriospora*), on *Populus monilifera,* 21 Sep 1894, *E. Bartholomew 1583* (NY, holotype of *L. pachystomum*).

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 pachyspo-rum* (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, 3–5–7-septate, with one longitudinal septum rarely into end cells; wall smooth or finely verruculose.

In dead branches of *Comptonia peregrina,* northeastern North America.

Material examined: CANADA. ONTARIO: Bear Island, Lake Timagami, 16 Jun 1933, *R. F. Cain 1191* (NY).

U.S.A. DISTRICT OF COLUMBIA: Washington, 6 Sep 1890, *F. W. Anderson s.n.* (NY). **MASSACHUSETTS:** Worcester Co. Petersham, Harvard Forest, 16 Sep 1961, *M. E. Barr 3136* (MASS now NY). **NEW HAMPSHIRE:** Carroll Co. Redstone, E. Conway Road, 11 Aug 1963, *M. E. Barr 4050* (MASS now NY). **NEW JERSEY:** Gloucester Co. Malaga, 22 Feb 1877, *J. B. Ellis 1496 (629)* (NY, isotype marked "original specimen"), Newfield, Jan 1878, *J. B. Ellis s.n.* (NY), Nov 1885, *J. B. Ellis s.n.* (NY), s. data, *N.A.F.I, 95* (MASS now NY).

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 *Berlesiella* (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.

Teichospora tuberculata Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia **46:** 330. 1894; *Strickeria tu-*

berculata (Ellis & Everh.) Kuntze, 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, ends obtuse, 7–9-septate, with two or three longitudinal septa, septa thin and often irregular in position; wall darkened, smooth.

On decorticated wood of Magnoliaceae, eastern North America.

Material examined: U.S.A. NEW JERSEY: Gloucester Co. Newfield, May 1877, s. coll. (NY, marked "original" of *C. congesta*, empty packet only), all on *Magnolia*, 3 Jul 1881, Dec 1881, 22 Jan 1882, 24 Jul 1882, 5 Apr 1884, *J. B. Ellis s.n.* (all NY). OHIO: s. loc., on *Liriodendron tulipifera, Morgan 1004* (NY, holotype of *T. tuberculata*).

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 ascus and ascospore shape, but the ascospores measure 33–37 × 15–18 μm in the latter species.

7. Teichospora coremae (Ellis & Everh.) Barr, comb. nov. Fig. 5l.

Cucurbitaria coremae Ellis & Everh., Bull. Torrey Bot. Club **10:** 89. 1883; *Gibberidea coremae* (Ellis & Everh.) Kuntze, Rev. Gen. Pl. **3:** 481. 1898.

Ascomata erumpent to superficial, gregarious, ca. 385 μm diam., obpyriform, surface pulverulent; peridium ca. 40 μm wide. *Asci* 100–150 × 15–20 μm. *Ascospores* 21–30 × 8–10 μm, brown, fusoid, ends acute, 5–7–(8-)septate, with one longitudinal septum in mid cells, rarely into one end cell; wall verruculose.

On dead branches of *Hudsonia tomentosa*, known from New Jersey.

Material examined: U.S.A. NEW JERSEY: Gloucester Co. Newfield, *J. B. Ellis, N.A.F. 1189* (MASS, NY, isotypes), Willow Grove, Autumn 1882, (NY), Aut 1883, all *J. B. Ellis s.n.* (MASS now NY).

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 conradii*, as Ellis and Everhart (1892) noted. Narrowly fusoid ascospores with a single longitudinal septum aid to identify the species.

8. Teichospora hispida Fuckel, J. Nassauischen Ver. Naturk. **25-26:** 305. 1871. Figs. 5d, e.

Pleosphaeria hispida (Fuckel) Sacc., Syll. Fung. **2:** 305. 1883; *Strickeria hispida* (Fuckel) Winter in Rabenhorst, Kryptogamen-Fl. **1(2):** 288. 1885.

Ascomata scattered or gregarious under loosened periderm, superficial in decorticated areas, separate or at times connected at sides, 165–385 (–550) μm diam., globose or obpyriform, papilla narrow to wide, upper surface roughened with stout, protruding, reddish brown hyphae, to 50 μm long; peridium 15–40(–50) μm wide, dark brown or reddish brown. *Asci* (70–)100–140 × (9–)12–18 μm. *Ascospores* (15–)18–22 × 7–10 μm, pale brown to dark reddish brown, ends paler, ellipsoid, ends obtuse, (3–)5–7-septate, with one (two to three) longitudinal septa, constricted at first-formed septum; wall smooth.

In branches of various trees and shrubs, at times over remnants of stromatic ascomycetes, widespread.

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

U.S.A. COLORADO: La Plata Co. Mancos, on *Juniperus*, 8 Jul 1898, *C. F. Baker s.n.* (NY as *Strickeria* sp.). MASSACHUSETTS: Franklin Co. Conway, Baptist Hill, on *Betula*, 28 May 1968, *M. E. Barr 5135*, on *Robinia pseudoacacia*, 3 Nov 1968, *M. E. Barr 5271*, on *Aesculus hippocastanum*, 31 May 1979, *M. E. Barr 6561* (all MASS now NY). MICHIGAN: Washtenaw Co. Ann Arbor, on *Cassandra calyculata*, 18 Apr 1893, *L. N. Johnson s.n.* (NY, as *Cucurbitaria cassandrae* ined.).

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.

9. Teichospora juglandis (Ellis & Everh.) Barr, comb. nov. Fig. 5m.

Pleospora juglandis Ellis & Everh., Bull. Torrey Bot. Club **24:** 279. 1897.

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 biconoid; wall smooth.

In twigs of *Juglans*, mid and western North America.

Material examined: U.S.A. ARIZONA: Santa Cruz Co. Coronado Nat'l. Forest, Pena Blanca Rec. Area, Sycamore Canyon, on *J. major*, 7 Aug 1980, *M. E. Barr 6808* (MASS now NY). KANSAS: Rooks Co., on *J. nigra*, 12 May 1897, *E. Bartholomew 2405* (NY, holotype).

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* (Melanommatales).

10. Teichospora minimispora Barr, nom. nov. Fig. 5w.

Cucurbitaria minima Ellis & Everh., Bull. Torrey Bot. Club **4**: 460. 1897, non *Teichospora minima* Ellis & Everh., 1895.

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.

Material examined: U.S.A. CALIFORNIA: s. loc., on *Baccharis halimifolia, H. W. Harkness, N.A.F. 1559* as *Dothidea baccharidis* (NY). COLORADO: Gunnison Co. Near Gunnison, on *Artemisia tridentata*, Jun 1897, *E. Bethel 311e* (NY, holotype).

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*.

11. Teichospora nigrobrunnea (Schwein.) Starb., Bih. K. Svenska Vet.-Akad. Handl. Afd. **3**(2): 41. 1894. Fig. 5n.

Sphaeria nigrobrunnea Schwein., Trans. Amer. Philos. Soc. II, **4**(2): 213 (n. 1563). 1832. *Strickeria nigrobrunnea* (Schwein.) Kuntze, Rev. gen. pl. 3: 534. 1898.

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 stromata of other ascomycetes, eastern North America.

Material examined: U.S.A. GEORGIA: Clarke Co. Athens, U. Georgia Bot. Garden, on *Quercus*, 25 Aug 1978, *M. E. Barr 6483* (MASS now NY). MASSACHUSETTS: Franklin Co. Mt. Toby, 14 May 1968, *M. E. Barr 5130*, Ruggles Pond, Wendell State Forest, 13 Oct 1972, *M. E. Barr 6026*, Webber Road, W. Whately, 7 Aug 1988, *M. E. Barr 7148* (all MASS now NY). MICHIGAN: Cheboygan Co. U. Michigan Biological Station, The Hermit's, 23 Aug 1953, *M. E. Barr 1534* (MASS now NY, with and under *Discostroma corticola*). NEW HAMPSHIRE: Carroll Co. South Conway, on *Quercus rubra*, 3 Jul 1963, *M. E. Barr 3815c* (MASS now NY). NEW JERSEY: Gloucester Co. E. Galway, on *Robinia pseudoacacia*, Apr 1894, s. coll. (NY), Newfield, on *Acer, J. B. Ellis 2834b* (NY as *Thyridium ambleium*). SOUTH DAKOTA: Spink Co. Northville, on

Symphoricarpos occidentalis, May 1929, *J. F. Brenckle, F. Dakot. 654* (NY as *T. umbonata*).

The smooth, shining surface of ascomata and fusoid ascospores are characteristic for the species. *Teichospora mycogena* Ellis & Everh. (Proc. Acad. Nat. Sci. Philadelphia **42**: 242. 1890) may be synonymous with this taxon, but the type specimen has not been located as yet.

12. Teichospora nucis Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia **45**: 446. 1894. Figs. 5o, p.

Strickeria nucis (Ellis & Everh.) Lindau *in* Engler & Prantl, Natürl. Pflanzenfam. **1(1)**: 416. 1897.

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.

Material examined: U.S.A. New Jersey: Gloucester Co. Newfield, 18 May 1893, *J. B. Ellis s.n.* (NY, holotype).

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

13. Teichospora opuntiae Ellis & Everh., Bull. Torrey Bot. Club **24**: 459. 1897. 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 reddish 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.

Material examined: U.S.A. Colorado: Pueblo Co. Pueblo, Jul 1897, *E. Bethel 329* (NY, holotype).

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.

Cucurbitaria quercina Ellis & Everh., Bull. Torrey Bot. Club **24**: 460. 1897.

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, obliquely when in end cell, constricted deeply at first-formed septum; wall smooth or finely verruculose.

On old periderm or decorticated wood, western North America.

Material examined: U.S.A. Colorado: Larimer Co. Fort Collins, on *Populus*, 4 Mar 1894, *C. F. Baker 224 p.p.* (NY), on *Populus*, Apr 1898, *C. S. Crandall s.n., F. Col. 1318* as *Amphisphaeria bisphaerica* (MASS now NY); Pueblo Co. Greenhorn, on *Quercus undulata*, Jul 1897, *E. Bethel 337* (NY, holotype); La Plata Co. Hermosa, on *Quercus*, 18 Mar 1899, *C. F. Baker s.n.* (NY as *Strickeria* sp.); Huerfano Co. La Veta, on *Q. undulata*, 21 Jun 1907, *F. E. & E. S. Clements, Crypt. Form. Colorado. 458* (NY).

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.

15. Teichospora rhypodes Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia **46**: 331. 1894. Fig. 5s.

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

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.

Material examined: U.S.A. COLORADO: Larimer Co. Foothills, on *Cercocarpus parvifolius,* 9 Apr 1898, *C. S. Crandall s.n.* (NY). KANSAS: s. loc., on *Prunus,* 4 Mar 1895, *E. Bartholomew s.n.* (NY). MASSACHUSETTS: Hampden Co. Longmeadow, Fanny Stebbins Preserve, on *Rhus,* 30 Sep 1970, *M. E. Barr 5650b* (MASS now NY). MICHIGAN: Washtenaw Co. Ann Arbor, on *Rhus,* 15 Apr 1893, *L. N. Johnson s.n.* (NY, holotype).

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

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

Ascomata erumpentia superficialia saepe aggregata vel seriata globosa 260–495(–550) μm diametro, superficie anthracinae, peridia 20–50 μm lata. *Asci* bitunicati basales 80–120 × 10–14.5(–18) μm. Pseudoparaphyses cellulosae. *Ascosporae* 15.5–22(–24) × 7.5–10(–12) μm brunneae obovoideae asymmetricae, hemispora superna infernae longiori et latiori, transversaliter (3–)5–7-septatae et longitudinaliter 1-(2-)septatae. Holotypus et isotypi in *Ribis* ramis, "Helena, Montana, Apr 1889" a F. D. Kelsey lecti in Herb. NY depositus "*N.A.F. 2370*" sub nomine *Cucurbitariae ribis* Niessl.

Ascomata erumpent to superficial, often 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.

Material examined: (in herbaria under *Cucurbitaria ribis*) CANADA. ONTARIO: Brant Co., 28 Mar 1932, *R. F. Cain 140* (NY).

U.S.A. COLORADO: Rio Grande Co. Del Norte, on *R. aureum,* Jul 1897, *E. Bethel 368* (NY), Malachite, on *Spiraea betulifolia,* Jul 1897, *E. Bethel 345* (NY as *T. nitida*). KANSAS: Rooks Co. on *R. aureum,* 2 Apr 1894, *E. Bartholomew s.n.* (NY), 1 Mar 1895, *E. Bartholomew, F. Col. 932* (NY), on gooseberry, 31 May 1901, *E. Bartholomew, F. Col. 1525* (MASS, NY). MONTANA: Lewis and Clark Co. Helena, 5 Mar 1889, *F. D. Kelsey 89/9* (NY), on *R. rotundifolia,* Apr 1889, *F. D. Kelsey, N.A.F. 2370* (MASS, NY). SOUTH DAKOTA: Spink Co. Northville, on *R. aureum,* 17 Apr 1927, *J. F. Brenckle, F. Dakot. 579* (NY).

The majority of specimens cited above are from *Ribes* and were identified as *Cucurbitaria ribis* 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. minima* (*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. ribis* 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. ribis.*

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

Thyridium sambuci Earle, Bull. New York Bot. Gard. **3:** 294. 1904; *Xylosphaeria sambuci* (Earle) Petrak, Sydowia **4:** 19. 1950; *Mycothyridium sambuci* (Earle) Petrak, Sydowia **15:** 290. 1961.

Ascomata closely gregarious in raised areas beneath periderm, surrounded by dark brown hyphae causing some blackening of surface, 220–440 μm diam., globose to obpyriform, apex papillate; peridium reddish brown, 20–32.5 μm wide below, 30–52 μm wide at upper sides. *Asci* (60–)100–120 × 16–20(–24) μm. *Ascospores* 25–35 × 7.5–10 μm, clear brown, narrowly obovoid fusoid, asymmetric, upper hemispore shorter and wider than lower, ends acute, inequilateral or slightly curved, (3–)5–10-septate, with one longitudinal septum in mid cells, occasionally obliquely in end cell, constricted at first-formed

septum; wall finely verruculose, surrounded by gel coating 2–2.5 μm wide.

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

Material examined: U.S.A. CALIFORNIA: Tehama Co. Mineral, Lassen Volcanic Nat'l. Park, 8 Oct 1981, *W. B. & V. G. Cooke 60758* (MASS now NY). MONTANA: Flathead Co. Glacier Nat'l. Park, Sperry Trail, 27 Jul 1961, *W. B. & V. G. Cooke 32665* (MASS now NY). NEVADA: Ormsby Co. Snow Valley Peak, 24 Jun 1902, *C. F. Baker, Pl. Nev. 1165* (FH, NY, holotype, isotypes). OREGON: Linn Co. Willamette State Forest, near Lost Prairie and Lava Beds, 16 Aug 1975, *M. E. Barr 6282a* (MASS now NY).

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

18. Teichospora solitaria (Ellis) Ellis & Everh., North Amer. Pyrenomyc. 214. 1892.

Fig. 5u.

Cucurbitaria solitaria (as *solitaris*) Ellis, Bull. Torrey Bot. Club **8**: 125. 1881; *Gibberidea solitaria* (Ellis) Kuntze, Rev. Gen. Pl. **3**: 481. 1898.

Teichospora megastega Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia **42**: 243. 1890; *Strickeria megastega* (Ellis & Everh.) Kuntze, Rev. Gen. Pl. **3**: 534. 1898.

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 verruculose.

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

Material examined: U.S.A. CALIFORNIA: Siskiyou Co. Mt. Shasta, between Panther Creek and Wagon Camp, on *Chrysothamnus bloomeri* var. *angustatus*, 15 Aug 1947, *W. B. & V. G. Cooke 20438* (NY as *T. megastega*). COLORADO: Larimer Co. Roosevelt Nat'l. Forest, 3 miles W of Redfeather Lakes, on *Salix*, 4 Aug 1984, *M. E. Barr 6998* (MASS now NY); Grand Co. Granby, 10 Aug 1984, *M. Blackwell 1875a* (MASS now NY), on *Artemisia tridentata*, 11 Aug 1984, *M. Blackwell 1915b* (MASS now NY); Huerfano Co. La Veta, on *Atriplex canescens*, 11 Jun 1907, *F. E. & E. S. Clements, Crypt. Form. Colorad. 455* (NY as *T. mammoides*). MONTANA: Lewis and Clark Co. Helena, on *Salix*, 23 Jan 1889, *F. D. Kelsey 89/4*, on *Acer glabrum*, 20 Apr 1889, *F. D. Kelsey 89/49* (NY, syntypes of *T. megastega*); Cascade Co. Sand Coulee, on *Populus tremuloides*, Oct 1889, *F. W. Anderson, Mont. F. 648* (NY, as *T. megastega*); Madison Co. Mill Creek, Mar 1892, *Mrs. N. M. Fitch s.n.* (NY as *T. megastega*), W of Sheridan, on *Salix*, 20 Jan 1892, *Mrs. N. M. Fitch s.n.* (NY as *Teichospora* sp.). NEBRASKA: Brown Co. Long Pine, on *Fraxinus viridis*, 3 Jun 1896, *J. M. Bates 420* (NY as *Cucurbitaria fraxini* var. *effusa*). UTAH: Carbon Co. Pleasant Valley, on *Artemisia*, Mar 1881, *S. J. Harkness s.n.* (NY, holotype of *C. solitaria*), *N.A.F. 1654* (MASS now NY as *C. umbilicata*); Weber Co. Malan's Peak, E of Ogden, on *Acer glabrum*, 18 May 1972, *C. T. Rogerson* (NY as *T. megastega*). WASHINGTON: Pierce Co. Mt. Rainier Nat'l. Park, Comet Falls trail, on *Sambucus callicarpa*, 25 Jul 1948, *E. G. Simmons 1618 p.p.* (MASS now NY). No data: On *Eriogonum, Herb. W. C. Sturgis* (NY as *T.? xerophila*).

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.

19. Teichospora trabicola Fuckel, Jahrb. Nassauischen Ver. Naturk. **23–24**: 161. 1870.

Figs. 5a–c.

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.

Material examined: GERMANY. Nassau, on *Quercus* grapevine supports, Winter, *G. Fuckel, Herb. B.-B. 532* (FH, NY, isotypes).

NORWAY. TROMS: Municip. Skånland, Tovik, on *Salix*, 8 Jul 1981, *G. Mathiassen 241/81* (MASS now NY).

SWITZERLAND. Zürich, on *Vitis*, Nov 1882, *G. Winter F. Eur. 1863 p.p.* (NY).

U.S.A. ARIZONA: Santa Cruz Co. Coronado Nat'l. Forest, Santa Rita Mts., Madera Canyon, on *Quercus hypoleucoides*, 9 Aug 1980, *M. E. Barr 6800* (MASS now NY). **CALIFORNIA:** Tehama Co. Lassen Volcanic Nat'l. Park, Minerall, on *Sambucus caerulea*, 8 Oct 1981, *W. B. & V. G. Cooke 60758* (MASS now NY). **KANSAS:** Rooks Co., on *Celtis occidentalis*, 23 May 1894, *E. Bartholomew 1467* (NY on holotype of *Didymosphaeria celtidis*), on *Rhus glabra*, 28 Mar 1896, *E. Bartholomew, F. Kansas 1096* (NY as *T. crossata*). **MASSACHUSETTS:** Norfolk Co. Cambridge, on *Robinia pseudoacacia*, 11 Jan 1899, *C. A. King s.n.* (NY); Franklin Co. Conway, Baptist Hill, on *Rosa*, 3 Jan 1988, *M. E. Barr 7132* (MASS now NY). **NEW HAMPSHIRE:** Carroll Co. Kancamagus Highway near Conway, on *Viburnum lentago*, 15 Jul 1963, *M. E. Barr 3896b* (MASS now NY). **OKLAHOMA:** Payne Co. 1 mi N. Ripley, Ripley Bluffs, on *Sapindus drummondii*, 16 Aug 1979, *M. E. Barr 6682* (MASS now NY).

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.

Material examined: SWITZERLAND. Zürich, on *Vitis*, Nov 1882, *G. Winter, F. Eur. 2863 p.p.* (NY, isotype).

CANADA. QUÉBEC: Gaspé Ouest Co. Gaspésien Prov. Park, Mt. Albert, on *Alnus*, 18 Aug 1957, *M. E. Barr 2178a* (MASS now NY).

U.S.A. CONNECTICUT: Windham Co. Bigelow Hollow State Park, 7 May 1978, *M. E. Barr 6435* (MASS now NY). **MAINE:** Piscataquis Co. Baxter State Park, Katahdin Lake trail, 20 Aug 1962, *M. E. Barr 3667a* (MASS now NY). **MASSACHUSETTS:** Hampshire Co. Amherst, U. Mass. Campus, on *Cornus florida*, 10 Aug 1959, *M. E. Barr 2619*, on *Platanus occidentalis*, 4 Feb 1980, *H. E. Ahles s.n., M. E. Barr 6693*, South Hadley, Notch, on *Ceanothus americana*, 25 Apr 1979, *M. E. Barr 6550* (all MASS now NY); Franklin Co. Mt. Toby, 20 Jun 1968, *M. E. Barr 5149*, Conway, Baptist Hill, on *Vitis*, 5 Mar 1961, *M. E. Barr 2869*, on *Populus (Lombardy)*, 28 Mar 1968, *M. E. Barr 5119*, 31 May 1970, *M. E. Barr 5600*, on *Populus balsamifera*, 20 May 1971, *M. E. Barr 5772*, 16 May 1973, *M. E. Barr 6050*, on *Populus*, 27 Apr 1975, *M. E. Barr 6244*, 9 Dec 1979, *M. E. Barr 6637*, on *P. tremuloides*, 6 Jan 1980, *M. E. Barr 6668*, 27 Nov 1984, *M. E. Barr 7017*, Greenfield, 3 Jun 1979, *H. E. Ahles s.n., M. E. Barr 6565*, Conway State Forest, on *Acer rubrum*, 17 Sep 1982, *M. E. Barr 6896*, Whately Road, 1 Sep 1983, *M. E. Barr 6949*, Conway, Cricket Hill, on *Rubus*, 5 Jul 1985, *M. E. Barr 7042* with *Lophiostoma fuckelii* (all MASS now NY). **MICHIGAN:** NW Corner Montmorency Co., 8 Sep 1969, *M. E. Barr 5452b* (MASS now NY). **MONTANA:** Missoula Co. Missoula, on *Ligustrum*, Oct 1916, *J. R. Wier 708* (NY as *Cucurbitaria ligustri*). **NEW JERSEY:** Cumberland Co. Near Vineland, on *Alnus*, 10 Jan 1880, *J. B. Ellis s.n.* (NY as *Valsa (Fenestella) elastica* Ellis ined.). **NEW YORK:** Albany Co. Karner, on *Ceanothus americana*, May 1875, *C. H. Peck s.n.* (NYS in holotype of *Physalospora ceanothina*), Albany, on *C. americana*, 1 Nov 1914, *H. D. House s.n.* (NYS in holotype of *Thyridium ceanothi*); Dutchess Co. Hyde Park, on *Populus tremuloides*, 10 Mar 1968, *H. E. Ahles s.n., M. E. Barr 5110* (MASS now NY). **NORTH CAROLINA:** Macon Co. Highlands Biological Station, 18 Aug 1985, *M. E. Barr 7092* (MASS now NY).

Berlese (1896) erected *T. winteriana* for the fungus named *T. trabicola* in *F. Eur. 2863*. According to the specimen of this exsiccatus in NY,

there are two fungi present: *T. trabicola* with three-septate ascospores (12–)14–15(–17) × 6–7 μm and *T. winteriana* with five- to seven-septate ascospores 28–32 × 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*. The Montana collection, earlier determined as *Cucurbitaria ligustri*, is sparse, with ascomata partially immersed in stromata of another ascomycete, but the characteristics of asci and ascospores fit the concept of *T. winteriana*.

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

Pyrenophora zabriskieana Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia **42**: 239. 1890; *Pleosphaeria zabriskieana* (Ellis & Everh.) Berlese, Icon. Fung. **2**: 67. 1896.

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 × 20–30 μm. *Ascospores* (25–)30–40 × 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 hemispore somewhat wider than lower at times; wall smooth.

In and erumpent from periderm, northeastern North America.

Material examined: U.S.A. MASSACHUSETTS: Franklin Co. Conway, Pine Hill, on *Malus*, 29 Dec 1984, *M. E. Barr 7025* (MASS now NY). **NEW YORK:** New Baltimore, on *Ulmus americana*, Apr 1882, *J. L. Zabriskie 108* (NY, holotype, second sheet depauperate).

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 × 7.5–90 μm) with seven transverse and two to three longitudinal septa.

Pleosphaeria, typified by *P. australis* Speg. (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*.

I. 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 verruculose or 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.

15. Phaeosphaeria Miyake, Bot. Mag. (Tokyo) **23(266)**: 93. 1909.

Leptosphaeria subgen. *Leptosphaerella* Sacc., Syll. Fung. **2**: 47. 1883; *Leptosphaerella* (Sacc.) Hara, Bot. Mag. (Tokyo) **27(327)**: 249. 1913, nom. illeg., non Speg. 1912.

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

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. Figs. 6a, b.

Sphaeria vitalbae DeNot., Comment. Soc. Critt. Ital. **1(4)**: 221. 1863; *Leptosphaeria vitalbae* (DeNot.) Winter *in* Kunze, Fungi Sel. 331. 1880; *Teichospora vitalbae* (DeNot.) Sacc., Fung. Venetia **5**: 177. 1876; *Pleospora vitalbae* (DeNot.) Berlese, Nuovo Giorn. Bot. Ital. **20**: 70. 1888. *Strickeria vitalbe* (De Not.) Kuntze, Rev. Gen. Pl. **3**: 534. 1898.

Leptosphaeria pleosporoides Auerswald, Hedwigia **8**: 88. 1869.

Pleospora clematidis Fuckel, Jahrb. Nassauischen Ver. Naturk. **23-24**: 132. 1870.

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 × 9–13 μm, often stipitate. Pseudoparaphyses narrowly cellular, in gel matrix. *Ascospores* 16–22(–25.5) × 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.

Anamorph: *Stagonospora* (*Hendersonia*) sec. Webster (1955).

On stems of *Clematis* spp., north temperate zone.

Material examined: FRANCE. Côte-d'Or: Noidan, on *C. vitalba*, Aut 1882, *F. Fautrey, F. Sel, Exs. 4855* (NY).

U.S.A. MAINE: Piscataquis Co. Baxter State Park, Katahdin Lake trail, on *C. virginiana*, 1 Sep 1962, *M. E. Barr 3741* (MASS now NY).

The synonymy follows that of Berlese (1895) and Wehmeyer (1961) who added to it *Pleospora ilicis* 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*.

16. Graphyllium Clements, Rep. Bot. Surv. Nebraska **5**: 6. 1901.

Comoclathris Clements, Minnesota Bot. Stud. **2(5)**: 186. 1911.

Platyspora Wehmeyer, A world monograph of the genus *Pleospora* 254. 1961; *Clathrospora* subg. *Platyspora* (Wehm.) O. Eriksson, Arkiv Bot. II, **6(8)**: 349. 1967.

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 nearly 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; biseriate 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.* Petrak (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 Petrak (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 *Platyspora/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

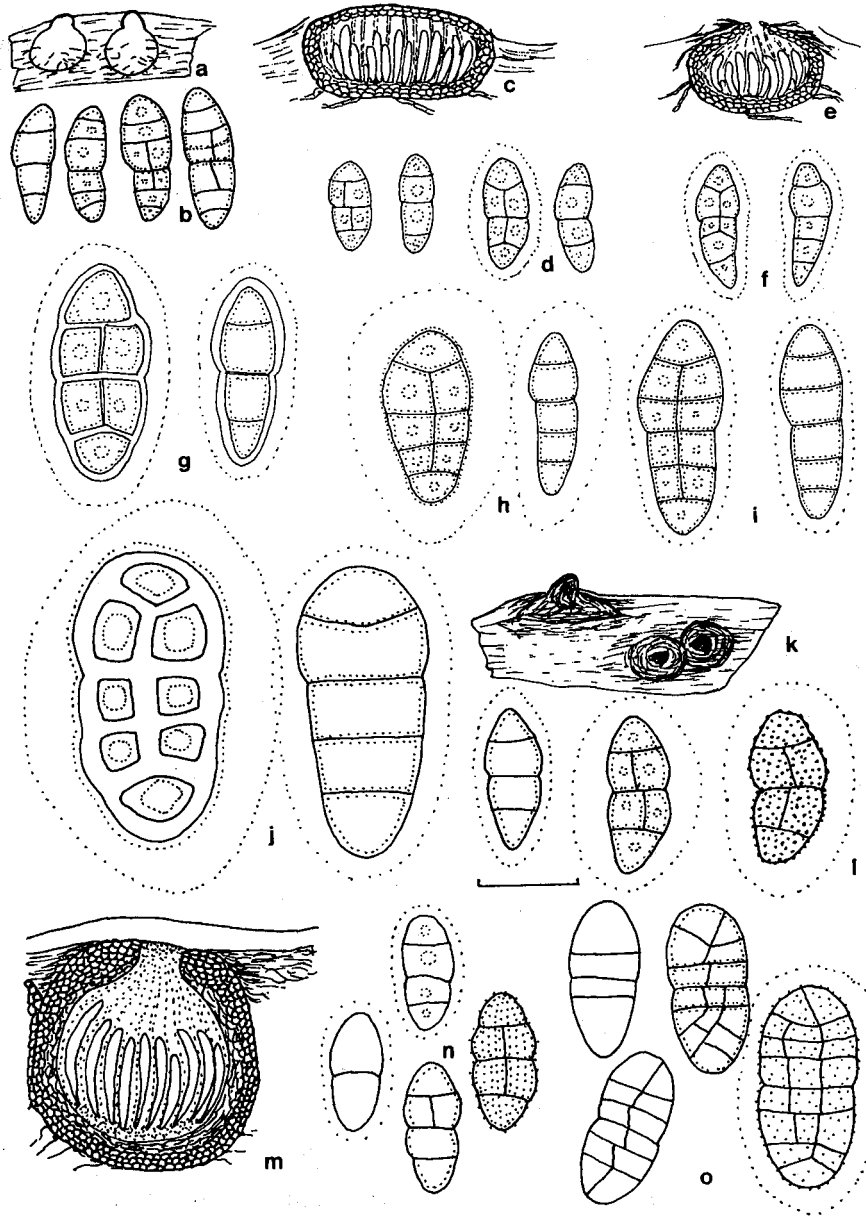
1. Ascospores 3-septate.
   2. Ascomata elongate or in rows, with sparse hyphae; ascospores 13–18(–22) × 6–7.5 × 4.5–6 μm, inequilateral. ..... 2. *G. hysterioides.*
   2. Ascomata separate, surrounded by stiff tomentum; ascospores 20–33 × 9–15(–18) × 6.5–10(–14) μm, straight or nearly so. ..... 5. *G. 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 40–45 × 20–25 × 15–17 μm, straight or nearly so; ascomata with sparse hyphae. ..... 1. *G. californianum.*
      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.

Ascomata immersa sphaeroidea collabentia 385 μm lata 330 μm alta, peridia 35–50 vel prope basin 70 μm lata. *Asci* bitunicati 100–170 × 30–55 μm. Pseudoparaphyses cellulosae. *Ascosporae* 40–45 × 20–25 × 15–17 μm rubrobrunneae compressae obovoideae 4 transversaliter et lon-

→

Fig. 6. a, b. *Phaeosphaeria vitalbae:* **a,** habit, **b,** ascospores. **c, d.** *Graphyllium hysterioides:* **c,** ascoma in vertical section, **d,** ascospores. **e, f.** *G. ipomoeae:* **e,** ascoma in vertical section, **f,** ascospores. **g.** *G. permundum,* ascospores. **h.** *G. pentamerum,* ascospores. **i.** *G. planisporum,* ascospores. **j.** *G. californianum,* ascospores. **k, l.** *Montagnula infernalis:* **k,** habit, **l,** ascospores. **m, n.** *M. thuemeniana:* **m,** ascoma in vertical section, **n,** ascospores. **o.** *M. phragmospora,* ascospores. Standard line = 15 μm for ascospores, 150 μm for ascomata. Habit sketches not to scale.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gitudinaliter 1-septatae. Holotypus in *Wyethiae* caulibus, "California, Shasta Co., Lassen Volcanic Nat'l. Park, Bumpass Hell-Cold Boiling Lake Trail, 12 Jul 1966," a W. B. & V. G. Cooke 37166 lectus in Herb. MASS nunc NY depositus.

Ascomata immersed, separate or gregarious, sphaeroid, collabent, to 385 μm wide, 330 μm high, surrounded by sparse tomentum of brown hyphae; peridium dark reddish brown, 35–50 μm wide, to 70 μm wide at base. *Asci* 100–170 × 30–55 μm. *Ascospores* 40–45 × 20–25 × 15–17 μm, reddish brown, obovoid, straight, 4-septate, with one longitudinal septum in mid cells; wall smooth, surrounded by narrow granular layer and wide gel coating.

In stalks of *Wyethia* sp. (Asteraceae), known only from type collection.

This superb collection has considerably larger four-septate ascospores than *G. pentamerum* (or any of its synonyms), its closest relative. Wehmeyer (1961) gave an extended size range for *Platyspora permunda* that could include the above sizes, but that species forms three rather than four transverse septa.

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

Pleospora hysterioides Ellis & Everh., Erythea **1:** 19. 1894; *Pleospora andropogonis* Niessl subsp. *hysterioides* (Ellis & Everh.) Berlese, Icon. Fung. **2:** 2. 1895; *Hysterographium hysterioides* (Ellis & Everh.) Wehm., Mycologia **41:** 581. 1949.

Hysterographium graminis Ellis & Everh., Bull. Torrey Bot. Club **27:** 53. 1900; *Graphyllium graminis* (Ellis & Everh.) Rehm, Ann. Mycol. **13:** 3. 1915.

Graphyllium chloës Clements, Rep. Bot. Surv. Nebraska **5:** 6. 1901; *Pleospora chloës* (Clements) Petrak, Sydowia **6:** 337. 1952.

Graphyllium dakotense Rehm, Ann. Mycol. **13:** 3. 1915; *Clathrospora dakotensis* (Rehm) von Höhnel, Ann. Mycol. **16:** 213. 1918; *Pleospora dakotensis* (Rehm) Petrak, Sydowia **6:** 337. 1952.

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.

Material examined: U.S.A. KANSAS: Rooks Co. Rockport, on *Sporobolus asper,* Mar 1893, *E. Bartholomew, N.A.F. 3020* (MASS now NY, isotype of *Pleospora hysterioides*). **NEBRASKA:** Greeley Co. Scotia, on *Juncus balticus,* 19 Sep 1906, *J. M. Bates s.n.* (NYS as *G. chloës* var. *junci* Peck, ined.). **NORTH DAKOTA:** Lamoure Co. Kulm, on *Andropogon scoparius,* Mar 1914, *J. F. Brenckle, Ascomyc. 2131* (NY, isotype of *G. dakotense*); Dicky Co. Widmer Lake, on *Phragmites communis,* 3 Nov 1914, *J. F. Brenckle, F. Dakot. 312* (NY as *G. dakotense*).

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.

3. Graphyllium ipomoeae (Clements) Barr, Mycotaxon **29:** 504. 1987. Figs. 6e, f.

Comoclathris ipomoeae Clements, Minnesota Bot. Stud. **4:** 186. 1911; *Pleospora ipomoeae* (Clements) Wehm., Mycologia **46:** 504. 1954.

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 hemispore 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.

Material examined: U.S.A. COLORADO: Yuma Co. Wray, on *Ipomoea leptophylla,* 25 Aug 1907, *F. E. & E. S. Clements, Cryptog. Form. Colorad. 450* (BPI, isotype; DAOM, slide ex Wehmeyer Herbarium). **UTAH:** Iron Co. Road to Lunt, on *Salsola,* 22 Aug 1973, *M. E. Barr 6157* (MASS now NY).

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

4. Graphyllium pentamerum (Karsten) Barr, comb. nov. Fig. 6h.

Pleospora pentamera Karsten, Öfvers. K. Svenska Vet.-Akad. Förh. **2:** 99. 1872; *Clathrospora pentamera*

(Karsten) Berlese, Icon. Fung. 2: 31. 1895; *Platyspora pentamera* (Karsten) Wehm., A world monograph of the genus *Pleospora* 261. 1961.

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.

Material examined: CANADA. BRITISH COLUMBIA: Kamloops, on grass, 17 Jun 1889, *J. Macoun, Canad. F. 154* (DAOM as *Clathrospora aurea*); Fairmont Hot Springs, on *Andropogon scoparius*, 17 Jul 1947, *J. W. Eastham s.n.* (UBC 2267); Penticton, on *Oryzopsis hymenoides*, 5 Jun 1938, *J. W. Eastham s.n.* (UBC 2234); Black Tusk, Garibaldi Prov. Park, on *Agropyron latiglume*, 12 Aug 1938, *J. W. Eastham s.n.* (UBC 2141). NORTHWEST TERRITORIES: See Barr (1959).

U.S.A. COLORADO: Larimer Co. Roosevelt Nat'l. Forest, Cameron Pass campground, 4 Aug 1984, *M. E. Barr 7016* (MASS now NY). MONTANA: Cedar Mt., on *Cerastium arvense*, 16 Jul 1897, *P. A. Rydberg & E. A. Bessey s.n.* (MASS ex WSP 9339 now NY). OREGON: Wallowa Co. Wallowa Mts., Horseshoe Lake, on *Arenaria verna* var. *pubescens*, 19 Jul 1950, *A. R. Kruckeberg s.n.* (MASS ex WSP 200188 now NY). UTAH: Sanpete Co. Skyline Drive above Mount Pleasant, Aug 1954, *K. H. McKnight s.n.* (MASS now NY); Iron Co. Road to Lunt, 22 Aug 1973, *M. E. Barr 6156, 6160* (MASS now NY). WASHINGTON: Grant Co. Grand Coulee N. of Dry Falls, on *Astragalus stenophyllus* var. *filipes*, 2 Jun 1940, *A. T. Rogers 592* (MASS ex WSP 112062 now NY).

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

5. Graphyllium permundum (Cooke) Barr, comb. nov. Fig. 6g.

Sphaeria permunda Cooke, Grevillea **5**: 111. 1876; *Pleospora permunda* (Cooke) Sacc., Syll. Fung. **2**: 243. 1883; *Clathrospora permunda* (Cooke) Berlese, Nuovo Giorn. Bot. Ital. **20**: 195. 1888; *Platyspora permunda* (Cooke) Wehm., A world monograph of the genus *Pleospora* 254. 1961; *Comoclathris permunda* (Cooke) Müller, Beitr. Kryptogamenfl. Schweiz **15(1)**: 66. 1977.

Pyrenophora depressa Peck, Bull. Torrey Bot. Club **11**: 28. 1884.

Pleospora utahensis Ellis & Everh. *in* M. E. Jones, Proc. California Acad. Sci. II, **5**: 727. 1895.

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).

U.S.A. CALIFORNIA: Sierra Nevada Mts., *H. W. Harkness, N.A.F. 1581* (MASS now NY). COLORADO: Larimer Co. Fort Collins, s. coll. *N.A.F. 886* (hand written, MASS now NY). MONTANA: Cascade Co. Sand Coulee, on *Clematis ligusticifolia*, Feb 1888, *F. W. Anderson s.n.* on *N.A.F. 2128* of *Dothidea insculpta* (MASS now NY). NEBRASKA: Greeley Co. Scotia, on *Juncus balticus*, 29 Sep 1906, *J. M. Bates s.n.* (NYS on collection of *G. hysterioides* as *G. chloës* var. *junci*). OKLAHOMA: Payne Co. Ripley Bluffs, on *Amorpha fruticosa*, 16 Aug 1979, *M. E. Barr 6721* (MASS now NY). OREGON: TINB 48E, Sec. 23, SW corner, on *Linum lewisii*, 29 Jun 1957, *J. E. Sivera s.n.* (MASS now NY). UTAH: s. loc., on *Arabis*, *M. E. Jones s.n.* (NYS, holotype of *Pyrenophora depressa*); Salt Lake Co. Big Cottonwood Canyon, 12 Jul 1905, *A. O. Garrett, F. Col. 2273*; 24 Aug 1906, *A. O. Garrett, F. Col. 2417* (both MASS now NY); Piute Co. W of Marysvale, Falls of Bullion Creek, on *Eupatorium occidentale*, 24 Aug 1894, *M. E. Jones 5902* (NY, isotype of *Pleospora utahensis*); Washington Co. Bryce Canyon Nat'l. Park, Fairyland, on *Cercocarpus*, 21 Aug 1973, *M. E. Barr 6152*, with and under *Gibbera cercocarpae* (MASS now NY). WASHINGTON: Chelan Co. Wenatchee, on *Lupinus nevadensis*, 28 Apr 1901, *K. Whited s.n.* (MASS ex WSP 38701 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*.

6. Graphyllium planisporum (Ellis) Barr, Mycotaxon **29:** 504. 1987. Fig. 6i.

Pleospora planispora Ellis, Bull. Torrey Bot. Club **10:** 53. 1883; *Clathrospora planispora* (Ellis) Berlese, Nuovo Giorn. Bot. Ital. **20:** 200. 1888; *Platyspora planispora* (Ellis) Wehm., A world monograph of the genus *Pleospora* 263. 1961; *Comoclathris planispora* (Ellis) Harr, Nova Hedwigia **20:** 868. 1971 [1972].
Comoclathris lanata Clements, Minnesota Bot. Stud. 2(5): 186. 1911.

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.

Material examined: CANADA. NORTHWEST TERRITORIES: Baffin Island, Bray I., on *Puccinellia phyganoides*, 10 Aug 1950, *P. Dansereau s.n.* (MASS now NY), Gee Lake, on *Carex nardina* var. *atriceps*, 11 Aug 1950, *P. Dansereau s.n.* (MASS now NY); Ellesmere Island, Hilgard Bay, on grass, 5 Aug 1955, on *Luzula*, 6 Aug 1955, both *R. M. Schuster s.n.* (MASS now NY).

U.S.A. COLORADO: San Juan Co. Silverton, on *Leptotaenia multifida*, 8 Jul 1907, *F. E. & E. S. Clements, Crypt. Form. Colorad. 444* (BPI, isotype of *C. lanata*, sparse with *Nodulosphaeria olivacea*). **IDAHO:** Latah Co. Moscow Mt., on *Senecio*, 30 Jun 1955, *P. Shope s.n.* (MASS ex WSP now NY). **UTAH:** Carbon Co. Utah Territory, on *Elymus*, Winter 1882, *S. J. Harkness, N.A.F. 1584* (MASS now NY, isotype of *Pleospora planispora*).

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

17. Montagnula Berlese, Icon. Fung. **2:** 68. 1896.

Pleospora subg. *Montagnula* (Berlese) Wehmeyer, Sydowia Beih. **1:** 263. 1957.

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, hemispores symmetric, fusoid or ellipsoid, straight or inequilateral, transversely septate, 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 ascisque longe stipitatis" and included *M. infernalis* and *M. gigantea* (Mont.) Berlese. The stromatic tissues are clypeate above ascomata in *M. infernalis* and completely surround 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 *Massariosphaeria* (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 broadly ellipsoid with obtuse ends, 5–7-septate, 21–30 × 10–14 μm. .... 2. *M. phragmospora*.
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.*

1. Montagnula infernalis (Niessl) Berlese, Icon. Fung. 2: 69. 1896. Figs. 6k, l.

Leptosphaeria infernalis Niessl, Contr. Fl. Mycol. Lusit. (Instituto Coimbra) **31**: 13. 1883; *Pleospora infernalis* (Niessl) Wehm., Sydowia Beih. **1**: 259. 1957.
Pleospora pustula Berk. & Sacc., Rev. Mycol. **5**: pl. 83. 1889.
Pleospora clypeata Wehm., Mycologia **41**: 584. 1949.

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). **BAHAMA ISLANDS.** EXUMA chain: Hummingbird Cay, on *F. macrophylla*, 12 Jun 1975, *N. H. Nickerson* (MASS now NY).

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.

Ascomata immersed, gregarious, 330–550 μm diam., apex with short wide papilla, to 55 μm high and wide, clypeus slight as massed brown hyphae near surface over few ascomata; peridium 30–40 μm wide, dark reddish brown, with brown hyphae into substrate. *Asci* 150–200 × 15–26 μm. *Ascospores* 21–30 × 10–14 μm, yellowish brown becoming dark reddish brown, broadly ellipsoid, ends obtuse, 5–7-septate, with two longitudinal septa, one usually obliquely into end cells, constricted at first-formed septum, A2 septa close to A1; wall verruculose, surrounded by gel coating.

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

Material examined: FRANCE: Galloprovincia, *Duby ad Fuckel, Herb. B.-B. 37* as *Pleospora gigantea* (Mont.) Sacc. (FH).
U.S.A. CALIFORNIA: San Bernardino Co. Victorville, on *Yucca brevifolia*, 4 Apr 1952, *L. Bonar, Calif. F. 1212* as *Teichospora xerophila* Sacc. (NY); San Mateo Co. Stanford, Stanford Univ. Campus, Nov 1972, *P. Ray s.n.* (MASS now NY, two collections); San Francisco Co. San Francisco State Univ. Campus, Dec 1980, *H. E. Bigelow s.n.* (MASS now NY).

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 verruculose, surrounded by gel coating.

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

Material examined: U.S.A. CALIFORNIA: San Mateo Co. Stanford, Stanford Univ. Campus, Apr 1984, *S. Fultz s.n.* (MASS now NY).

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.*

18. Chaetoplea (Sacc.) Clements *in* Clements & Shear, Genera of Fungi 275. 1931; Clements, 1909, nom. nud.

Pyrenophora subg. *Chaetoplea* Sacc., Syll. Fung. 2: 279. 1883.

Pleospora subg. *Cylindrosporeae* Wehmeyer, A world monograph of the genus *Pleospora* 233. 1961; *Paraphaeosphaeria* subg. *Cylindrosporeae* (Wehm.) Crivelli, Diss. ETH Nr. 7318: 180. 1983.

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 roughened with protruding cells and short hyphae or smooth and shining, often in brown subiculum or with clypeus over apex of one or more immersed ascomata; peridium relatively narrow, soft, of slightly compressed brown or reddish brown, small pseudoparenchymatous cells, with internal, pallid layer of compressed cells. *Asci* basal and sometimes lateral, clavate or cylindric, short stipitate. Pseudoparaphyses narrowly cellular, extending into apical pore at times. *Ascospores* yellowish brown or reddish brown, end cells at times paler than mid cells, symmetric and ellipsoid, fusoid, oblong or asymmetric and obovoid, ends obtuse or acute, with three or more transverse septa and one (rarely more) longitudinal septum in most cells, often oblique when into end cells, constricted or not at first-formed septum; wall smooth or verruculose at times, at times surrounded by gel coating; homogeneous or one rounded globule in each cell; biseriate or uniseriate in the ascus.

Anamorph coelomycetous where known; conidiomata similar in aspect to ascomata; conidiogenous cells holoblastic, lining peridium; conidia yellowish, oblong, one-septate (described as *Microdiplodia*).

Saprobic in herbaceous stalks, decorticated wood, or periderm, also known from old cotton cloth and string.

Type: *C. calvescens* (Fr. ex Desm.) Clements.

Although most investigators (Wehmeyer, 1961; von Arx & Müller, 1975; Crivelli, 1983) have included *Chaetoplea* within *Pleospora* or as a synonym of *Leptosphaeria* (Eriksson & Hawksworth, 1987), *C. calvescens* deviates from *Pleospora herbarum* (Fr.) Rabenh. and from *Leptosphaeria doliolum* (Pers.: Fr.) Ces. & DeNot. by 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 dictyosporous 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. *Cylindrosporeae* Wehm. and of *Paraphaeosphaeria* subg. *Cylindrosporeae* (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 *Cylindrosporeae* 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 *CHAETOPLEA* TREATED

1. Ascospores oblong, ends rounded, first-formed septum submedian; apical papilla conspicuous.
   2. Ascospores 20–27 × 7.5–9 μm, 3-5-7-septate. ..... 12. *C. oblongispora.*
   2. Ascospores 14–22.5 × 5–7(–8) μm, 4–6-(7-)septate. ..... 11. *C. oblongata.*
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 small, 10–16(–19) × 4–7(–9) μm, 3–5-(7-)septate; apical papilla conspicuous. ..... 9. *C. hyphasmatis.*
      4. Ascospores larger; apical papilla not so conspicuous.
         5. Ascospores fusoid in cylindric asci; ascomata quite shining in upper parts.
            6. Ascospores 18–27 × 6.5–9(–11) μm, 3–5-(6-7-)septate. ..... 7. *C. ellisii.*
            6. Ascospores 15–21(–23) × 6.5–8(–9) μm, 3–4–5-(7-)septate. ..... 14. *C. stenocarpa.*
         5. Ascospores ellipsoid in cylindric-clavate asci; ascomata 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.*
            7. Ascospores smaller, (13–)14–23 μm long.
               8. Ascospores broadly ellipsoid, 7–10 μm wide, 3–5-(7-)septate. ..... 6. *C. crossata.*
               8. Ascospores narrower, (5–)6–8(–9) μm wide, 3–(4–5-)septate.
                  9. Ascomata collabent, surrounded by hyphal tomentum. ..... 4. *C. calvescens.*
                  9. Ascomata sphaeroid.
                     10. Ascomata beneath clypeus; ascospores partially biseriate in clavate asci. ..... 13. *C. pusilla.*
                     10. Ascomata surrounded by tomentum; ascospores uniseriate in cylindric 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.
         12. Ascomata collabent, surrounded by hyphal tomentum; ascospores 20–26 × 8–11 μm, 5–7-septate. ..... 15. *C. strigosa.*
         12. Ascomata sphaeroid beneath clypeus; ascospores 22–25 × 9–12 μm, (3–)4–5-(7-)septate. ..... 2. *C. apicirubida.*
      11. Upper hemispore wider but shorter than lower, lower hemispore tapered strongly to base.
         13. Ascospores 15–20 μm long, 3–4-(5-)septate.
            14. Ascomata smooth and somewhat shining above; ascospores 15–18 × 5–7.5(–8) μm in cylindric asci. ..... 10. *C. nubilosa.*
            14. Ascomata dull and roughened by protruding cells and hyphae; ascospores 15–20 × 6–8(–9) μm in clavate asci. ..... 3. *C. aspera.*
         13. Ascospores (15–)18–27 μm long, (3–)4–7-septate.
            15. Ascospores (15–)18–22(–25) × (6–)7–10 μm, uniseriate in cylindric asci. .. 8. *C. helenae.*
            15. Ascospores ranging larger, biseriate in clavate asci.
               16. Ascospores straight, 18–25 × 8–11 μm. ..... 1. *C. amygdaloides.*
               16. Ascospores inequilateral to slightly curved, 22–27 × 9–12 μm. .... 17. *C. variabilis.*

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

Teichospora amygdaloides Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia **46**: 330. 1894; *Strickeria amygdaloides* (Ellis & Everh.) Lindau *in* Engler & Prantl, Natürl. Pflanzenfam. **1(1)**: 416. 1897.

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.

Material examined: U.S.A. KANSAS: Rooks Co., 14 Jul 1894, *E. Bartholomew 1507* (NY, holotype, two packets).

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 inequilateral to curved ascospores. *Teichospora patellarioides* 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 immersa dispersa sphaeroidea 385 μm lata 250 μm alta clypeata, pori apicales rubri, peridia 13–18.5 μm lata 39–52 μm lata versus apicem. *Asci* bitunicati 75–110 × 18–20 μm. Pseudoparaphyses cellulosae. *Ascosporae* 22–25 × 9–12 μm rubrobrunneae obovoideae, hemispora superna infernae longiori et latiori, (3–)4–5–(7–) transversaliter et 1 longitudinaliter septata. Holotypus in *Juniperi* ligno, "SE Colorado, 30 Mar 1881," a C. G. Pringle lectus in Herb. NYS sub nomine *Teichosporae aridophilae* depositus.

Ascomata immersed, separate, sphaeroid, 385 μm wide, 250 μm high, clypeate over surface, apex with small pore surrounded by minute brilliant reddish cells; peridium 13–18.5 μm wide below, to 39–52 μm above, with brown hyphae from lower sides into substrate. *Asci* 75–110 × 18–20 μm. *Ascospores* 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.

Material examined: U.S.A. Colorado: "S.E.," 30 Mar 1881, *C. G. Pringle s.n.* (NYS as *Teichospora aridophila*).

This collection was labelled "TYPE" apparently by House, but another collection labelled "SYNTYPE" has both collection information and microscopic data in accord with the original description of *T. aridophylla* Peck (Barr et al., 1986). *Chaetoplea apicirubida* is distinctive in the brightly colored cells that mark the apical pore, in the formation of a clypeus, and in obovoid ascospores having a long upper hemispore in short clavate asci.

3. Chaetoplea aspera (Ellis & Everh.) Barr, comb. nov. Fig. 7r.

Teichospora aspera Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia **45**: 131. 1893; *Strickeria aspera* (Ellis & Everh.) Kuntze, Rev. Gen. Pl. **3**: 534. 1898.
Teichospora negundinis Ellis & Everh., Bull. Torrey Bot. Club **25**: 503. 1898.

Ascomata superficial, separate to gregarious, collabent, 275–550 μm wide, 220–330 μm high, surface roughened with cells and short hyphae; peridium 20–50 μm wide, dark brown or reddish brown. *Asci* 50–90 × 10–15 μm, clavate. *Ascospores* 15–20 × 6–8(–9) μm, yellowish brown to dark brown, 3–4-(5-)septate, with one longitudinal septum in mid cells; wall smooth.

On old wood, widespread in North America.

Material examined: U.S.A. California: Los Angeles Co. Palmdale, Solidado Canyon, Feb 1961, *P. Martin 598* (NY). **Colorado:** Larimer Co. Fort Collins, on *Negundo aceroides* (=*Acer negundo*), Apr 1898, *C. S. Crandall s.n.* (NY, holotype of *T. negundinis*), *F. Col. 1319* (MASS, NY, isotype of *T. negundinis*). **Kansas:** Rooks Co. Rockport, on *Populus,* 10 Jan 1893, *E. Bartholomew Kansas F. 853* (NY, holotype of *T. aspera,* two packets), on *Populus,* Mar 1894, *N.A.F. 3115* (MASS, NY), on *Populus,* 14 Mar 1894, on *Celtis occidentalis,* 20 Mar 1894, on *Rhus glabra,* 12 Sep 1895, on *Populus,* 10 Jul 1896, on *Populus,* 27 Jul 1896, on *Maclura aurantiaca* [=*pomifera*] 18 May 1897, on *Salix cordata,* 8 Dec 1898, all *E. Bartholomew s.n.* (all NY), on *Populus,* 23 Mar 1894, *E. Bartholomew s.n.* (NY as *T. inconspicua* ined.) **Massachusetts:** Franklin Co. Conway, Baptist Hill, 9 Apr 1978, *M. E. Barr 6421* (MASS now NY).

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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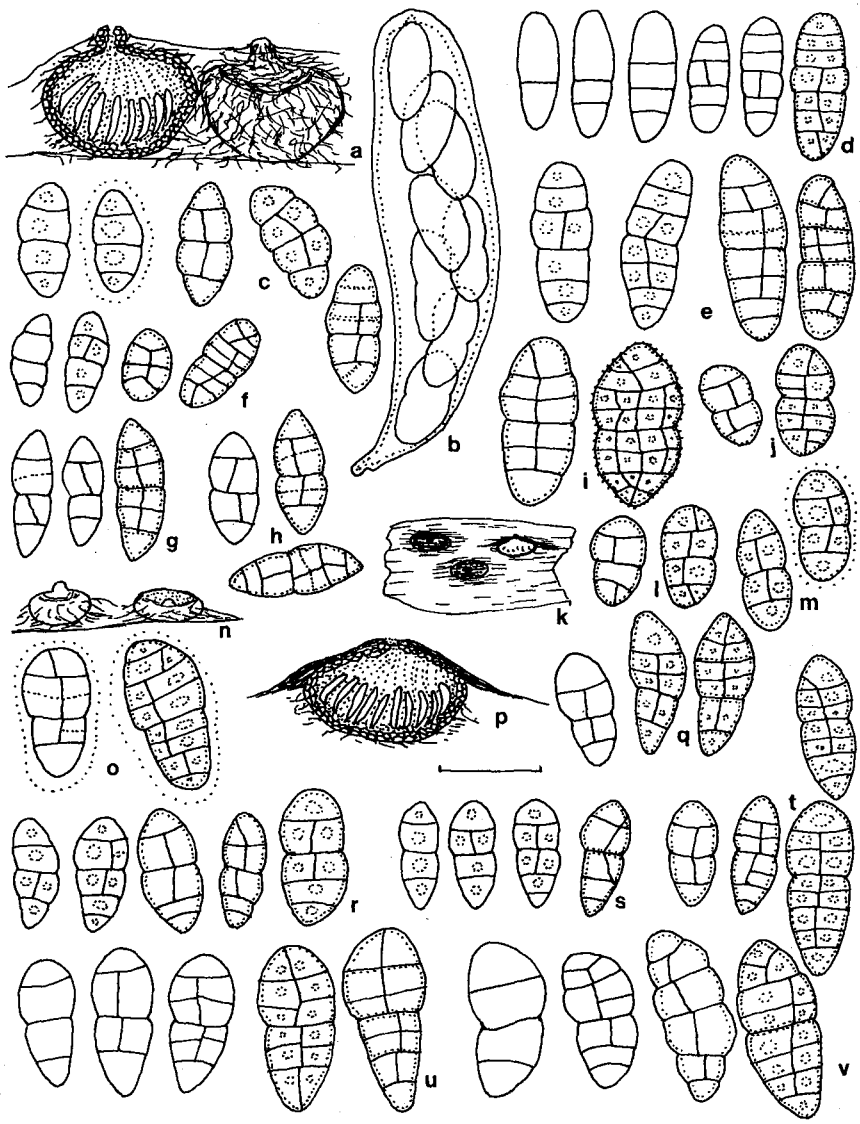
Fig. 7. Species of *Chaetoplea.* **a-c.** *C. calvescens:* **a,** ascomata in vertical section and surface view, **b,** ascus, **c,** ascospores. **d.** *C. oblongata,* ascospores. **e.** *C. oblongispora,* ascospores. **f.** *C. hyphasmatis,* ascospores. **g.** *C. ellisi,* ascospores. **h.** *C. stenocarpa,* ascospores. **i.** *C. umbilicata,* ascospores. **j.** *C. crossata,* ascospores. **k, l.** *C. pusilla:* **k,** habit, **l,** ascospores. **m.** *C. carpinicola,* ascospores. **n, o.** *C. strigosa:* **n,** habit, **o,** ascospores. **p, q.** *C. apicirubida:* **p,** ascoma in vertical section, **q,** ascospores. **r.** *C. aspera,* ascospores. **s.** *C. nubilosa,* ascospores. **t.** *C. helenae,* ascospores. **u.** *C. amygdaloides,* ascospores. **v.** *C. variabilis, ascospores.* Standard line = 15 μm for ascus and ascospores, 150 μm for ascomata. Habit sketches not to scale.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4. Chaetoplea calvescens (Fr. ex Desm.) Clements *in* Clements & Shear, Genera of Fungi 275. 1931. Figs. 7a–c.

Sphaeria calvescens Fr. ex Desm., Ann. Sci. Nat. Bot. II, **19:** 353. 1843; *Pleospora calvescens* (Fr. ex Desm.) Tul. & C. Tul., Sel. Fung. Carp. **2:** 266. 1863; *Pyrenophora calvescens* (Fr. ex Desm.) Sacc., Syll. Fung. **2:** 279. 1883; *Leptosphaeria calvescens* (Fr. ex Desm.) Crivelli, Diss. ETH Nr. **7318:** 177. 1983.

Leptosphaeria eutypoides Peck, Rep. New York State Mus. **38:** 105. 1885.

Sphaeria echinella Cooke, Handb. Brit. Fungi **2:** 906. 1871; *Leptosphaeria echinella* (Cooke) Sacc., Syll. Fung. **2:** 88. 1883; *Pyrenophora echinella* (Cooke) Berlese, Nuovo Giorn. Bot. Ital. **20:** 207. 1888.

Pleospora calvescens var. *moravica* Petrak, Ann. Mycol. **21:** 189. 1923.

Pyrenophora calvescens var. *leptosphaerioides* Kirschst., Ann. Mycol. **33:** 227. 1935.

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. *Asci* 70–96 × 11–15 μm. *Ascospores* (13–)15–23 × (5–)6–8(–9) μm, yellowish brown or pale brown, ends obtuse, (1–2–)3–(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 septate, 9–13 × 4–5(–8) μm (Webster & Lucas, 1959); *Microdiplodia henningsii* Staritz = *Chaetodiplodia caudina* Karst. (Sutton, 1980).

On herbaceous stems, north temperate zone.

Material examined: U.S.A. GEORGIA: Clarke Co. Athens, Univ. Georgia Bot. Garden, on *Silphium compositum,* 25 Aug 1978, *M. E. Barr 6500* (MASS now NY). NEW JERSEY: Gloucester Co. Newfield, on *Chenopodium album,* Jan 1877, *J. B. Ellis, N.A.F.I 592* (MASS now NY). NEW YORK: Albany Co. Albany, on *C. album,* May 1884, *C. H. Peck s.n.* (NYS, holotype of *Leptosphaeria eutypoides*).

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.

Pleospora carpinicola Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia **45:** 135. 1893; *Karstenula carpinicola* (Ellis & Everh.) Berlese, Icon. Fung. **2:** 4. 1895.

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.

Material examined: CANADA. ONTARIO: Middlesex Co. London, 6 Apr 1892, *J. Dearness 1738* (NY, holotype).

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 clypeate, 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 cylindric 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 centra differ, and *P. shepherdiae* is a species of *Karstenula* (Melanommatales).

6. Chaetoplea crossata (Ellis & Everh.) Barr, comb. nov. Fig. 7j.

Teichospora crossata Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia **46:** 331. 1894; *Strickeria crossata* (Ellis & Everh.) Kuntze, Rev. Gen. Pl. **3:** 534. 1898.

Ascomata gregarious, collabent, 220–330(–495) μm wide, 187–220(–330) μm high, papilla short; peridium 20 μm wide, brown, surface finely roughened with short brown hyphae. *Asci* 60–

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.

Material examined: U.S.A. ARIZONA: Santa Cruz Co. Coronado Nat'l. Forest, Pina Blanca Rec. Area, Sycamore Canyon, on *Juglans major*, 7 Aug 1980, *M. E. Barr 6807*; Pima Co. Organ Pipe Nat'l. Monument, on *Opuntia*, 30 Apr 1987, *M. F. & P. J. Rohman s.n.* (both MASS now NY). KANSAS: Rooks Co. on *Ulmus*, 30 Mar 1894, *E. Bartholomew, Kansas F. 1437* (NY, holotype), Rockport, *Ulmus*, 2 Apr 1894, 24 Dec 1894, both *E. Bartholomew s.n.* (NY). MASSACUSETTS: Franklin Co. Mt. Toby, on *Populus*, 6 May 1969, *M. E. Barr 5280* (MASS now NY). NEW YORK: Dutchess Co. Hyde Park, on *Ceanothus americana*, 16 Feb 1969, *H. E. Ahles s.n.* (MASS now NY).

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. Fig. 7g.

Cucurbitaria ellisii Sacc. & P. Sydow, Syll. Fung. **14**: 607. 1899.

Cucurbitaria astragali Ellis & Everh., Bull. Torrey Bot. Club **24**: 127. 1897, hom. illeg., non Karsten & Harriot, 1890; *Gibberidea astragali* Kuntze, Rev. Gen. Pl. **3**: 481. 1898.

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(–60) μm wide, reddish brown. *Asci* 93–130(–180) × 10.5–14.5 μm. *Ascospores* 18–27 × 6–9(–11) μm, yellowish brown or dull dark brown, fusoid, symmetric, 3–5-(6–7-)septate, with one longitudinal septum, constricted at first-formed septum; wall smooth.

On branches, mostly decorticated, midwestern North America.

Material examined: U.S.A. KANSAS: Rooks Co. on *Astragalus*, Jan 1896, *E. Bartholomew, N.A.F. 3426* as *C. astragali* (DAOM, MASS now NY, isotypes), Rockport, Jul 1894, *E. Bartholomew N.A.F. 3221*, 15 Nov 1901, *E. Bartholomew F. Col. 1524* (both MASS now NY, on *Amorpha fruticosa* as *Cucurbitaria amorphae*). SOUTH DAKOTA: Brown Co. Aberdeen, on *Fraxinus americana*, Jan 1898, *D. Griffiths, W.A.F. 198* (MASS now NY as *Cucurbitaria fraxini*).

The symmetric, fusoid ascospores in cylindric asci are the main distinguishing features of *Chaetoplea ellisii*. Both the peridium and the basal hyphae in which ascomata are seated are reddish brown and the upper parts of ascomata are smooth and somewhat shining.

8. Chaetoplea helenae (Ellis & Everh.) Barr, comb. nov. Fig. 7t.

Teichospora helenae Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia **43**: 243. 1891; *Strickeria helenae* (Ellis & Everh.) Kuntze, Rev. Gen. Pl. **3**: 534. 1898.

Teichospora populina Ellis & Everh., Bull. Torrey Bot. Club **24**: 278. 1897.

Strickeria rhoina Earle *in* Greene, Plantae Bakerianae **2**: 16. 1901.

Ascomata erumpent superficial, separate to gregarious, collabent, 330–550 μm wide, 220–440 μm high, surface roughened with short hyphae; peridium 20–40 μm wide, reddish brown, with dark hyphae into substrate. *Asci* 95–130 × 10–13(–15) μm. *Ascospores* (15–)18–22(–25) × (6–)7–10 μm, clear brown or reddish brown, obovoid, asymmetric, upper hemispore 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.

Material examined: U.S.A. COLORADO: s. loc., on *Salix, E. Bethel s.n.* (NY); Morrison, on *Populus angustifolia*, 20 Nov 1897, *E. Bethel 398* (NY); La Plata Co. Hermosa, on *Rhus trilobata*, 29 Mar 1899, *C. F. Baker s.n.* (NY, holotype of *Strickeria rhoina*, two packets). KANSAS: Rooks Co. Rockport, Sep 1893, *E. Bartholomew, F. Col. 624*, on *Ulmus americana*, 22 Dec 1893, *E. Bartholomew s.n.* (as *T. pomiformis*), on *U. americana*, 26 Feb 1894, *E. Bartholomew s.n.*, on *U. americana*, 14 Jul 1894, *E. Bartholomew s.n.*, on *Salix amygdaloides*, 2 Aug 1894, *E. Bartholomew s.n.*, on *U. americana*, Jul 1894, *E. Bartholomew F. Col. 515*, on *Populus*, 14 Apr 1896, *E. Bartholomew s.n.* (all NY), on *Populus monilifera*, *E. Bartholomew 2388* (NY, holotype of *T. populina*), *E. Bartholomew, F. Col. 1592* (MASS now NY as *T. populina*). MONTANA: Lewis and Clark Co. Helena, on *Salix*, Feb 1889, *F. D. Kelsey 4 p.p.* (NY, holotype of *Teichospora helenae*), *N.A.F. 1269* (MASS, NY, isotype), on *Prunus virginiana*, Oct 1889, *W. Anderson s.n.* (NY); Madison Co. Sheridan, on *Salix*, 1892, *L. O. Fitch s.n.* (NY).

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. Fig. 7f.

Pyrenophora hyphasmatis Ellis & Everh., J. Mycol. **4:** 77. 1888; *Pleosphaeria 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, ellipsoid, ends tapered but obtuse, 3–5-(7-)septate, with one longitudinal septum in mid cells, sometimes lacking, rarely into end cells; wall smooth.

On exposed cotton cloth and rotting strings, eastern and southern North America.

Material examined: U.S.A. LOUISIANA: St. Martin, 25 Jul 1888, *A. B. Langlois, Fl. Ludovic. 1434* (NY, holotype). NEW JERSEY: Iona, Jan 1880, *I. Leonard s.n.* (NY, as *Teichospora bombycina* ined.).

The protologue gives *Langlois 1433* but the TYPE packet in NY is *1434*, with identical data. This small-spored species has been moved from genus to genus; Wehmeyer (1961) suggested even more possibilities. It is close in all characters to *C. calvescens* and when *Chaetoplea* is recognized it finds a home here. The collection from New Jersey is on rotted string from a grape trellis; ascomata are often oblique in position and do not have such a conspicuous papilla as do those in the holotype.

10. Chaetoplea nubilosa (Ellis & Everh.) Barr, comb. nov. Fig. 7s.

Teichospora nubilosa Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia **46:** 332. 1894; *Strickeria nubilosa* (Ellis & Everh.) Kuntze, Rev. Gen. Pl. 3: 534. 1898.
Melanomma dealbatum Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia **46:** 328. 1894.
Strickeria populi Earle *in* Greene, Plantae Bakerianae **2:** 15. 1901.

Ascomata erumpent to superficial, separate to gregarious, collabent, 275–385(–440) μm wide, 190–275 μm high, surface smooth and somewhat shining, papilla short; peridium narrow, 20–40 μm wide, brown hyphae sparse from lower sides into substrate. *Asci* 50–90(–120) × (8–)10–12 μm, (4–)8-spored. *Ascospores* 15–18 × 5–7.5(–8) μm, yellowish to dull brown or reddish brown, asymmetric, obovoid, upper hemispore obtuse, shorter and wider than tapered lower hemispore, (1–)3–4-(5-)septate, with one longitudinal septum in mid cells, constricted at first-formed septum; wall smooth; obliquely uniseriate in the ascus.

In wood or old periderm, midwestern and western North America.

Material examined: U.S.A. COLORADO: La Plata Co. Durango, on *Populus angustifolia*, 21 Mar 1899, *C. F. Baker 15* (NY, holotype of *S. populi*, two packets, one marked *Pl. S. Colorado 68*); Malachite, on *P. angustifolia*, Jul, *s. coll.* (NY as 331. *T. helichrysi* Fabre). KANSAS: Rooks Co. Rockport, on *Celtis occidentalis*, 21 Nov 1893, *E. Bartholomew 1249* (NY, holotype of *T. nubilosa*), on *P. monilifera*, Jul 1894, *E. Bartholomew N.A.F. 3111* (MASS now NY as *Melanomma dealbatum*).

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. Fig. 7d.

Pleospora oblongata Niessl, Verh. Naturf. Vereins Brünn **14:** 177. 1876; *Paraphaeosphaeria oblongata* (Niessl) Crivelli, Dissert. ETH Nr. **7318:** 182. 1983.
Pleospora echiinicola Petrak, Ann. Mycol. **22:** 24. 1924.
Pleospora oblongata var. *coluteae* Goid., Malpighia **32:** 13. 1933; *Pleospora coluteae* (Goid.) Wehm., A world monograph of the genus *Pleospora* 235. 1961.
Pleospora cylindrospora Wehm., Mycologia **45:** 396. 1953.

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. *Asci* 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).

CANADA. NEWFOUNDLAND: Humber District, Wild Cove, White Cliff, on *Dryas integrifolia*, 5 Jul 1950, *E. Rouleau 649a* (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 wegeliniana* Müller (Wehmeyer, 1961) and as *Paraphaeosphaeria longispora* (Wegelin) Crivelli (Crivelli, 1983). The ascospores are long and narrow, 24–37 × 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 × 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.

Teichospora oblongispora Ellis & Everh., Bull. Torrey Bot. Club **25**: 503. 1898.

Strickeria amelanchieris Earle in Greene, Plantae Bakerianae **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 × 15–18 μm. *Ascospores* 20–27 × 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.

Material examined: U.S.A. COLORADO: Larimer Co. Fort Collins, on *Populus angustifolia*, Apr 1898, *C. S. Crandall s.n.* (NY, holotype of *T. oblongispora*), on *P. monilifera*, Mar 1894, *C. F. Baker s.n.* (NY as *T. papillosa*); La Plata Co. Hermosa, on *Amelanchier*, Mar 1899, *C. F. Baker, Pl. S. Colorado 69* (NY, holotype of *S. amelanchieris*, two packets).

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*.

13. Chaetoplea pusilla (Karsten & Malbranche) Barr, Mycologia **73**: 601. 1981. Figs. 7k, l.

Curreya pusilla Karsten & Malbranche *in* Le Breton & Niel, Bull. Soc. Amis Sci. Nat. Rouen **2**: 154. 1893 [1894].

Ascomata separate, immersed and slightly raising surface under ellipsoid clypei ca. 440–715 × 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 × 10–15 μm. *Ascospores* 14–18(–20) × 6.5–8(–9) μm, pale brown, ellipsoid or obovoid, 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 *Sambucus*, s. coll. (FH, holotype in Theissen Herb.).

U.S.A. COLORADO: Costilla Co. Fort Garland, on *Chrysothamnus graveolens*, 23 Jun 1907, *F. E. & E. S. Clements, Crypt. Form. Colorad. 457* as *T. trabicola*, second fungus (NY). MONTANA: Cascade Co. 10 mi. NW Great Falls, on *Sarcobatus vermiculatus*, 18 Jul 1889, *F. W. Anderson s.n.* (NY in type collection of *Teichospora mammoides*, two packets).

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

14. Chaetoplea stenocarpa (Ellis & Everh.) Barr, comb. nov. Fig. 7h.

Cucurbitaria stenocarpa Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia **47**: 420. 1895; *Gibberidea stenocarpa* (Ellis & Everh.) Kuntze, Rev. Gen. Pl. **3**: 481. 1898.

Ascomata superficial, gregarious or separate, collabent, smooth above and somewhat shining, (220–)355–550 μm wide, 275–440 μm high; peridium 20–40 μm wide, reddish brown, with brown hyphae in substrate from lower sides. *Asci* 80–120 × 8–12(–15) μm. *Ascospores* (12–)15–21(–23) × (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, widespread in North America.

Material examined: U.S.A. ARIZONA: Pima Co. Organ Pipe Nat'l. Monument, on *Opuntia acanthocarpa,* 30 Apr 1987, *M. F. & P. J. Rohman s.n.* (MASS now NY). CALIFORNIA: Los Angeles Co. Pasadena, on *Rhus diversiloba,* Aug 1884, *A. J. McClatchie 766* (NY, holotype). COLORADO: Costilla Co. Fort Garland, on *Chrysothamnus graveolens,* 23 Jun 1907, *F. E. & E. S. Clements, Crypt. Form. Colorad. 457 p.p.* (NY as *T. trabicola*); Larimer Co. Roosevelt Nat'l. Forest, 3 mi W Redfeathers Lake, on *Populus tremuloides,* 4 Aug 1984, *M. E. Barr 7000* (MASS now NY, with and under *Pleomassaria hesperia*). KANSAS: Rooks Co. Rockport, on *Acer negundo,* 12 Jul 1894, *E. Bartholomew 1453* (NY as *T. negundinis*), on *Prunus demissa,* 22 Apr 1896, *E. Bartholomew 2129* (NY as *T. aspera*?), on *Acer negundo,* 9 Apr 1894, *E. Bartholomew s.n.*, on *Fraxinus viridis,* May 1896, *E. Bartholomew 2139* (as *Teichospora* or *Pleospora*), on *Rhus glabra,* 24 Jan 1899, *E. Bartholomew 1540* (as *T. aspera*?) (all NY). MASSACHUSETTS: Franklin Co. Conway, Emerson Hollow, 21 Apr 1968, *M. E. Barr 5127,* Conway State Forest, 25 Jun 1969, *M. E. Barr 5323,* Conway, Baptist Hill, on *Platanus occidentalis,* 20 May 1979, *M. E. Barr 6554* (all MASS now NY). NEW YORK: Otsego Co. Richfield Springs, on wood, *G. W. Clinton s.n.* (NYS on type of *Zignoella exigua*). UTAH: Tooele Co. Grantsville, on *Chrysothamnus nauseosus,* 13 Apr 1918, *J. F. Brenckle 28* (NY as *T. insecura*).

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

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

Teichospora strigosa Ellis & Everh., Bull. Torrey Bot. Club **24:** 459. 1897.

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.

Material examined: U.S.A. CALIFORNIA: Tehama Co., SR-36 below Battle Creek Crossing, on *Sambucus caerulea,* 9 Oct 1981, *W. B. & V. G. Cooke 60783B* (MASS now NY, part). COLORADO: Baldwin, on *Symphoricarpos,* 17 Jun 1897, *E. Bethel 174* (NY, holotype).

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.

Cucurbitaria umbilicata Ellis, Bull. Torrey Bot. Club **10:** 53. 1883; *Gibberidea umbilicata* (Ellis) Kuntze, Rev. Gen. Pl. **3:** 481. 1898.

Ascomata separate or gregarious, immersed erumpent, at times beneath slight clypeal tissues, sphaeroid, 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. *Asci* 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.

Material examined: U.S.A. ARIZONA: Pima Co. Baboquivari Mts., Forestry Cabin, on *Prosopis juliflora,* 30 Sep 1971, *R. L. Gilbertson 10516* (MASS now NY, part), Santa Catalina Mts., Creek area, on *Acacia greggii,* 2 Aug 1980, *M. E. Barr 6837* (MASS now NY), Pinal Co. Camp Grant Wash, 4 Nov 1971, *E. R. Canfield 71-358* (MASS now NY, part). UTAH: Carbon Co. Utah Territory, on *Artemisia, S. J. Harkness, N.A.F. 1654* (MASS now NY, isotype).

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.

Teichospora variabilis Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia **45:** 131. 1894. *Strickeria variabilis* (Ellis & Everh.) Kuntze, Rev. Gen. Pl. **3:** 534. 1898.

Ascomata collabent, 330–550 μm wide, 300–385 μm high; peridium 30 μm wide, reddish brown, with brown hyphae into substrate. *Asci* 90–130 × 15–20 μm, clavate. *Ascospores* 22–27 × 9–12 μm, reddish brown, inequilateral to slightly curved, 5–7-septate, with one longitudinal septum in mid cells; wall smooth.

On old *Artemisia,* known from type locality.

Material examined: U.S.A. MONTANA: Madison Co. Sheridan, Jun 1892, *Mrs. Fitch s.n.* (NY, holotype).

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. LOPHIOSTOMATACEAE

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.

19. Cilioplea Munk, Dansk Bot. Ark. **15(2)**: 113. 1953.

Pleospora subg. *Cilioplea* Munk *in* Müller, Sydowia **5**: 302. 1951, nom. inval. (Art. 36).

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 hemispore 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 narrowed 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 asci. It is thus assigned to *Cilioplea* despite its occurrence on woody rather than herbaceous substrates.

KEY TO SPECIES OF *CILIOPLEA* TREATED

1. Apical setae brown, inconspicuous; ascospores 15–24(–28) × 5–8(–9.5) μm, 3–4–5-(7-)septate. ..... 3. *C. kansensis.*
1. Apical setae dark to black, conspicuous.
   2. Ascospores 12–22 × 6.5–8(–9) μm, 3–4–5-(8-)septate; in fibers of decorticated *Populus.* ..... 2. *C. fulgurata.*
   2. Ascospores 18–30(–36) μm long, 3–9-(11-)septate.
      3. Ascospores (5–)6–8(–10) μm wide; European. ... 1a. *C. coronata* subsp. *coronata.*
      3. Ascospores (7–)9–11(–12.5) μm wide; western North American. ..... 1b. *C. coronata* subsp. *montana.*

1a. Cilioplea coronata (Niessl) Munk, Dansk. Bot. Ark. **15(2)**: 113. 1953. subsp. **coronata** Fig. 8a.

Pleospora coronata Niessl, Verh. Nat. Vereins Brünn **14**: 176. 1876; *Pyrenophora coronata* (Niessl) Sacc., Syll. Fung. 2: 283. 1883.

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 Walhallastrasse/Regensburg, on *Daucus carota,* Jun 1880, *Rehm, Ascomyc. 591* (FH, NY).

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

1b. Cilioplea coronata subsp. **montana** Barr, subsp. nov. Figs. 8b–d.

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

Ascomata immersed to erumpent, gregarious, sphaeroid, 275–495 μm wide, 245–330 μm high, setae short and blackish, occasionally elongate over upper sides of ascoma; peridium (10–)25–40 μm wide. *Asci* 75–100(–160) × (12–)15–24 μm. *Ascospores* 18–30 × (7–)9–11(–12.5) μm, hyaline then yellowish brown, finally dark brown in age, ends obtuse to acute, 3–5–7–9-septate, with one (two) longitudinal septum in most cells.

In old branches, western North America.

Material examined: U.S.A. ARIZONA: Pima Co. Santa Catalina Mts., Bear Wallow, on *Robinia neomexicana,* 2 Aug 1980, *M. E. Barr 6794,* Santa Cruz Co. Coronado Nat'l. Forest, Pena Blanca Rec. Area, Sycamore Canyon, on *Populus,* 7 Aug 1980, *M. E. Barr 6809* (both MASS now NY). **COLORADO:** Gunnison Co. Gunnison, on *Artemisia tridentata,* Jun 1897, *E. Bethel 322 p.p.* (NY as *Teichosporella montanae*); Costilla Co. Fort Garland, on *Artemisia,* 24 Jun 1907, *F. E. & E. S. Clements,* on *Crypt. Form. Colorad. 435* of *Melanomma occidentale* (NY); Grand Co. Granby, County Road 63, on *A. tridentata,* 11 Aug 1984, *M. Blackwell 1915a* (MASS now NY, holotype).

2. Cilioplea fulgurata (Ellis & Everh.) Barr, comb. nov. Fig. 8e.

Teichospora fulgurata Ellis & Everh., Erythea **2**: 18. 1894; *Strickeria fulgurata* (Ellis & Everh.) Kuntze, Rev. Gen. Pl. **3**: 534. 1898.

Teichospora infuscans Ellis & Everh., Bull. Torrey Bot. Club **24**: 459. 1897.

Ascomata immersed to erumpent, gregarious, sphaeroid, 220–330 μm wide, 190–220 μm high, setae blackish; peridium 13–30 μm wide. *Asci* 65–84 × (9–)12–15 μm. *Ascospores* 12–22 × 6.5–8(–9) μm, yellowish brown to dark brown, apex obtuse, tapered to more acute base, 3–4–5-(8-)septate, with one longitudinal septum in most cells.

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

Material examined: U.S.A. COLORADO: Larimer Co. Fort Collins, 4 Mar 1894, *C. F. Baker 224 p.p.* (NY). **KANSAS:** Rooks Co. Rockport, 11 Dec 1893, *E. Bartholomew, Kansas F. 1144* (NY, holotype of *T. fulgurata*), 5 Aug 1897, *E. Bartholomew, Kansas F. 2422* (NY, two packets, holotype of *T. infuscans*); 9 Dec 1893; *E. Bartholomew 1307, N.A.F. 3013,* Nov 1893, *E. Bartholomew s.n.* (all MASS now NY); Phillips Co., 28 Nov 1901, *E. Bartholomew, F. Col. 1685* (MASS now NY).

3. Cilioplea kansensis (Ellis & Everh.) Crivelli, Dissert. ETH Nr. **7318**: 174. 1983. Figs. 8f,g.

Pleospora kansensis Ellis & Everh., J. Mycol. **8**: 17. 1902.

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.

Material examined: U.S.A. KANSAS: Rooks Co., 12 Mar 1902, *E. Bartholomew s.n.* (NY, holotype), *F. Col. 1636* (MASS now NY, isotype).

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

K. ARTHOPYRENIACEAE

20. Julella Fabre, Ann. Sci. Nat. Bot. VI, **9**: 113. 1879.

Peltosphaeria Berlese, Rev. Mycol. **10**: 18. 1888.

Polyblastiopsis Zahlbruckner *in* Engler & Prantl, Natürl. Pflanzenfam. **1(1*)**: 37. 1907, nom. nov. for *Polyblastia* Müller Arg., 1882, hom. illeg., non Lonnroth, 1858.

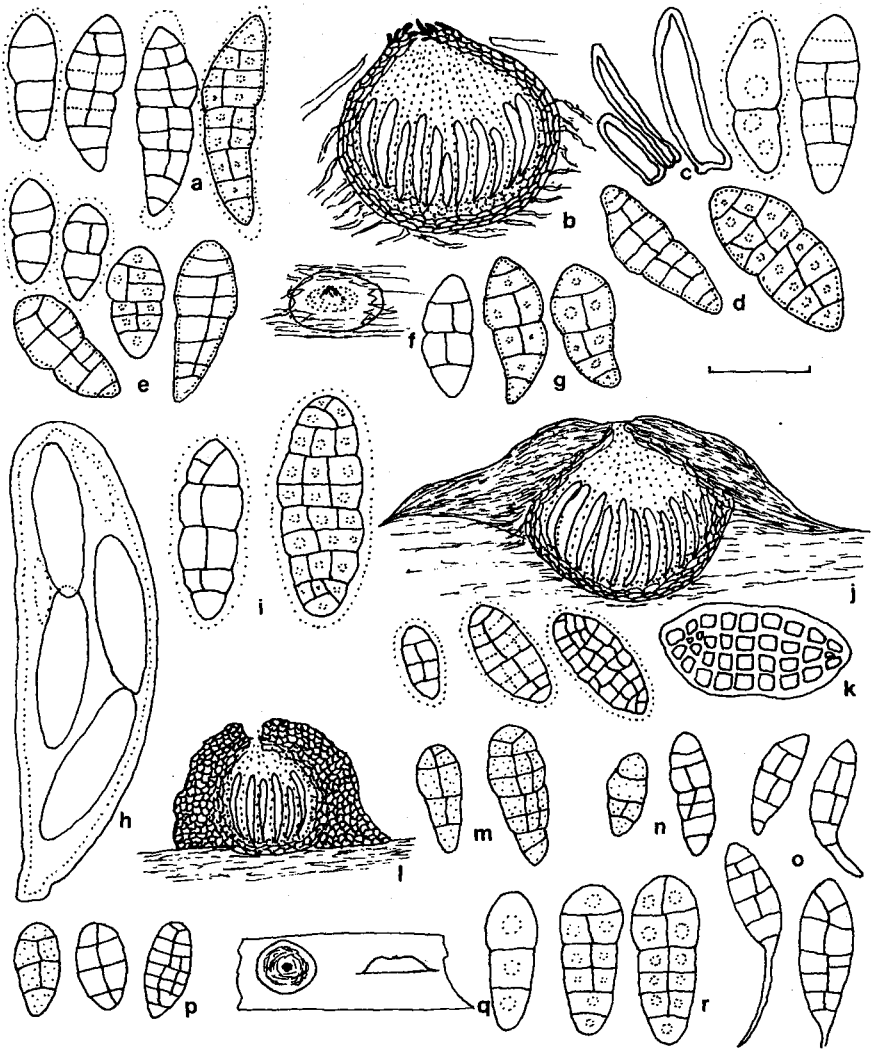

Fig. 8. **a.** *Cilioplea coronata* subsp. *coronata,* ascospores. **b–d.** *C. coronata* subsp. *montana:* **b,** ascoma in vertical section, **c,** setae, **d,** ascospores. **e.** *C. fulgurata,* ascospores. **f, g.** *C. kansensis:* **f,** habit of ascoma, **g,** ascospores. **h, i.** *Julella lactea:* **h,** ascus, **i,** ascospores. **j, k.** *J. vitrispora:* **j,** ascoma in vertical section, **k,** ascospores. **l, m.** *Mycoglaena canadensis:* **l,** ascoma in vertical section, **m,** ascospores. **n.** *M. subcoerulescens,* ascospores. **o.** *M. acuminans,* ascospores. **p.** *M. elegans,* ascospores. **q, r.** *M. alni:* **q,** habit, **r,** ascospores. Standard line = 15 μm for setae, ascus and ascospores, 150 μm for ascomata. Habit sketches not to scale.

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 two other 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 *Polyblastiopsis lactea* (Massal.) 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 *Polyblastiopsis.* Harris (1973) described *P. fallaciosa* (Stizenb. ex Arn.) Zahlbr. as well as *P. lactea* from North American specimens. Eriksson and Hawksworth (1987) united *Polyblastiopsis* 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 *Polyblastiopsis* 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

1. Asci 8-spored; ascospores (21–)25–33 × (7.5–)10–13 μm. ..... 2. *J. vitrispora.*
1. Asci 2–4-spored; ascospores 22–32 × 9–12 μm. ..... 1. *J. lactea.*

1. Julella lactea (Massal.) Barr, Sydowia **38:** 13. 1985 [1986] var. **lactea.** Figs. 8h, i.

Blastodesmia lactea Massal., Richerche Auton. Lich. 181. 1852; *Polyblastiopsis lactea* (Massal.) Zahlbr. in Engler & Prantl, Natürl. Pflanzenfam. **1(1*):** 65. 1907.

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).

2. Julella vitrispora (Cooke & Harkness) Barr, Sydowia **38:** 13. 1985 [1986]. Figs. 8j, k.

Pleospora vitrispora Cooke & Harkness, Grevillea **9:** 86. 1881; *Peltosphaeria vitrispora* (Cooke & Harkness) Berlese, Rev. Mycol. **10:** 18. 1888.
Teichosporella lonicerina Fairman *in* Millspaugh & Nuttall, Field Mus. Nat. Hist. Bot. Ser. **5:** 347. 1923.

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.

Material examined: U.S.A. CALIFORNIA: Marin Co. Sausalito, on *Lonicera hispidula, H. W. Harkness, N.A.F. 1582* (MASS now NY); Los Angeles Co. Santa Catalina Island, Avalon, on *Salvia polystachya* (as *Ramona*), 14 Mar 1904, *C. F. Baker, Pacific Sl. F. 4037* as *Thyridium lividum* (NY), Avalon Canyon, on *Lonicera*, 18 Jul 1920, *L. W. Nuttall 620* (F, holotype of *Teichosporella lonicerina*).

L. MICROPELTIDACEAE

21. Mycoglaena von Höhnel, Sitzungsber. Kaiserl. Akad. Wiss. Math.-Naturwiss. Kl., Abt. 1, **118**: 1210. 1909.

Ascomata superficial, separate to gregarious, dimidiate scutate, apex rounded, opening by rounded pore, somewhat collabent 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 septate 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 acuminate base, 15–24 × 5–7 μm. ..... 1. *M. acuminans.*
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 brownish black; ascospores 17.5–24 × 6–7.5 μm, upper hemispore short and wide, constricted at first-formed septum. ..... 2. *M. alni.*
      3. Ascomata bluish black; ascospores tapered from above, not noticeably constricted.
         4. Ascospores 14–23 × 4.5–8 μm; on periderm. ..... 5. *M. subcoerulescens.*
         4. Ascospores relatively wider, 15–20 × 7–9 μm; on leaf sheaths of conifers. ..... 4. *M. elegans.*

1. Mycoglaena acuminans (Nyl.) Vainio, Acta Soc. Fauna Flora Fennica **49(2)**: 165. 1921.

Fig. 8o.

Verrucaria acuminans Nyl., Sert. Lich. Trop. 45. 1891; *Winteria acuminans* (Nyl.) Rehm, Hedwigia **37**: [144]. 1898.

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.

Material examined: U.S.A. IDAHO: Bonner Co. Highway & Trail 246, on *Pinus contorta*, 9 Jun 1940, *A. W. Slipp 705, 707* (MASS now NY, WSP). OREGON: Lane Co. H. J. Andrews Exp. Forest, 23 Jun 1973, *M. Sherwood s.n.* (MASS now NY).

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

Saccardinula alni Dearness & House, Bull. New York State Mus. **233-234:** 40. 1921.

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 hemispore 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, *C. H. Peck s.n.* (NYS, isotype). VERMONT: Lamoille Co. Stowe, Goldbrook Road, 18 Sep 1964, *M. E. Barr 4680d* (MASS now NY).

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

Thyridium canadense Ellis & Everh., North Amer. Pyrenomyc. 416. 1892; *Thyridella canadensis* (Ellis & Everh.) Sacc., Syll. Fung. **11:** 351. 1895; *Peltosphaeria canadensis* (Ellis & Everh.) Berlese, Icon. Fung. **2:** 110. 1900.

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.*

4. Mycoglaena elegans (Berk. & Curtis) von Höhnel, Sitzungsber. Kaiserl. Akad. Wiss. Math.-Naturwiss. Kl., Abt. 1, **118:** 1518. 1908. Fig. 8p.

Phacidium elegans Berk. & Curtis, Grevillea **4:** 7. 1875; *Dothiora elegans* (Berk. & Curtis) Sacc., Syll. Fung. **8:** 765. 1889.

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).

5. Mycoglaena subcoerulescens (Nyl.) von Höhnel, Sitzungsber. Kaiserl. Akad. Wiss. Math.-Naturwiss. Kl., Abt. 1, **118:** 1211. 1909. Fig. 8n.

Verrucaria subcoerulescens Nyl., Flora **55:** 362. 1872; *Winteria subcoerulescens* (Nyl.) Rehm, Ascom. n. 1242. 1898.

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.*

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