

NOTES ON THE AMPHISPHAERIACEAE AND RELATED FAMILIES

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SUMMARY

The relationships of three families, Amphisphaeriaceae, Clypeosphaeriaceae, and Pleurotremaceae are considered, as are those of other members of the Xylariales in a narrow sense. Keys are provided to the families accepted in the order, to the genera assigned to three of the families, and to North American species of these genera. Newly described are one genus *Dyrithium*, and ten species: *Amphisphaerella deceptiva*, *Amphisphaeria arizonica*, *Crassoascus canadensis*, *Discostroma empetri*, *D. ledi*, *D. pachystimae*, *D. rhododendri*, *Phomatospora striatispora*, *P. lithocarpi*, and *Saccardoella separans*. New combinations are proposed as: *Discostroma succineum*, *Dyrithium lividum*, *Jobellisia rynchostoma*, *Phomatospora minutella*, *Pseudovalsaria peckii*, and *Saccardoella macroasca*.

The original intent of this article was to review the North American taxa assigned to the Amphisphaeriaceae and Clypeosphaeriaceae. As work progressed, certain problems were encountered, in particular the separation of families and the arrangement of genera. Eventually, it became necessary to recognize yet another family in the group of organisms involved. This contribution now considers the relationships and the differences among the taxa that I assign to three families of the Xylariales. Certain genera are shifted from the position given them earlier (Barr 1990a). Some other genera that Eriksson and Hawksworth (1991) arranged in the Amphisphaeriaceae are not known to me and are not mentioned here. Others belong elsewhere, i.e., *Ceriospora*, *Leiosphaerella*, *Oxydothis*, *Vialaea*, are more typical of the Hyponectriaceae, whereas *Diapleella* (= *Kalmusia*) is a loculoascomycete in the Phaeosphaeriaceae, Pleosporales (Barr 1992). Based on peridium and centrum structure, *Iodosphaeria* belongs in the Lasiosphaeriaceae, Sordariales. *Cainiella* is perhaps

diaporthaceous, and *Ceratostomella*, again separated from *Endoxyla*, is also diaporthaceous, both genera forming part of a group of taxa that eventually must be recognized as separate from the families presently accepted in that order.

The taxa under consideration share a number of characteristics that are typically xylariaceous, and, with the Boliniaceae, Xylariaceae, and Diatrypaceae, they constitute the restricted order Xylariales. Ascomata may be hemibiotrophic, saprobic or hypersaprobic; they develop in leaves, herbaceous stems, monocot culms, periderm of woody branches, or old wood. They may be separate or gregarious, sphaeroid or globose to ovoid, with a papillate apex or a stout beak in which the ostiole is periphysate. The peridium is composed of few to numerous rows of compressed cells, often visible in surface view as *textura intricata*. Asci develop peripherally, are typically cylindrical or clavate cylindrical with a short to elongate stipe. The apical region bears a narrow or enlarged apical ring, amyloid or nonamyloid, sometimes surmounted by a refractive pulvillus. Paraphyses are apically free, narrow, septate, guttulate, often deliquescent at maturity. Variations in stromatic development are particularly noteworthy in members of the Boliniaceae, Diatrypaceae and Xylariaceae, whereas members of the other families generally form clypeal tissues over apices of ascomata, although a few taxa have valsoid ascomata beneath a stromatic disc. The characteristics that are basic for separation of members of the order into families are chiefly those of the ascospores.

Key to Families of Restricted Order Xylariales

1. Ascospores brown, typically with elongate germ slit, aseptate or one-septate near end with pallid, small end cell; asci typically cylindrical, apical ring amyloid; ascomata in variously shaped and developed stromata or separate or grouped beneath clypeus.....Xylariaceae
1. Ascospores brown or hyaline, lacking elongate germ slit, variable in septation.....2
2. Ascospores allantoid, light to dark brown, lacking germ slit or germ pore, usually aseptate; asci clavate cylindrical and stipitate, apical ring amyloid or nonamyloid; ascomata grouped in stromata in various configurations.....Diatrypaceae
2. Ascospores not allantoid, aseptate or septate, hyaline or brown; ascomata immersed beneath clypeus or in stromata in various configurations.....3
3. Ascospores radially symmetric, hyaline or brown; asci typically cylindrical, apical ring amyloid or nonamyloid...4
3. Ascospores radially asymmetric, shades of brown; asci cylindrical or clavate cylindrical and stipitate, apical ring nonamyloid or amyloid.....5

4. Ascospores hyaline, distoseptate or containing large globules, lacking germ pores; ascus ring nonamyloid; ascomata immersed singly beneath closely adhering clypeus.....Pleurotremaceae
4. Ascospores brown or hyaline, if distoseptate then brown, at times with one or more germ pores when brown; ascus ring amyloid or nonamyloid; ascomata immersed singly or few beneath clypeus or in valsoid configuration under stromatic disc..Amphisphaeriaceae
5. Ascospores aseptate (rarely septate), often flattened, germ pore at tapered end, small (5-7 μm long mostly); asci clavate cylindrical, stipitate, apical ring minute, nonamyloid; ascomata grouped in stromata in various configurations.....Boliniaceae
5. Ascospores aseptate or septate, not flattened, with one or two terminal germ pores (or group of short slits); asci cylindrical or clavate cylindrical and stipitate, apical ring nonamyloid or amyloid; ascomata immersed singly or few under clypeus or singly to valsoid in interwoven hyphae
Clypeosphaeriaceae

The Boliniaceae, Diatrypaceae, and Xylariaceae are not considered further in this article, except for restriction of the Boliniaceae to only *Camarops* and *Apiocamarops* (Nannfeldt 1972, Samuels and Rogers 1987). Barr (1990a) added *Rhynchostoma* to the Boliniaceae. That genus must be excluded however, for *R. minutum* P. Karst. has been shown to form a coelomycetous anamorph having holoarthric conidiogenesis (Constantinescu and Tibell 1992), whereas species of *Camarops* and *Apiocamarops* do not form anamorphs in culture (Horn 1984, Samuels and Rogers 1987). Barr (1993) also included *Pseudovalsaria* and *Endoxyla* in the Boliniaceae; these genera are again assigned (Barr 1990a) to the Clypeosphaeriaceae.

Amphisphaeriaceae

The genera accepted in the Amphisphaeriaceae have cylindrical, short stipitate asci whose apices contain an amyloid or nonamyloid apical ring and a short pulvillus; all taxa have quite radially symmetric ascospores. The ascomata are immersed singly or in small groups in the substrate beneath a small or well developed, blackened clypeus or may become erumpent, then clypeal tissues are closely adherent to the peridium. Less frequently, the ascomata are grouped in valsoid configuration in stromatic tissues. The genera accepted in the family are diverse in ascospore pigmentation, shape, septation and wall ornamentation.

Anamorphs are associated (presumed) or are linked in culture in species of several genera. These are coelomycetous anamorphs whose holoblastic, monoblastic or percurrently proliferating conidiogenous cells produce

hyaline or versicolorous, several-septate conidia that may bear setose appendages. These genera include: *Amphisphaeria argentinensis* Nag Raj - *Bleptosporium pleurochaetum* (Speg.) Sutton (Nag Raj 1977); *Broomella* spp. - *Pestalotiopsis*, *Truncatella* spp. (Shoemaker and Müller 1963, Nag Raj 1993); *Discostroma* spp. - *Seimatosporium*, *Sporocadus* spp. (Müller and Shoemaker 1965, Shoemaker and Müller 1964, 1965); *Griphosphaerioma kansensis* - *Labridella cornu-cervae* (Shoemaker 1963); *Lepteutypa* (and *Bligiascospora*) spp. - *Seiridium* spp. (Shoemaker and Müller 1965, Nag Raj 1993); *Pestalosphaeria* spp. - *Pestalotiopsis* spp. (Barr 1975, Nag Raj 1985).

Other genera, such as *Amphisphaerella*, *Crassoascus*, and *Dyrithium*, that are morphologically similar in teleomorphs but that are not known to possess anamorphs are also included in the family. *Urosporella* is removed from the Amphisphaeriaceae on the bases of asci forming a basal layer and the presumed coelomycetous anamorph of *U. magnoliae* (Ellis & Everh.) M.E. Barr (Barr 1966). The species may eventually be assigned to the Hyponectriaceae, but further evaluation is required.

Key to Genera of Amphisphaeriaceae

1. Ascospores aseptate, brown, several germ pores in equatorial ring or in two groups.....*Amphisphaerella*
1. Ascospores septate, hyaline or brown, usually lacking germ pore, occasionally with terminal group of short slits.....2
2. Ascospores hyaline or lightly pigmented.....3
2. Ascospores brown (end cells hyaline or lightly pigmented at times); ascomata single or few beneath clypeus.....4
3. Ascomata in valsoid configuration beneath stromatic disc; ascospores 1-septate.....*Griphosphaerioma*
3. Ascomata single or few beneath clypeus; ascospores 1- or several septate, rarely muriform.....*Discostroma*
4. Ascospores 1-septate, wall smooth or ornamented...
Amphisphaeria
4. Ascospores 2- or more septate.....5
5. Ascospores 2-septate, wall longitudinally striate.....
Pestalosphaeria
5. Ascospores 3- or more septate.....6
6. Ascospores 3-septate.....7
6. Ascospores 3-4-7-septate or muriform.....8
7. Ascospores with hyaline terminal cells, bearing elongate appendages, euseptate, wall smooth.....*Broomella*
7. Ascospores with brown terminal cells, lacking elongate appendages, distoseptate at times, wall usually ornamented, surrounded by narrow coating.....*Lepteutypa*
8. Ascospores 3-4-7-septate, terminal cells often lighter brown.....*Crassoascus*
8. Ascospores 3-5-septate with longitudinal septum, terminal cells brown.....*Dyrithium*

Amphisphaerella includes species whose brown, one-celled ascospores contain several germ pores arranged either equatorially or in groups toward the poles, but not strictly terminally as they may be in other brown-spored taxa (Munk 1953, O. Eriksson 1966). The species known in North America at present include two whose ascus apical ring is amyloid: *A. dispersella* (Nyl.) O.E. Erikss., the type species of the genus on *Populus*, having ascospores 18-25 x 7.5-9(-12) μm , and a recently discovered species having larger ascospores, described below, and two whose ascus apical ring is nonamyloid: *Amphisphaerella xylostei* (Pers.: Fr.) Munk on *Lonicera* having ascospores 15-24(-26) x (7-)10-15 μm and *A. vaga* (Niessl in Rabenh.) O.E. Erikss. on *Clematis* having ascospores 10-14 x 6-7.5 μm . *Anthostomella hypsophila* Ellis & Everh. (Proc. Acad. Nat. Sci. Philadelphia 46: 338. 1894) is a synonymous name of *A. xylostei*. Descriptions of these species are available in Munk (1957) and O. Eriksson (1966). Other undescribed taxa are known and Krug (personal communication) is preparing a monograph of the genus.

Amphisphaerella deceptiva M.E. Barr, sp. nov. Fig. 1a,b

Ascomata immersa discreta vel aggregata clypeata globosa 300-400 μm diametro papillata. Asci 200-225 x 15-25 μm unitunicati cylindrici paraphysati, annuli apicali amyloidei. Ascosporae 24-30 x (10-)12-15 μm fuscae ellipsoideae unicellulares guttulate uniseriatae, pori germinales aequatorii. Holotypus in ramis *Salicis*, "Canada: British Columbia: Sidney, 1 Jul 1991" a M.E. Barr n. 7640 lectus in DAOM et isotypus in NY depositus.

Ascomata immersed separately or few grouped beneath blackened clypeal tissues, globose, 300-400 μm diam; apex papillate, up to 200 μm wide and high, ostiole periphysate; peridium brown, ca. 20 μm wide, compressed rows of cells, surrounded by brownish hyphae in wood, clypeus dark reddish brown, hyphal in wood over ascomata, up to 200-250 μm deep. Asci 200-225 x 15-25 μm , cylindrical; apical ring refractive, amyloid, 1-2 μm deep. Paraphyses narrow, guttulate. Ascospores 24-30 x (10-)12-15 μm , becoming dark brown, ellipsoid, one celled; wall smooth, thick; germ pores darkly margined in equatorial row; contents densely guttulate; uniseriate in the ascus.

In old branches, British Columbia.

Additional collections: (all Sidney) *Salix*, 4 Oct 1991, Barr 7788, 9 Dec 1991, Barr 7883, 21 Mar 1992, Barr 8026, 18 Jul 1993, Barr 8559; *Rhamnus purshiana* DC., 20 Jul 1991, Barr 7675; *Crataegus oxyacantha* L., 11 Jan 1993, Barr 8353 (DAOM).

The epithet is chosen because of the deceptive aspect of the ascospores: when first observed they appear to be uniseptate because of the closely aligned row of dark-walled germ pores, and they appear reticulately ornamented because of the densely guttulate cytoplasm. The ascospore lengths are greater than those of either *A. xylostei* or *A.*

dispersella, and the germ pores are conspicuous in their close equatorial arrangement and heavily pigmented walls.

Amphisphaeria has been the repository for many extraneous taxa having one-septate, brown ascospores, and species have been confused with species of *Didymosphaeria* (Melanommatales, Loculoascomycetes). Lectotypification with *A. umbrina* (Fr.) De Not. (Hawksworth and Sherwood 1981) allows recognition of the genus in the sense of modern authors, e.g., Müller and Arx (1962). Rather few species are accepted at present in North America. *Amphisphaeria umbrina*, *A. bufonia* (Berk. & Broome) Ces. & De Not., and *A. multipunctata* (Fuckel) Petr. are known from North America as well as Europe in branches of various deciduous trees. Some additional synonyms of *A. multipunctata* [given in error as *A. millipunctata* by Petrak and Müller and Arx, corrections noted by Shoemaker and LeClair (1975) and Samuels et al. (1987)] are *Didymosphaeria major* Ellis & Everh. (Bull. Torrey Bot. Club 24: 130. 1897) (Barr 1989b) and *Didymella corylina* Ellis & Everh. (Bull. Torrey Bot. Club 25: 504. 1898). A specimen on *Isomeris* (C.F. Baker, Pacific Slope fungi 4047 det. as *Thyridium lividum*, NY) is also this species. *Amphisphaeria serrulata* (Ellis & G. Martin) M.E. Barr, having longitudinally striate ascospores, on palms and larger grasses, and *A. pardalina* (Ellis & Everh.) M.E. Barr, having ascospores with one to three slits at each end, on *Spartina*, were redescribed by Barr (1989b). *Amphisphaeria aspera* Ellis & Everh. is a species of *Dothidotthia* (Pleosporales, Barr 1989a).

A species on periderm of *Juniperus*, having longitudinally striate ascospores, does not fit any species described on that host; it is smaller than *A. juniperi* Tracy & Earle and is newly described below.

Amphisphaeria arizonica M.E. Barr, sp. nov. Fig. 1c

Ascomata immersa erumpentia globosa 495-550 μm diametro papillata clypeata. Asci 140-150 x 13-15 μm unitunicati cylindrici paraphysati, annuli apicali nonamyloidei. Ascosporae 18-22(-27) x 8-9(-10) μm fuscae ellipsoideae uniseptatae longistrosum striatae uniseriatae. Holotypus in corticis *Juniperi deppeanae* Steud., "USA: Arizona: Santa Cruz Co., Madera Canyon, Santa Rita Mts., 11 Aug 1980" a M.E. Barr n. 6814 lectus in NY depositus.

Ascomata immersed erumpent, nearly globose, 495-550 μm diam; apex stout papillate; peridium up to 40 μm wide below, compressed rows of brown cells, thickened above to 50-60 μm by closely adhering clypeus. Asci 140-150 x 13-15 μm ; apical ring nonamyloid. Paraphyses narrow. Ascospores 18-22(-27) x 8-9(-10) μm , dark brown, ellipsoid, one-septate, constricted; wall finely longitudinally striate; one globule and several guttules in each cell; uniseriate in the ascus.

Known from the type collection.

Key to North American species of *Amphisphaeria*

1. In branches and periderm of woody plants; clypei usually rounded and small over single ascomata.....2
1. In culms of grasses or petioles of palms; clypei often merging as blackened blotches over several ascomata.....5
 2. Ascospores 12-18(-24) x (5-)6-8 μm , wall smooth or verruculose; ascomata sphaeroid.....*A. multipunctata*
 2. Ascospores (15-)18-24(-30) μm long.....3
3. Ascospores 18-22(-27) x 8-9(-10) μm , wall longitudinally striate; ascomata globose.....*A. arizonica*
3. Ascospore wall smooth or verruculose, not striate; ascomata sphaeroid to nearly globose.....4
 4. Ascospore wall verruculose, usually surrounded by gel coating, (15-)18-24(-30) x 7-10 μm ; ascomata sphaeroid.....*A. bufonia*
 4. Ascospore wall smooth, lacking gel coating, 16.5-27.5 x 9-11 μm ; ascomata nearly globose....*A. umbrina*
5. Ascospore wall longitudinally striate, (15-)17-24 x 5-7(-8) μm ; ascomata globose.....*A. serrulata*
5. Ascospore wall bearing 1-3 terminal slits, 20-24(-27) x 7-9 μm ; ascomata sphaeroid.....*A. pardalina*

Broomella montaniensis (Ellis & Everh.) E.Müll. & S.Ahmad (Fig. 1f) is the only representative of the genus known in North America. This species was redescribed by Shoemaker and Müller (1963) with the presumed anamorph *Pestalotia pestalozzioides* (Dearn. & Fairm. in Fairm.) Shoemaker & E. Müll. [as *Truncatella pestalozzioides* (Dearn. & Fairm. in Fairm.) Shoemaker, Babcock & E. Müller, Shoemaker and Müller 1963).

Crassoascus was recently described for *C. fusisporus* Barassa, Checa & A.T. Martinez (Barassa et al. 1993), as a member of the Clypeosphaeriaceae. The brown ascospores, 40-45 x 8-10 μm , are typically 4-septate, have a large median cell and pallid end cells bearing delicate terminal protrusions or papillae at both ends. Several collections from British Columbia have shorter ascospores that are 3-7-septate with a median septum, and lack papillate tips to the pallid end cells. They evidently comprise another taxon in the genus.

Crassoascus canadensis M.E. Barr, sp. nov. Fig. 1d,e

Ascomata immersa discreta vel gregaria sphaeroidea 300-500 μm lata 200-350 μm alta papillata clypeata parva. Asci 110-160 x 15-20 μm unitunicati cylindrici vel oblongi paraphysati, annuli apicali amyloidei. Ascosporae 26-38 x 8-12 μm flavobrunneae vel avellaneae vel pallidae extrema versis fusoidae 3-7-septatae uniseriatae vel biseriatae. Holotypus in ligno *Salicis*, "Canada: British Columbia:

Sidney, 4 Oct 1991" a M.E. Barr 7787 lectus in DAOM et isotypus in NY depositus.

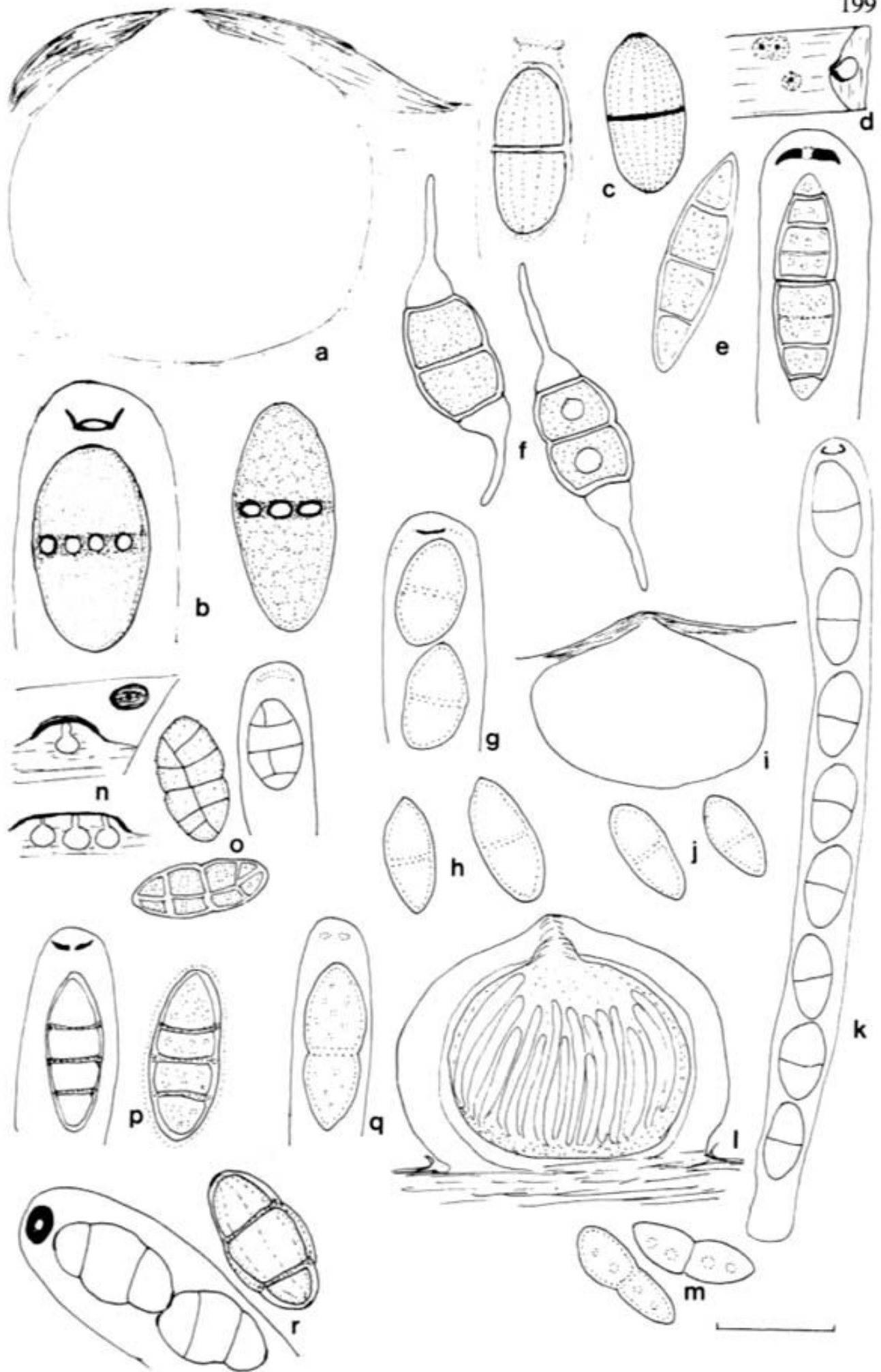
Ascomata immersed, scattered to gregarious, sphaeroid, 300-500 μm wide, 200-350 μm high; apex papillate, ostiole periphysate; peridium reddish brown, compressed cells, 20-25 μm wide, darkened around papilla as small clypeus. Asci 110-160 x 15-20 μm , unitunicate, cylindric to oblong, short stipitate; apical ring narrow, amyloid. Paraphyses delicate, guttulate, 2-3(-4) μm wide. Ascospores 26-38 x 8-12 μm , light yellowish brown to bright brown, end cells hyaline or light brownish, fusoid, 3-7-septate, slightly constricted at median septum; wall smooth; guttulate; uniseriate to partially biseriate in the ascus.

In wood or periderm of woody plants, British Columbia.

Additional collections: (all Sidney) *Acer macrophyllum* Pursh, 27 Mar 1991, Barr 7489; *Cornus occidentalis* Coville, 7 Jun 1991, Barr 7606 (DAOM).

Two other recently described genera have similar ascospores, fusoid, 5-7-septate, with hyaline or pallid end cells, but in asci whose apical ring is nonamyloid. *Ascotaiwania lignicola* Sivan. & H.S. Chang (Sivanesan and Chang 1992) forms oblique to horizontal, laterally short beaked ascomata on the wood surface and appears to belong in the *Amphisphaeriaceae*. *Herbampulla crassirostris* Scheuer & Nogrsek has immersed, beaked ascomata, nearly cylindric asci, and was assigned to the *Diaporthales* (Scheuer and Nogrsek 1993). This fungus has superficial similarities to *Trematosphaeria pachycarpa* (Sacc. & Marchal) Shoemaker & Babcock (Shoemaker and Babcock 1989), a loculoascomycetous member of the *Melanommatales*, and was originally determined as that species (Nogrsek 1990), in the new genus *Botanamphora* Nogrsek & Scheuer, now a synonym of *Trematosphaeria*.

Fig. 1. *Amphisphaeriaceae*. a, b. *Amphisphaerella deceptiva*, a. immersed clypeate ascoma in outline, b. ascus apex, ascospores. c. *Amphisphaeria arizonica*, ascus apex, ascospores. d, e. *Crassoascus canadensis*, d. habit of clypeate ascomata in branch, e. ascus apex, ascospores. f. *Broomella montaniensis*, ascospores. g. *Discostroma empetri*, ascus apex, ascospores. h. *D. hyperboreum*, ascospores. i, j. *D. ledi*, i. immersed clypeate ascoma in outline, j. ascospores. k. *D. rhododendri*, ascus, ascospores. l, m. *D. pachystimae*, l. erumpent clypeate ascoma in section, m. ascospores. n, o. *Dyrithium lividum*, n. habit of clypeate ascomata in wood, n. ascus apex, ascospores. p. *Leuteutypa hippophaes*, ascus apex, ascospores. q. *Griphosphaerioma kansensis*, ascus apex, ascospore. r. *Pestalosphaeria concentrica*, ascus apex, ascospores. Standard line = 15 μm for asci and ascospores, 150 μm for ascomata. Habits X ca. 10.



Discostroma. Three species studied by Brockmann (1976) in Europe are known from North America also: *D. massarinum* (Sacc.) Brockmann, *D. fuscella* (Berk. & Broome) Huhndorf (Huhndorf 1992) [as *D. corticola* (Fuckel) Brockmann], and *D. tostum* (Berk. & Broome) Brockmann. These three are the type species of *Discostroma* and *Clathridium*, *Griphosphaeria*, and *Paradidymella*, respectively, all presently arranged under *Discostroma*. Brockmann utilized *Seimatosporium* for species with appendaged conidia, *Sporocadus* for species lacking appendages, but Sutton (1980) included them all under *Seimatosporium*. Nag Raj (1993) analyzed the various taxa attributed to *Seimatosporium* and concluded that five genera should be segregated, two of them having teleomorphs in *Discostroma*. The connections for the three species noted above are: *D. massarinum* - *Seimatosporium ribis-alpini* (Corda) Shoemaker & E. Müll. (Shoemaker and Müller 1964, Brockmann 1976) [Nag Raj included this name as a synonym of *S. salicinum* (Corda) Nag Raj, and suggested that a different species could be the anamorph of *D. massarinum*]; *D. fuscella* - *S. lichenicola* (Corda) Shoemaker & E. Müll. (Shoemaker and Müller 1964), *Sporocadus lichenicola* Corda (Brockmann 1976); *D. tostum* - as *Seimatosporium kriegerianum* (Bres.) Morgan-Jones & B. Sutton (Müller and Shoemaker 1965), as *S. passerinii* (Sacc.) Brockmann (Brockmann 1976) [but *Diploceras kriegeriana* (Bres.) Nag Raj with teleomorph *Discostromopsis callistemonis* Swart (Nag Raj 1993)].

Discostroma propendulum (P. Karst.) Brockmann [as (B. Erikss.) Brockmann] is known in North America as well as Europe (B. Eriksson 1974) on *Arctostaphylos*. *Discostroma hyperboreum* (P. Karst.) O.E. Erikss. (O. Eriksson 1992) (Fig. 1h) develops in leaves of *Cassiope tetragona* (L.) D. Don., circumpolar in arctic regions. L. Holm (1975a) described it under the synonymous name *Griphosphaeria hyperborea* (P. Karst.) L. Holm. *Mycosphaerella immersa* Dearn. (Rep. Canad. Arctic Exped. 1916-18, 4C: 6. 1923) is another synonym (Barr 1959). *Discostroma muricatum* (Ellis & Everh.) M.E. Barr was redescribed by Barr (1983). Two other species, *D. cupulum* (Ellis) M.E. Barr and *D. rubicola* (Ellis & Everh.) M.E. Barr, were added to the genus from North American collections (Barr 1993). Four new species are described and an additional new combination is proposed below.

Discostroma empetri M.E. Barr, sp. nov. Fig. 1g

Ascomata immersa globosa 200-290 μm diametro papillata clypeata, peridia ca. 15 μm lata. Asci 80-93 x 9-10.5 μm unitunicati cylindrici paraphysati, annuli apicali amyloidei. Ascospores 12-13.5(-15) x 5.5-7(-8) μm hyalinae ellipsoideae obtusae uniseptatae uniseriatae. Holotypus in foliis *Empetri nigri* L. "USA: Alaska: Aleutian Islands, a T. P. Banks Jr. n. 501 lectus in NY depositus.

Ascomata immersed, globose, 200-290 μm diam, apex

papillate, surrounded by circular, somewhat shining black clypeus; peridium ca. 15 μm wide. Asci 80-93 x 9-10.5 μm ; apical ring narrow, amyloid. Ascospores 12-13.5(-15) x 5.5-7(-8) μm , hyaline, ellipsoid, ends obtuse, 1-septate, slightly constricted.

Known from the type collection.

This species and two newly described taxa on members of the Ericaceae, *D. ledi* and *D. rhododendri*, are rather similar to one another and to *D. hyperboreum*, but are recognizable as distinct by ascospore sizes and shapes and extent of clypeus development.

Discostroma ledi M.E. Barr, sp. nov. Fig. 1i, j

Ascomata immersa sphaeroidea vel globosa, 200-245 μm lata 175-245 μm alta papillata clypeata, peridia 16-20 μm lata. Asci 63-75 x 6-7 μm unitunicati cylindrici paraphysati, annuli apicali amyloidei. Ascosporae 10.5-12 x 4-4.5 μm hyalinae ellipsoideae obtusae uniseptatae uniseriatae. Holotypus in foliis *Ledi groenlandici* Oed. "Canada: Quebec: Mont Albert, trail near falls" a M.E. Barr n. 1938c lectus in NY depositus.

Ascomata immersed, 200-245 μm wide, 170-245 μm high, apex papillate beneath shallow clypeus; peridium 16-20 μm wide. Asci 63-75 x 6-7 μm ; apical ring narrow, amyloid. Paraphyses narrow. Ascospores 10.5-12 x 4-4.5 μm , hyaline, ellipsoid, ends obtuse, 1-septate, not constricted.

Known from the type collection. Some three-septate, brown conidia, ca. 18 x 6 μm , were found and perhaps are referable as a species of *Sporocadus*.

Discostroma pachystimae M.E. Barr & Rogerson, sp. nov.

Fig. 1l,m

Ascomata erumpentia discreta vel aggregata sphaeroidea 330 μm lata 275 μm alta papillata clypeata peridis adhaerens. Asci 80-100 x 7-7.5 μm unitunicati cylindrici paraphysati, annuli apicali amyloidei tarde. Ascosporae 12-14 x 4.5-5 μm hyalinae ellipsoideae fusoidae uniseptatae uniseriatae. Holotypus in ramunculis *Pachystimae myrsinites* (Pursh) Rafinesque, "USA: Utah: Weber Co., Taylor Canyon, Wasatch Mts. E. of Ogden, 14 Jul 1983" a C.T. Rogerson lectus in NY depositus.

Ascomata erumpent, separate or two or few coalescent, sphaeroid, ca. 330 μm wide, 275 μm high; papilla short, ostiole periphysate; peridium hyaline, ca. 32 μm wide of pseudoparenchymatous cells externally, compressed cells internally, beneath stromatic covering of blackish, pseudoparenchymatous cells ca. 50 μm wide. Asci 80-100 x 7-7.5 μm , unitunicate, cylindrical, apical ring very narrow, slowly amyloid. Paraphyses narrow, numerous. Ascospores 12-14 x 4.5-5 μm , hyaline, ellipsoid fusoid, 1-septate, slightly constricted, rarely 3-septate; wall smooth; two globules per cell; uniseriate in the ascus.

Known from the type collection.

Discostroma rhododendri M.E. Barr, sp. nov. Fig. 1k

Ascomata immersa gregaria in maculis sphaeroideae 200-220 μm lata 150-180 μm alta papillata clypeata, peridia ca. 15 μm lata. Asci 60-88 x 6.5-9 μm unitunicati cylindrici paraphysati, annuli apicali amyloidei. Ascosporae 10-13 x 4.5-5.5 μm hyalinae oblongae ellipsoideae obtusae uniseptatae uniseriatae. Holotypus in foliis *Rhododendri californici* Hook. "USA: Oregon, Rhododendron, 5 Nov 1930" a J.R. Hansbrough n. 324 lecti in NY depositus sub *Sphaerella rhododendri* Cooke.

Ascomata gregarious, immersed in dead portion of living leaf containing *Mycosphaerella clintoniana* (House) House, sphaeroid, 200-220 μm wide, 150-180 μm high, papillate; peridium 15 μm wide, darkened over apex as small, closely adherent clypeus. Asci 60-88 x 6.5-9 μm ; apical ring narrow, amyloid. Ascospores 10-13 x 4.5-5.5 μm , hyaline, oblong ellipsoid, ends obtuse, 1-septate, not or slightly constricted.

Known from the type collection.

Discostroma succineum (Roberge in Desm.) M.E. Barr, comb. nov.; basionym: *Sphaeria succinea* Roberge in Desm. Ann. Sci. Nat. ser. 3, 10: 354. 1848. This species differs from *D. cupulum* in smooth-walled, hyaline ascospores rather than delicately longitudinally striate, light brown ascospores. It is known from USA, in grayish spots in living leaves of *Quercus agrifolia* Née, California: Mendocino Co., Jackson State Forest, 15 Apr 1983, H.E. Bigelow (NY). The species was redescribed by Petrak (1927) under *Paradidymella* and by Müller (in Müller and Arx 1962) under *Leiosphaerella* from Europe.

Key to North American Species of *Discostroma*

1. Ascomata in coriaceous leaves; ascospores 1-septate...2
1. Ascomata in herbaceous stems or woody branches; ascospores 1- or several septate.....7
 2. In leaves of *Quercus* (rarely *Castanea*).....3
 2. In leaves of *Ericaceae* or *Empetraceae*.....4
3. Ascospores 11-13(-16.5) x 5-6.5 μm , becoming light brown, wall finely verruculose forming longitudinal striae
D. cupulum
3. Ascospores 13-16 x 5-6 μm , hyaline, wall smooth.....
D. succineum
 4. Ascospores 13.5-16(-18) x 5.5-7.5 μm , ends acute; clypeus small, closely adherent to apex, in *Cassiope*.
D. hyperboreum
 4. Ascospores 10-13.5(-15) μm long, ends obtuse.....5
5. Ascospores 12-13.5(-15) x 5.5-7(-8) μm ; clypeus well developed over ascomata, in *Empetrum*.....*D. empetri*
5. Ascospores 10-13 x 4-5.5 μm6

6. Clypeus well developed over ascomata, in *Ledum*...
D. ledi
6. Clypeus small, closely adherent to apex; in
Rhododendron.....*D. rhododendri*
7. Ascospores 1-septate.....8
7. Ascospores 3-5-6-septate.....9
8. Ascospores 10-14 x 3.5-5 μm ; ascomata immersed and
 clypeate, in stems of *Epilobium*;*D. tostum*
8. Ascospores 12-14 x 4.5-5 μm ; ascomata erumpent,
 few grouped beneath stromatic covering, in twigs of
Pachystima.....*D. pachystimae*
9. Ascomata superficial, surrounded by soft stroma of
 large, pseudoparenchymatous cells; ascospores light dull
 brown, 18-20(-34) x 8-10(-12.5) μm*D. muricatum*
9. Ascomata immersed beneath clypeus or erumpent and
 grouped beneath stromatic covering; ascospores hyaline to
 light brown.....10
10. Ascospores 11-18(-20) x 5-7(-8) μm ; in various
 woody plants.....*D. fuscella*
10. Ascospores larger.....11
11. Ascospores 19-22(-24) x 10-13 μm ; in *Arctostaphylos*...
D. propendulum
11. Ascospores (5.5-)6-10 μm wide.....12
12. Ascospores 15.5-24 x 6.5-9 μm , 3-septate; in
 canes of *Rubus*.....*D. rubicola*
12. Ascospores 15-28 x (5.5-)6-10 μm , 3-5-septate and
 usually one longitudinal septum in one or more cells;
 in branches of *Ribes*.....*D. massarinum*

Dyrithium. Although relatively few dictyosporous taxa are known in the Hymenoascomycetes as compared to the Loculoascomycetes, one such is a member of the Amphisphaeriaceae. *Thyridium lividum* (Pers.: Fr.) Sacc. was named as type of the genus by Clements and Shear (1931), but that was certainly not Nitschke's original concept (L. Holm 1975b, Barr 1983). Many species assigned to *Thyridium* have bitunicate asci and are thus excluded (Barr 1990b); only *T. vestitum* (Fr.) Fuckel is presently accepted in that genus (Barr 1983, 1990b) which belongs in the Thyridiaceae. *Thyridium vestitum* differs conspicuously from *T. lividum* by valsoid configuration of ascomata in interwoven, reddish stromatic tissues. According to Berlese (1897, Pl. CIII, f. 1), in *T. lividum* several ascomata are immersed in darkened pulvinate stromatic tissues in wood. Dennis (1978) illustrated a single ascoma in wood beneath raised ellipsoid blackened clypeus. A specimen in Fries' herbarium (*Sphaeria livida* Fr. E. Galie (?) Levieux... Herb. E. Fries, UPS) has one to five ascomata beneath elongate raised clypei, as do some North American collections. The species does not belong in any of the dictyosporous genera that I am aware of and a new genus is proposed to accommodate it.

Dyrithium M.E. Barr, gen. nov. (anagram of *Thyridium*)

Ascomata immersa solitaria vel pauca papillata vel rostellata sub clypeis elevatis denigratis ellipsoideis. Asci unitunicati cylindrici paraphysati, annuli apicali nonamyloidei. Ascosporeae fuscae ellipsoideae muriformia. Species typicus *D. lividum* (Fr.) M.E. Barr

Ascomata immersed, separate or few beneath raised, blackened, ellipsoid clypeus, at times extended as blackened marginal zone at sides and toward base of ascoma, globose; papilla or short beak stout; peridium narrow. Asci unitunicate, cylindric, short stipitate, apical ring shallow, nonamyloid. Paraphyses narrow. Ascospores dull brown, ellipsoid, muriform. Type species *D. lividum* (Fr.) M.E. Barr

Dyrithium lividum (Fr.) M.E. Barr, comb. nov. Fig. 1n,o

Sphaeria livida Fr. Syst. Mycol. 2: 479. 1823.

Teichospora livida (Fr.) P. Karst., Mycol. Fenn. 2: 68. 1873.

Thyridium lividum (Fr.) Sacc. Michelia 1: 50. 1877; Syll. Fung. 2: 324. 1883.

Fenestella livida (Fr.) G. Winter in Rabenh. Kryptogamen-Flora von Deutschland... 1(2): 796. 1885.

Xylophaeria livida (Fr.) Petr., Sydowia 4: 19. 1950.

Mycothyridium lividum (Fr.) Petr., Sydowia 15: 289. 1961 (1962).

Ascomata immersed in wood, single or few beneath dark gray to blackish, arched, ellipsoid clypeus, 1-2 mm long, up to 1 mm wide, of small brown cells and hyphae surrounding substrate cells, at times extending around ascomata; ascomata globose, 300-440 μm ; apex wide, papillate to short beaked, 165-300 μm high, 110-220 μm wide, opening to surface; peridium narrow, 10-20 μm , externally brown small pseudoparenchymatous cells, internally hyaline compressed cells. Asci 80-100 x 9-14 μm , 8-spored or less; pulvillus chitinous; apical ring shallow, nonamyloid. Paraphyses numerous, narrow. Ascospores 12-20 x 7-10 μm , dull brown, ellipsoid, 3-5-septate with one longitudinal septum in mid or all cells; wall punctate, appearing finely verruculose; granular; uniseriate in the ascus.

In old wood. CANADA: Newfoundland: Bay of Islands, Rev. Waghorne 688 (NY). USA: Iowa: *Juniperus communis* L., Decorah, 31 Aug 1882, E. W. Holway 139 (NY). Texas: *Juniperus ashei* Buchholz, Austin, Oct 1975, R.T. Jackson, det. M. Sherwood, UPS ex CUP 54852. Vermont: *Thuja*, Cedar Swamps, Addison Co., Munkton, 19 Jun 1879, C.G. P(ringle). (NY). PUERTO RICO: Mona Island, Punta Capitan, 7 Jun 1992, coll. S. Cantrell, comm. D. J. Lodge PR 907 part via S. Huhndorf (NY).

Sphaeria garryae Cooke & Harkness may be an additional synonym. The specimen in NY from Harkness is

overmature, but is similar to those cited above in external features. However, the descriptions as *Thyridium* in Ellis and Everhart (1892) and as *Peltosphaeria* in Berlese (1897) are of a species with much larger, seven to nine transversely septate ascospores, in appearance more like a species of *Peltosphaeria* (= *Julella*) than *Thyridium* or *Dyrithium*.

Griphosphaerioma kansensis (Ellis & Everh.) Shoemaker (Fig. 1q) has short-beaked ascomata that develop in valsoid configuration among brownish stromatic tissues. *Labridella cornu-cervae* Brenckle is the anamorph. Shoemaker (1963) redescribed and illustrated the species.

Lepteutypa. As Samuels et al. (1987) pointed out, when they compared species of *Lepteutypa* and *Pestalospaeria*, the three-septate brown ascospores in *L. fuckelii* (Nitschke in Fuckel) Petr. appear to be distoseptate. The septa are often incomplete and are marked by an accumulation of brown granules. The ascospore wall is smooth and surrounded by a firm, narrow hyaline layer, not expanding in water as most gel coatings do. Several collections that fit in *Lepteutypa* have verruculose or irregular walls within the outer coating and pigmentation is more intense than in the smooth-walled but octagonal ascospores of the type species or in *L. hippophaes* (Fabre) Arx, the type species of *Hymenopleella* (Munk 1953). Ascomata in *Lepteutypa* are quite similar in appearance to those in *Discostroma* and are immersed and clypeate or at times may be erumpent and grouped under a common covering. Apices are papillate or short beaked.

Shoemaker and Müller (1965) described *L. fuckelii* as well as *L. hippophaes* (under *Hymenopleella*), with *Seiridium*-like anamorphs from European specimens. *Lepteutypa hippophaes* has smooth-walled ascospores with mid cells shorter than end cells (Fig. 1p). A collection on *Ceanothus velutinus* Douglas ex Hook. (USA: California: Loomis Peak Trail, Lassen Volcanic Nat'l Park, 17 Aug 1957, W.B. & V.G. Cooke 30904, NY) agrees well with *L. hippophaes*. *Lepteutypa fuckelii* is not yet known convincingly from North America, although a collection on *Celastrus scandens* (USA: Massachusetts: Franklin Co., Pine Hill, Conway, 25 Nov 1979, M.E. Barr 6627, NY) is close and is deposited under that name. The ascospores are not octagonal, but they are delicately longitudinally striate. The presence of *L. cupressi* (Natrass, C. Booth & B. Sutton) H.J. Swart in North America is inferred from the anamorphs *Seiridium unicolorne* (Cooke & Ellis) B. Sutton (Guba 1961, Sutton 1980) and *S. cardinale* (Wagener) Sutton & Gibson (Nag Raj 1993). Three species, *L. alpestris* (Ellis & Everh.) M.E. Barr, *L. sabalicola* (Ellis & G. Martin) M.E. Barr, and *L. ulmicola* (Ellis & Everh.) M.E. Barr were redescribed and illustrated by Barr (1993).

Key to North American Species of *Lepteutypa*

1. Ascospores typically octagonal in end view or longitudinally striate, (13-)18-22 x (4.5-)5-7.5 μm*L. fuckelii*
1. Ascospores not octagonal in end view nor longitudinally striate.....2
 2. Ascospore wall smooth, brown.....3
 2. Ascospore wall verruculose, reddish brown.....5
3. Ascospores typically with short, somewhat darker mid cells than end cells, 18-25 x 6-9 μm*L. hippophaes*
3. Ascospores with mid and end cells about equal in length and pigmentation.....4
 4. Ascospores 14-23(-27) x 6-9 μm*L. cupressi*
 4. Ascospores 20-27 x 5-7.5 μm*L. alpestris*
5. Ascospores narrow, 11-15.5 x 3.5-5 μm , in clavate cylindrical asci; ascomata usually gregarious beneath clypeus..
L. sabalicola
5. Ascospores wider, 16.5-21(-28) x 6-9 μm , in cylindrical asci; ascomata usually separate beneath clypei.....
L. ulmicola

Pestalosphaeria was described for *P. concentrica* M.E. Barr (Barr 1975) (Fig. 1r) in leaves of *Rhododendron maximum* L., with *Pestalotiopsis guepinii* (Desm.) Steyaert var. *macrotricha* (Kleb.) B. Sutton as anamorph. This is the only North American species but several others have been described, typically having two-septate ascospores. Nag Raj (1985) summarized information on five species and Samuels et al. (1987) added another. Zhu et al. (1991) described two more species from China. According to van der Aa's (1986) revision of *Keissleriella podocarpi* Butin and disposition to *Lepteutypa*, this species probably belongs in *Pestalosphaeria* also.

Clypeosphaeriaceae

The family includes taxa whose ascospores are radially asymmetric, flattened or slightly incurved on one side. The ascospores are brown, may have a small pallid end cell, and usually contain one or two germ pores or a group of short slits at one end. The asci are cylindrical or clavate cylindrical and stipitate and often contain a conspicuous refractive pulvillus over the amyloid or nonamyloid apical ring. Stromatic tissues form as darkened clypei over single immersed ascomata or may be closely adherent to peridium of erumpent ascomata, or as interwoven hyphae surrounding one or more ascomata that may be grouped in valsoid configuration. Anamorphs are not yet known in the family.

Key to Genera of Clypeosphaeriaceae

1. Ascomata single or few beneath dark clypeus.....2
1. Ascomata single or grouped, surrounded by interwoven

- hyphae, apical ring of ascus nonamyloid.....3
2. Ascospores 2-septate with short pallid end cell; apical ring of ascus nonamyloid.....*Apiorhynchostoma*
2. Ascospores 1-septate with short pallid end cell or 3-septate and brown; apical ring of ascus amyloid or nonamyloid.....*Clypeosphaeria*
3. Ascomata in valsoid configuration; ascospores 1-septate
Pseudovalsaria
3. Ascomata single or few grouped.....4
4. Immersed in wood; ascospores aseptate or 1-(rarely 2-)septate, at times with short pallid end cell.....
Endoxyla
4. Erumpent superficial on substrate; ascospores 1-septate (rarely aseptate).....*Jobellisia*

Apiorhynchostoma curreyi (Rabenh.) E. Müll. in Müller and Arx (1962) is the type species of the genus, known from North America (as *Sphaeria altipeta* Peck) as well as Europe. Petrak (1923) and Müller in Müller and Arx (1962) provided descriptions of this species. *Apiorhynchostoma tumulatum* (Cooke) Sivan. is known from wood of *Pinus contorta* Douglas ex Loud. in California (Sierra Nevada, W. H. Harkness 1014, K) and has ascospores with a delicate hyaline appendage at the end opposite the small pallid cell. They measure 25-35 x 9-12 μm (Sivanesan 1975), larger than those of *A. curreyi* (Fig. 2c) which measure 15-18(-27) x 4.5-6.5(-9) μm .

Clypeosphaeria was re-evaluated by Barr (1989c) who at that time knew only *C. americana* M.E. Barr & Samuels in North America. *Clypeosphaeria mamillana* (Fr.: Fr.) Lambotte is now known from western Canada on several woody host plants [*Arbutus menziesii* Pursh, *Cornus nuttallii* Audubon, *C. occidentalis*, *Holodiscus discolor* (Pursh) Maxim., *Lonicera ciliosa* (Pursh) Poir., *Quercus garryana* Douglas, *Rosa* sp., *Rubus laciniatus* Willd.]. The ascomata may be separate with only the black papillate apex erumpent or separate or few under a conspicuous black clypeus in twigs, or gregarious under a darkened widespread clypeus in wood (Fig. 2a), much as in *Sphaeria hemitapha* Berk. & Broome, one of the synonymous names. All other features, including those of ascospore septation (Fig. 2b), are in accord with the variations described in Barr (1989c) and Huhndorf (1992), although most ascospores in the species are delicately three septate.

Endoxyla was investigated by Untereiner (1993). She accepted five species in the genus, all but the type species *E. macrostoma* Fuckel known from North America. She considered a number of families in her efforts to assign the genus and finally left it in the Clypeosphaeriaceae, suggested by Barr (1990a). Barr (1993) added *E. luteobasis* to the genus. This species has grouped ascomata that are surrounded by yellowish,

furfuraceous hyphae. The uniseptate ascospores are most similar to those of *E. parallela* (Fr.: Fr.) Fuckel, and are smaller, 9-12 x 2-2.5 μm .

The hyaline-spored species that have traditionally been assigned to *Ceratostomella* (Arx 1952, Dennis 1978, Eriksson and Hawksworth 1991), also have been synonymized under *Endoxyla* (Arx and Müller 1954, Munk 1957, 1965). The two genera are quite different. Even though species of *Ceratostomella* are saprobic in wood, the asci are truly diaphragmose in structure, and the genus must be assigned to the Diaporthales. Its precise position awaits another re-evaluation of certain taxa in the Melanconidaceae. *Endoxyla avocetta* (Cooke & Ellis) Romero & Samuels (Romero and Samuels 1991) should be removed to a position among these taxa at the appropriate time.

Jobellisia was described for two species, *J. luteola* (Ellis & Everh.) M.E. Barr and *J. nicaraguensis* (Ellis & Everh.) M.E. Barr, having brown, broadly ellipsoid, aseptate or one-septate ascospores (Barr 1993). An additional taxon is transferred to this genus. It was originally described from Europe and is also known in North America. The ascomata are erumpent separately or few gregarious.

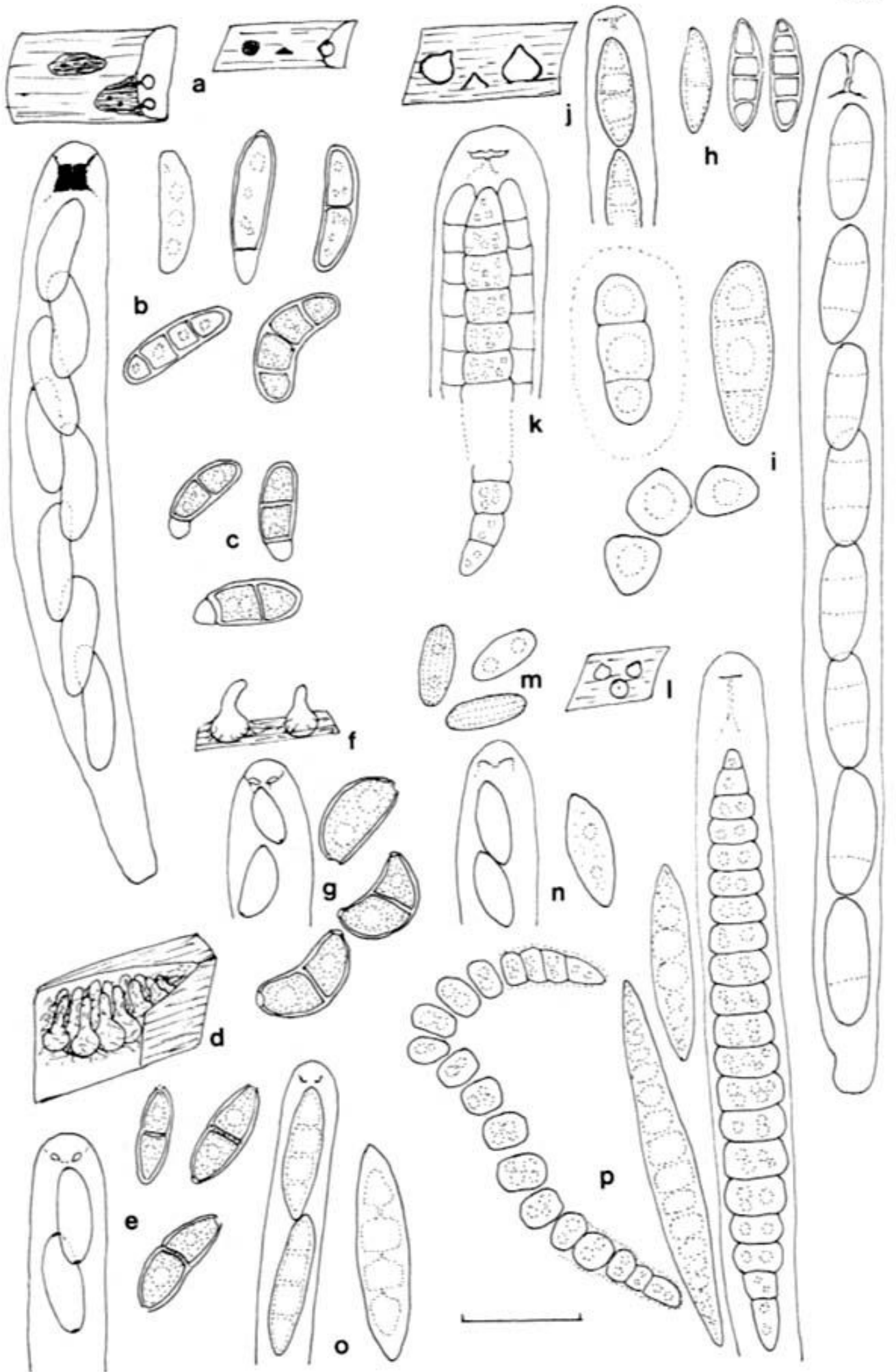
Jobellisia rhynchostoma (Höhn.) M.E. Barr, comb. nov.

Fig. 2f,g

Letendreaa rhynchostoma Höhn., Sitzungsber. Kaiserl. Akad. Wiss. Math.-Naturwiss. Kl. Abt. 1, 116: 108. 1907.

Ascomata separate or gregarious, erumpent to superficial, globose, 350-660 μm diam; beaks stout, 385-520 μm high, 160-300 μm wide, ostioles periphysate; peridium externally reddish to dark brown, small pseudoparenchymatous cells, 40-60 μm wide, up to 100 μm wide as closely adhering stromatic layer around beaks, internally hyaline,

Fig. 2. a-g. Clypeosphaeriaceae. a,b. *Clypeosphaeria mamillana*, a. habit of forms in wood (left) and twig (right), b. ascus and variation in ascospores. c. *Apio-rhynchostoma curreyi*, ascospores. d, e. *Pseudovalsaria peckii*, d. habit of grouped ascomata, e. ascus apex and ascospores. f, g. *Jobellisia rhynchostoma*, f. habit of ascomata, g. ascus apex, ascospores. h-p. Pleurotremaeaceae. h. *Pleurotrema polysemum*, ascus apex and ascospores. i. *Melomastia mastoidea*, ascus and stages in development of ascospores. j, k. *Daruvedia bacillata*, j. habit of ascomata, k. ascus apex, uppermost and lowermost cells of ascospore. l, m. *Phomatospora striatispora*, l. habit of ascomata, m. ascospores. n. *P. lithocarpi*, ascus apex, ascospores. o. *Saccardoella macrasca*, ascus apex, ascospores. p. *S. separans*, ascus apex, stages in development of ascospores. Standard line = 15 μm for asci and ascospores. Habits X ca. 10.



10 μm wide. Asci 65-90 x 6-11(-14.5) μm , cylindric, 8-spored or less; apical ring shallow, nonamyloid, pulvillus chitinous. Paraphyses narrow, numerous, 1-3 μm wide. Ascospores 9-15 x 4.5-7.5 μm (up to 15.5-20 x 7.5-9 μm in few-spored asci), grayish brown becoming dark brown, ellipsoid to navicular, inequilateral, one side flattened or slightly curved, one celled or one septate; wall smooth, one or two terminal germ pores; one globule per cell; uniseriate in the ascus.

In pericarps and old wood. AUSTRIA: pericarps of *Juglans regia* L., Prater (Donau) near Vienna, 19 Aug 1906, F. v. Höhnel 2845, holotype (Höhnel Herb. in FH). Additional collections: USA: Massachusetts: *Carya* pericarp, Franklin Co., Roaring Brook Road, Conway, 11 Nov 1961, M.E. Barr 3176. North Carolina: *Robinia pseudo-acacia* L. wood, Transylvania Co., 3 mi S of Sapphire, 6 Jul 1972, J. Menge 204 (both NY).

Key to Species of *Jobellisia*

1. Ascomata immersed to erumpent, apex stout beaked; ascospores 9-15 x 4.5-7.5 μm*J. rhynchostoma*
1. Ascomata erumpent superficial, apex papillate.....2
 2. Ascomata surrounded by yellowish brown, stromatic tissues; ascospores 9-15(-16) x 4-6 μm*J. luteola*
 2. Ascomata surrounded by crustose, dark brown stromatic layer; ascospores 10-12 x 4.5-5 μm*J. nicaraguensis*

Pseudovalsaria was erected for *P. foedans* (P. Karst.) Spooner (Spooner 1986), a species separated from *Valsaria* by the type of stroma and by nonornamented ascospores that contain one germ pore. Spooner did not assign the genus to a family, although he inclined toward the Trichosphaeriaceae. Spooner redescribed and illustrated the species. He included the synonymous names *Phaeosperma niesslii* G. Winter and *Valsaria lignicola* Teng & S.H. Ou, noted collections on several substrates (*Alnus*, *Betula*, *Castanea*, *Pinus*, *Prunus*, *Quercus*, ?*Viburnum*) in Europe and China. Barr (1990a) arranged the genus in the Clypeosphaeriaceae and added *Valsaria moroides* (Cooke & Peck) Sacc. as another synonymous name, on *Alnus* in eastern North America. The fungus is also known in North America on *Betula* from Massachusetts (Barr 1789, NY, as *Valsaria niesslii*) and on *Salix* from Idaho (A.W. Slipp 434, NY).

Pseudovalsaria allantospora (Ellis & Everh.) M.E. Barr (Barr 1993) was redescribed and illustrated by Shoemaker and Egger (1982). Another taxon is inserted in the genus.

Pseudovalsaria peckii (Howe in Peck) M.E. Barr, comb. nov.
Fig. 2d,e

Valsa peckii Howe in Peck, Rep. New York State Mus.
27: 109. (for 1873) 1875.

Valsaria peckii (Howe in Peck) Sacc. Syll. Fung. 1: 746. 1882.

Ascomata closely gregarious in valsoid configuration, as rounded or ellipsoid areas surrounded by dark brown prosenchymatous stromatic tissues around beaks; ascomata globose or ovoid, 400-800 μm ; beaks 770-1000 μm high, 150-200 μm wide, erumpent together, ostioles periphysate; peridium externally dark reddish brown compressed rows of cells, 20-30 μm wide, internally 6-10 μm wide, pallid. Asci cylindric. 90-120 x 7.5-10 μm ; apical ring shallow, nonamyloid, pulvillus chitinous. Paraphyses numerous, delicate, 1-1.5 μm wide. Ascospores 12-15.5(-17) x 4.5-5.5 μm , soon dark brown, oblong ellipsoid, straight or slightly curved, 1-septate, heavily pigmented each side of septum; wall smooth or finely verruculose, two terminal germ pores; one or two globules per cell; uniseriate in the ascus.

In ericaceous branches. USA: Connecticut: *Vaccinium atrococcum* (Gray) Heller, near Willimantic, 25 Aug 1979, M.E. Barr 6583. New Jersey: *V. corymbosum* L., Newfield, J.B. Ellis N.A.F. 171 (NY). New York: *Kalmia latifolia* L., Forestburgh, C.H. Peck (NYS, holotype); *V. corymbosum*, Albany Co., Vorheesville, 18 Apr 1925, H.D. House 606 (NYS).

Key to Species of *Pseudovalsaria*

1. Ascospores 9-13 x 2-5 μm ; in various trees...*P. foedans*
1. Ascospores longer; substrates restricted.....2
 2. Ascospores 12-15.5(-17) x 4.5-5.5 μm ; in ericaceous branches.....*P. peckii*
 2. Ascospores 11-16.5(-20) x 3.5-5.5 μm ; in *Acer*.....*P. allantospora*

Pleurotremaceae

The family Pleurotremataceae Walt. Watson (New Phytol. 28: 112. 1929) was erected for *Pleurotrema polysemum* (Nyl.) Müll. Arg., the sole species, and has been considered to be lichenized. Eriksson (1981) redescribed and illustrated this organism, which has horizontal ascomata beneath a blackened clypeus that open by short lateral apices, the ostioles periphysate. He considered that the species was lichenized and suggested that the family could be synonymized under the Pyrenulaceae (Pyrenulales or Melannomatales, i.e., among the Loculoascomycetes.) Although Eriksson indicated that the asci were bitunicate but not fissitunicate, his Fig. 186b shows a definite narrow ring in the ascus apex, as did my examination of isotype material from NY. Eriksson and Hawksworth (1991) have Pleurotremataceae as a questionable synonym of Pyrenulaceae, while Poelt (1973) assigned *Pleurotrema* to the Strigulaceae. Aptroot (1991) synonymized the genus under *Lithothelium* as a member of

the Pyrenulaceae. Recently, R. Harris (personal communication) examined the NY isotype of *Pleurotrema polysemum*, determined that it is a nonlichenized fungus, that the short-stipitate, cylindrical asci are unitunicate, and suggested that it could be related to *Melomastia* and *Saccardoella*. I concur with his findings, and remove the family to a position in the Xylariales, where it accommodates several other genera having hyaline, symmetric, frequently distoseptate ascospores in short stipitate, cylindrical asci whose apical ring is narrow and nonamyloid and whose pulvillus is indistinct. The ascospores of *P. polysemum* (Fig. 2h) are evidently distoseptate, according to Luttrell's (1963) definition of the condition. They do not have lenticular lumina such as are found in species of *Massaria* or *Pyrenula*, for example, but rectangular median cells. Development of septation is macrocephalic (Eriksson 1981), with most ascospores three septate, but one or two additional septa may be formed.

With the insertion of *Phomatospora* into this family, the invalid name Phomatosporaceae Arx [Antonie van Leeuwenhoek 17: 271. 1951; nom. inval. Art. 36.1, Art. 32.1(b), Hawksworth and David 1989] is included.

Only for a few species in *Phomatospora* are any anamorphs known: *Dinemasporium strigosum* (Pers.: Fr.) Sacc. for *P. dinemasporium* Webster (Webster 1955), and species of *Sporothrix* for *P. berkeley* Sacc. and *P. arenaria* Sacc., E. Bommer & M. Rousseau (Rappaz 1992). Because these anamorphs are so dissimilar, this genus may not represent a single entity upon detailed scrutiny.

Key to Genera of Pleurotremaceae

1. Ascospores aseptate (rarely 1-septate), in herbaceous stems, monocot culms, coriaceous leaves.....*Phomatospora*
1. Ascospores septate, in wood or periderm.....2
 2. Ascospores oblong, 2-septate.....*Melomastia*
 2. Ascospores fusoid, elongate or filiform, 3- to multiseptate.....3
3. Ascomata horizontal, short apex lateral; asci parallel to substrate surface; ascospores 3-septate.....*Pleurotrema*
3. Ascomata upright or tilted, short apex central or eccentric; asci perpendicular to substrate surface.....4
 4. Ascospores fusoid to elongate, 3-30-septate.....*Saccardoella*
 4. Ascospores filiform, up to 50-septate....*Daruvedia*

Daruvedia was erected recently by Dennis (1988) to accommodate *Sphaeria bacillata* Cooke, with synonymous name *Rhaphidophora macrocarpa* Sacc. As Dennis observed, *Acerbia* cannot be utilized for this species; in the type species *A. hyptidis* (Henn.) Sacc. the ascospores are nonseptate and relatively short. In addition, the description of rugulose ascomata and comparison to *Ophioceras longispora* (Ellis) Sacc. suggests that *Acerbia* is a member

of the Lasiosphaeriaceae (Sordariales), as is *Sphaeria longispora* Ellis. This taxon is lasiosphaeriaceous according to the type specimen, whose ascomata have a short papillate apex composed of dark setae, and required a new name, *Lasio-sphaeria ellisii* M.E. Barr (Barr 1993) when transfer was made to that genus. Berlese (1899) provided illustrations of "*Acerbia*" *bacillata*, showing stout, erumpent ascomata, long cylindrical ascus and filiform ascospores that are closely septate with up to 50 septa, the apex obtuse and tapering to the narrow base. Berlese also suggested that *Sphaeria longispora* could be the same, and Ellis and Everhart (1892) mentioned *S. longispora* as possibly identical to *Acanthostigma decastylum* (Cooke) Sacc. This latter species has distantly setose ascomata, shorter, 3-5-septate ascospores 22-30 x 4-4.5 μ m, and was compared to *A. atrobarbum* (Cooke & Ellis) Ellis & Everh. which is properly *Chaetosphaeria atrobarba* (Cooke & Ellis) Sacc. *Acanthostigma decastylum* is surely also a species of *Chaetosphaeria*.

While I agree with Dennis that *Sphaeria bacillata* requires a separate genus, I disagree on its disposition. The asci are unitunicate and the fungus is most closely related to *Melomastia mastoidea* (Fr.) Schröt. and species of *Saccardoella*. Locally, *Lonicera ciliosa* is host to *Daruvedia bacillata*, *Melomastia mastoidea* and a new species of *Saccardoella*, and it is impossible to tell which of these fungi is in hand by their macroscopic appearance. The stout-walled, strongly papillate ascomata, the thick peridium composed of numerous rows of compressed reddish brown cells, and the centrum of long cylindrical asci and narrow paraphyses in a gel matrix are shared characteristics. The asci do have a thickened wall at the apex that is penetrated by a narrow canal that bears a narrow refractive apical ring. In water mounts the asci in all three species tend to break and release the ascospores, but not in a bitunicate fashion, i.e., lacking an extendable endoascus. The ascospores of *Daruvedia bacillata* differ from those of other scolecosporous taxa in their close septation and do not have any internal cells that are enlarged. Such a fungus was illustrated by Shoemaker (1976) as *Ophiobolus lonicerae* Fabre from California, the ascospores multiseptate and lacking any enlarged cells. This name is surely another synonym of *D. bacillata* as Berlese (1899) had suggested. Because of the difficulty of access to Dennis's article, the synonymy and a description of this species follows.

- Daruvedia bacillata* (Cooke) Dennis, *Belarra* 2(4): 25. 1988. Fig. 2j,k
Sphaeria bacillata Cooke, *Handbook Brit. Fungi* 2: 879. 1871.
Ceratostomella (*Ophioceras*) *bacillata* (Cooke) Cooke, *Grevillea* 17: 50. 1889.
Ophioceras bacillata (Cooke) Sacc. *Syll. Fung.* 2:

360. 1883.

Acerbia bacillata (Cooke) Berl. Icon. Pyrenomyc. 2 : 142. 1899.

Rhaphidophora macrocarpa Sacc. Nuovo Giorn. Bot. Ital. 7: 306. 1875.

Ophioceras macrocarpa (Sacc.) Sacc. Syll. Fung. 2: 359. 1883.

Ophiobolus lonicerae Fabre, Ann. Sci. Nat. Ser. 6, 15: 62. 1883.

Ascomata loosely gregarious, immersed, apex erumpent, nearly globose, 500-700 μm diam; apex stoutly papillate, ostiole periphysate; peridium 40-60 μm wide, dark reddish brown, numerous rows of compressed cells. Asci (130-)180-220(-350) x 10-14(-18) μm , apex thickened, narrow canal surrounded by narrow, refractive nonamyloid apical ring. Paraphyses narrow, 1-1.5 μm wide, in gel matrix. Ascospores 130-200(-250) x (2.5-)4-5-(6) μm , hyaline to slightly yellowish in mass, filiform, apex obtuse, base tapered, up to 50 or more septate, slightly constricted at septa; wall smooth, guttulate, finally one globule per cell; parallel in fascicle in the ascus.

In old branches of *Hedera*, *Ampelopsis*, *Catalpa*, *Fraxinus* (Europe), *Lonicera* (Europe, North America).

Material examined: Canada: British Columbia: *Lonicera ciliosa*, Sidney, 26 May 1991, M.E. Barr 7576, 28 Oct 1991, M.E. Barr 7828.

Duradens was described recently for *D. lignicola* Samuels & Rogerson (Samuels and Rogerson 1990), a taxon that was distinguished by the extremely thick carbonized peridium. Asci and ascospores resemble those of *Daruvedia bacillata*, although both are wider and the ascospores are infrequently septate. Samuels and Rogerson referred *Duradens* to the Clypeosphaeriaceae but the genus probably should be assigned to the Pleurotremaceae.

Melomastia mastoidea (Fr.) J. Schröt. in Cohn is the type species of the genus and the sole species that I recognize. It is known from Europe and western North America, on assorted old woody branches.

Melomastia mastoidea (Fr.) J. Schröt. in Cohn, Kryptogamen-Fl. Schlesien 3(2): 320. 1894. Fig. 2h,i

Sphaeria mastoidea Fr. Syst. Mycol. 2: 463. 1823.

Trematosphaeria mastoidea (Fr.) G. Winter in Rabenh. Kryptogamen-Fl. 1(2): 274. 1885.

Melomastia friesii Nitschke in Fuckel, Jahrb. Nassauischen Ver. Naturk. 25-26: 306. 1871.

Metasphaeria macounii Dearn. Mycologia 8: 100. 1916.

Ascomata gregarious, immersed, apex erumpent, globose, 300-800 μm diam; apex stoutly papillate, ostiole periphysate; peridium dark blackish brown, numerous rows of compressed cells, 40-50 μm wide, thickened above as closely adherent clypeus to 125 μm wide. Asci 120-200 x

6-10 μm , cylindrical, short stipitate; apical ring narrow, nonamyloid, pulvillus enlarged but usually indistinct, nonchitinoid. Paraphyses narrow, guttulate. Ascospores (12.5-)16-20(-25) x 4.5-7.5(-8) μm , hyaline, oblong, 2-septate, constricted, occasionally separating into partspores at septa; wall smooth, sometimes verruculose in age, surrounded by delicate gel coating 2-4 μm wide when fresh; usually one large globule per cell; uniseriate in the ascus.

In old periderm and wood of various shrubs and trees.

Material examined: CANADA: BRITISH COLUMBIA: *Rosa*, Comox, Jun 1915, J. Macoun 637a (holotype of *Metasphaeria macounii*, Dearness Herb. in DAOM); (all Sidney except where noted otherwise, various dates) *Acer macrophyllum*, M.E. Barr 7264, 7488; *Arbutus menziesii* Pursh, Barr 7955; *Berberis aquifolium* Pursh, Barr 8134; *Gaultheria shallon* Pursh (Mill Bay), Barr 7395; *Holodiscus discolor*, Barr 8202, 8242, 8259; *Ilex aquifolium* L., Barr 8590; *Lonicera ciliosa*, Barr 7378, 7458, 7472, 7565, 7620, 7647, 7703, 7757, 7942, 7945, 7984, 8041, 8190, 8343; *L. hispidula* (Lindl.) Douglas ex Torr. & A. Gray, Barr 7269, 7346, 7770, 7810, 7816, 7917, 8384, 8434; *L. involucrata* (Richardson) Banks ex Spreng., Barr 7221, 7491, 7612, 8179, 8196, 8262; *Philadelphus lewisii* Pursh, Barr 7192, 7408, 7728, 7901, 8068, 8326, 8472; *Populus tremuloides* Michx., Barr 7254; *Rhamnus purshiana*, Barr 7171, 7431, 7674, 7724, 8059, 8125; *Ribes divaricatum* Douglas, Barr 7477; *R. sanguineum* Pursh, Barr 8021; *Rubus parviflorus* Nutt., Barr 7276; *R. spectabilis* Pursh, Barr 7684; *Sambucus callicarpa* Greene, Barr 7245; *Symphoricarpos albus* (L.) S.F. Blake, Barr 7447, 7912, 8300 (all DAOM). USA: California: *Sambucus callicarpa*, Marin Co., Muir Woods, 7 Dec 1971, M.E. Barr 5950b (NY).

Phomatospora is typified by *P. berkeleyi* Sacc., a plurivorous species that Rappaz (1992) has shown to produce a *Sporothrix* anamorph in culture. The European *P. arenaria* Sacc., E. Bommer, & M. Rousseau on *Ammophila* has similar ascomata but ascospores differ in size and shape (Eriksson 1967). The *Sporothrix* anamorph also differs (Rappaz 1992). *Gnomoniella asparagina* Rehm (Ann. Mycol. 10: 390. 1912; Krieger, *F. saxonicus* 2216, TRTC) is a synonymous name of *P. berkeleyi*. *Phomatospora dinemasporium* J. Webster, on Poaceae, forms a different type of anamorph, *Dinemasporium strigosum* (Pers.: Fr.) Sacc., in culture and has narrow, elongate ascospores (8-)9-16 x (2-)3-4 μm (Webster 1955).

Physalospora minutella (Peck) Sacc. is removed from synonymy of *P. berkeleyi* (Barr et al. 1986) and is recognized as a separate species, *Phomatospora minutella* (Peck) M.E. Barr, comb. nov.; basionym: *Sphaeria minutella* Peck, Ann. Rep. New York State Mus. 29: 62. (for 1875) 1878. This collection has small ascospores that lack longitudinal striae. No anamorph has been associated.

Another species that is similar to *P. berkeleyi* in wall striations but has larger ascospores without pulvinate appendages appears to be undescribed.

Phomatospora striatisporea M.E. Barr, sp. nov. Fig. 21,m

Ascomata gregaria superficialia globosa 440-495 μm diametro papillata. Asci 80-110 x 7-8 μm unitunicati cylindrici paraphysati, annuli apicali nonamyloidei. Ascosporae 12-14 x 5-6 μm hyalinae oblongae unicellulares longistrorsum striatae uniseriatae. Holotypus in caulibus *Cowaniae mexicanae* D. Don., "USA: Utah: Bryce Canyon Nat'l Park, Paria Lookout, 21 Aug 1973" a M.E. Barr n. 6150a in NY depositus.

Ascomata gregarious, appearing superficial on decorticated stem bases, globose, 440-495 μm diam; apex papillate; peridium ca. 20 μm wide, dark reddish brown, compressed rows of cells. Asci 80-110 x 7-8 μm , cylindrical; apical ring shallow, nonamyloid. Paraphyses delicate, deliquescent. Ascospores 12-14 x 5-6 μm , hyaline, oblong, ends obtuse, one celled; wall delicately longitudinally striate; two globules; uniseriate in the ascus.

Known from the type collection.

Phomatospora angelicae (Fuckel) Mouton (including *Sphaerella angelicae* Ellis & Everh.) usually occurs on umbellifers and has more fusoid ascospores that appear to be finely verruculose and may develop a median septum (the basis for *Phomatosporopsis* Petr.) *Phomatospora leptasca* (Peck & G.P. Clinton) J. Reid & C. Booth (Reid and Booth 1966) develops over old ascomycete stromata. *Phomatospora therophila* (Desm.) Sacc. on *Carex* and *Juncus* forms small clypei and the oblong ascospores may bear caplike appendages; this species is considered by some to belong in *Phyllachora* e.g., Arx and Müller (1954). Scheuer (1988) added *P. striatigera* Scheuer on *Carex* with larger, fusoid, striate ascospores, (18-)22-30 x (3.5-)4-7 μm , and *P. radegundensis* Scheuer on *Scirpus*, with 1-3-septate, fusoid, verruculose ascospores, (9.5-)10-14(-15.5) x 2.2-3.5(-4) μm . Nogrsek (1990) contributed *P. admontensis* Nogrsek on *Carex*, whose fusoid, slightly verruculose ascospores are 3-(4-7-)septate and 17-26(-30) x 4-7(-8) μm .

Another series of species develops in coriaceous leaves and produces fusoid, one-celled ascospores. *Phomatospora clarae-bonae* (Speg.) M.E. Barr on *Vaccinium vitis-idaea* L. has the apices of ascomata composed of upright, parallel, hyaline hyphae surrounding the darkened minute papilla; ascospores are 13.5-20 x 4.5-6.5 μm (Barr 1970). *Phomatospora gelatinosporea* M.E. Barr on *Rhododendron maximum* L. has a darkened apical papilla; ascospores are 15-18.5 x 5.5-7 μm , surrounded by a gel coating (Barr 1970). This species is also known from Britain (Dennis 1981). A third taxon in this group is

described below.

Phomatospora lithocarpi M.E. Barr, sp. nov. Fig. 2n

Ascomata immersa gregaria globosa 330 μm diametro papillata. Asci 90-110 x 6-7.5 μm unitunicati cylindrici paraphysati, annuli apicali nonamyloidei. Ascospores 13-16 x 4.5-5 μm hyalinae fusoidae unicellulares uniseriatae. Holotypus in foliis *Lithocarpi densiflorae* (Hook. & Arnott) Rehd., "USA: California: Yuba Co., Bullard's Bar, 17 Apr 1983" a H.E. Bigelow lectus in NY depositus.

Ascomata immersed, gregarious, globose, about 330 μm diam; apex papillate; peridium brown, ca. 20 μm wide around base and sides, up to 40 μm wide and darkened toward apex. Asci 90-110 x 6-7.5 μm , unitunicate, cylindric, apical ring shallow, nonamyloid, Paraphyses delicate, 1.5-2.5 μm wide, deliquescent. Ascospores 13-16 x 4.5-5 μm , hyaline, fusoid, one celled; wall smooth; two globules; uniseriate in the ascus.

Known from the type collection.

Key to North American Species of *Phomatospora*

1. Ascospores small, 6.5-8 x 2-3.5 μm , walls smooth.....2
1. Ascospores larger or walls longitudinally striate.....3
 2. In herbaceous stems.....*P. minutella*
 2. In old ascomycete stromata.....*P. leptasca*
3. In herbaceous stems or monocot leaves and culms.....4
3. In coriaceous leaves.....8
 4. Ascospore wall longitudinally striate.....5
 4. Ascospore wall smooth.....6
5. Ascospores 7-10.5 x 2.5-3.5 μm , often bearing pulvinate terminal appendages.....*P. berkeleyi*
5. Ascospores 12-14 x 5-6 μm , lacking terminal appendages.

P. striatispora
6. Ascospores 9-10.5 x 3-3.5 μm , oblong, bearing pulvinate terminal appendages.....*P. therophila*
6. Ascospores narrower, fusoid.....7
7. Ascospores 9.5-12(-16) x (2.5-)3.5-5(-6.5) μm

P. angelicae
7. Ascospores (8-)9-16 x (2-)3-4 μm*P. dinaemosporium*
 8. Minute black papilla surrounded by hyaline crown of parallel hyphae; ascospores 13.5-20 x 4.5-6.5 μm ..

P. clarae-bonae
 8. Black papilla not surrounded by crown of hyphae..9
9. Ascospores 15-18.5 x 5.5-7 μm , surrounded by gel coating.....*P. gelatinospora*
9. Ascospores 13-16 x 4.5-5 μm , lacking gel coating.....

P. lithocarpi

Saccardoella. The known species have large, stoutly papillate ascomata, immersed to erumpent from old wood and periderm. The asci are cylindric and the apical ring is shallow, beneath a conspicuous or inconspicuous, refractive pulvillus, neither of them staining in IKI or ink.

The ascospores are uniseriate, hyaline, several septate or distoseptate and several celled without definite septa. The type species is *S. montellica* Speg., at this time known only from *Quercus* in Italy. Its ascospores are 100-115 x 12 μm and 20-30-septate (Berlese 1892, Mathiassen, personal communication).

Petrak (1961) provided an emended description of the genus, in which he recognized four species, and noted that it was related to *Melomastia*. Müller and Arx (1973) arranged both genera in the Sphaeriaceae. Barr (1990a) inserted them under the Clypeosphaeriaceae, while Eriksson and Hawksworth (1991) accepted *Melomastia* in that family but did not assign *Saccardoella* to a family.

Mathiassen (personal communication) has examined a number of the species. He has determined that *S. canadensis* Ellis & Everh. and *S. berberidis* Eliasson are not separable from *S. transsylvanica* (Rehm) Berl. This taxon evidently is the most widespread in distribution and substrate, although it is not common. Mathiassen recognizes another species from Norway in *Salix* wood (Mathiassen 1989, 1992). Hyde (1992) described and illustrated three species growing on mangrove wood in the southern hemisphere. One of these species, *S. mangrovei* K.D. Hyde, is known also from Florida (Huhndorf, personal communication). In addition to *S. transsylvanica* in eastern and central North America, a western taxon with ascospores intermediate in length between those of *S. montellica* and *S. transsylvanica*, is described as new. Another taxon is referable to a species earlier assigned to *Zignoella*. [The type species of that genus is now recognized as a species of *Chaetosphaeria* (Müller in Eriksson and Hawksworth 1987) and the genus falls into synonymy.] Berlese (1892) had already suggested that some species described in *Zignoella* belonged instead in *Saccardoella*. One of these species, with cylindrical asci and fusoid ascospores, is transferred to *Saccardoella*.

Saccardoella macrasca (Sacc.) M.E. Barr, comb. nov.

Fig. 20

Zignoella macrasca Sacc. *Michelia* 2: 138. 1881.

Ascomata immersed, globose, 485-660 μm diam, with papilla erumpent 550-700 μm high; ostiole periphysate; peridium reddish brown, compressed rows of cells, 25-30 μm wide, brown hyphae extending into wood. Asci 100-150 x 6-9 μm . Paraphyses narrow, 1-2 μm , distantly septate. Ascospores 16-28(-36) x 4-5.5 μm , hyaline, fusoid, 3-septate (usually as four cells, without septa); wall smooth; uniseriate in the ascus.

In old wood. USA: Georgia: *Aucuba japonica* Thunb., Univ. Georgia Bot. Gardens, Athens, Clarke Co., 25 Aug 1978, M.E. Barr 6461. Massachusetts: *Populus balsamifera* L., Franklin Co., Conway, Baptist Hill, 9 Dec 1979, M.E. Barr 6642 (both NY).

These two collections agree well with descriptions

and Berlese's illustration of *Z. macrasca*, although asci do not reach the length given originally (200 x 10 μm). The species was described from a Ravenel collection from Carolina and a specimen in FH (in the *Trematosphaeria mastoidea* folder) collected by Ravenel on ash is identical (J. Boise, personal communication).

Saccardoella separans M. E. Barr, sp. nov. Fig. 2p

Ascomata immersa erumpentia solitaria vel gregaria globosa 500-600 μm diametro papillata clypeata peridis adhaerens. Asci 300-400 x 10-12 μm unitunicati cylindrici paraphysati, annuli apicali angusti nonamyloidei. Ascosporeae 65-85(-90) x 9-10 μm hyalinae elongatae fusoidae 18-23 septatae uniseriatae secedens in endosporeae circa 5-6 x 8-9 μm . Holotypus in ramis *Lonicerae ciliosae*, "Canada: British Columbia, Sidney, 3 Jul 1991" a M.E. Barr n. 7646 lectus in DAOM et isotypus in NY depositus.

Ascomata immersed, apex erumpent, separate or gregarious, globose, 500-600 μm diam; apex short papillate, ca. 100-150 μm wide and high; peridium dark brown, 35 μm wide at base and lower sides, enlarged as clypeus or closely surrounding papilla, up to 100 μm wide, of compressed rows of cells, at times extended as blackened line in substrate. Asci 300-400 x 10-12 μm , extending in water mounts to 600 μm long, unitunicate, cylindrical, (4-5-6-)8-spored; apical ring narrow, refractive, nonamyloid. Paraphyses narrow, to 2 μm wide, guttulate. Ascospores 65-85(-90) x 9-10 μm , hyaline, elongate fusoid, ends acute, 18-23-septate or septa lacking except for first-formed median septum, at maturity constricted and disarticulating into individual cells (endospores), ca. 5-6 x 8-9 μm ; wall smooth, thickened, at times caplike terminal appendages; one or two globules per cell; overlapping uniseriate in the ascus.

In old woody stems and decorticated branches. Additional collections: CANADA: British Columbia: all Sidney, *Acer macrophyllum*, 27 Jul 1991, Barr 7680; *Lonicera ciliosa*, 29 Jul 1990, Barr 7232; 22 Jan 1991, Barr 7411; 9 Mar 1991, Barr 7459; 6 Apr 1991, Barr 7499; 25 Jan 1992, Barr 7946; 19 Apr 1992, Barr 8050; 22 Jun 1992, Barr 8136; *Lonicera hispidula*, 13 Nov 1992, Barr 8292; *Malus*, 7 Jul 1991, Barr 7652; *Rhamnus purshiana*, 20 Jul 1991, Barr 7673; 19 Aug 1991, Barr 7722; *Salix*, 9 Dec 1991, Barr 7884 (all DAOM).

Key to North American Species of *Saccardoella*

1. Ascospores less than 40 μm long.....2
1. Ascospores longer, (35-)40-90 μm long.....3
 2. Ascospores 21.5-32.5 x 6-7 μm*S. mangrovei*
 2. Ascospores 16-28(-36) x 4-5.5 μm*S. macrasca*
3. Ascospores (35-)40-75 x 8-10.5(-12) μm , 8-20-celled....
S. transsylvanica

3. Ascospores 65-90 x 9-10 μm , 18-24 celled....*S. separans*

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