The Venturiaceae in North America: Revisions and Additions

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The Venturiaceae (Pleosporales) in North America is revised to include *Venturia, Platychora, Coleroa, Pyrenobotrys, Phaeocryptopus, Dibotryon, Xenomeris, Gibbera, Apiosporina, Metacoleroa, Acantharia,* and *Protoventuria.* Notes and revised keys to species of the genera are provided. *Venturia iridicola, Protoventuria angustispora,* and *P. arizonica* are described as new. New combinations are proposed for *Coleroa concinna, Plowrightia abietis, Protoventuria cassandrae, P. myrtilli, P. gaultheriae, P. kalmiae, P. andromedae, P. ramicola, P. major,* and *P. elegantula.*

The concept of the family Venturiaceae (Pleosporales) in North America has been revised and limited (Barr, 1987b) from that of Barr (1968). The family is more restricted than its circumscription by Müller & von Arx (1962), Luttrell (1973), von Arx & Müller (1975), O. Eriksson & Hawksworth (1987). Studies by a number of authors, e. g., B. Eriksson (1974), Sivanesan (1977), and Morelet (1983) have resulted in additions to taxa or name changes that are accepted in the family. It seems time to provide a revised key to genera of the family, keys to species of the genera, and additional notes on some taxa.

The genus *Stigmatea* was replaced by *Pyrenobotrys* (B. Eriksson, 1974). The genera *Atopospora, Hormotheca (Coleroa* subgenus *Hormotheca)* (Corlett & Barr, 1986), and tentatively *Trichodothis* are removed from the Venturiaceae to the Polystomellaceae (Barr, 1987b), based upon their biotrophic, superficial, dimidiate-scutate ascomata. *Dibotryon* is once again separated from *Apiosporina. Gibbera* is viewed as a genus with relatively few species, and *Protoventuria* (replacing *Antennularia;* Barr, 1971) is consequently enlarged by the addition of species formerly in *Gibbera* subgenus *Venturioides.* More details are provided below under each genus accepted.

Key to North American Genera of Venturiaceae

1. Hyphae intramatrical (including subcuticular); ascomata immersed to erumpent, or superficial on erumpent hypostromatic tissues lacking free hyphae 2

1. Hyphae superficial as well as intramaterical; ascomata superficial 9
   2. Ascomata immersed to erumpent, hyphae intramatrical . . 3
   2. Ascomata erumpent to superficial on innate or erumpent hypostroma 4
3. Ascospore septum near base (apiosporous); ascomata as nonsetose locules in stromatic tissues. . . . . *Platychora*
3. Ascospore septum variable in position but not apiosporous; ascomata usually setose, separate to gregarious in substrate . . . . . *Venturia*
   4. Ascomata usually setose, erumpent from subcuticular or intramatrical hypostroma. 5
   4. Ascomata glabrous or setose, on erumpent hypostroma . . . 6
5. Hypostromatic tissues subcuticular, thin . . . . . *Coleroa*
5. Hypostromatic tissues intramatrical . . . . . *Pyrenobotrys*
   6. Ascoma single on small columnar hypostroma, erumpent from stomatal opening in conifer leaves . . *Phaeocryptopus*
   6. Ascomata several on platelike, pulvinate or irregular hypostroma, not in conifer leaves 7
7. Ascospore septum near base (apiosporous); ascomata nonsetose, crowded on irregular hypostroma composed of hyphae and below intermixed with cells of substrate . . . . . *Dibotryon*
7. Ascospore septum variable in position but not apiosporous; ascomata setose or not, on hypostroma solely of fungus tissues .8
   8. Ascomata nonsetose, marginal on platelike hypostroma . . . . *Xenomeris*
   8. Ascomata setose or not, over surface of pulvinate hypostroma. . . . . *Gibbera*
9. Ascospore septum near base (apiosporous), ascomata nonsetose . . . . . *Apiosporina*
9. Ascospore septum variable in position but not apiosporous, ascomata setose 10
   10. Superficial hyphae as well as ascomata setose; ascospores becoming dark brown . . . . . *Acantharia*
   10. Superficial hyphae not setose; ascospores greenish to olivaceous 11
11. Intramatrical hyphae subcuticular. . . . . *Metacoleroa*
11. Intramatrical hyphae penetrating tissues. . . . . *Protoventuria*

Venturia

The following revised key utilizes host specificity of taxa in *Venturia* to provide a first separation that may be more readily used than the structure of ascomata or the type of anamorphic state. Some variations in shape of ascomata and position of septum in the

ascospores are illustrated by Figs. 1 *(V. inaequalis),* 2 *(V. rumicis),* 3 *(V. iridicola),* 4 *(V. corni).* CORLETT (1983) provided a key to the four species known on *Salix* species. CORLETT & EGGER (1982) and CORLETT (1982a, 1982b, 1983) provided descriptions and illustrations of these species; in addition CORLETT (1974a, 1974b, 1984) and CORLETT & EGGER (1980a, 1980b, 1981) illustrated other species in the genus from Canadian specimens.

The species on *Populus* sect. *Leuce* were studied in detail by MORELET (1983), who accepted *V. orbicularis* (PECK) MORELET as the correct name for the species termed *V. macularis* (FR.) MÜLLER & VON ARX. He recognized also from North America *V. viennotii* MORELET and *V. tremulae* var. *grandidentatae* MORELET. The latter taxon RULAMORT (1986) designated *V. moreletii;* he also separated the North American *V. orbicularis* from the European *V. maculosa* (SACC.) RULAMORT.

SIVANESAN (1977, 1984a) provided details on numerous species of *Venturia.* He recognized that the fungus reported as *V. centaureae* VON ARX (BARR, 1968) was in fact a separate species that he described as *V. achilleae* SIVANESAN. A similar situation exists for the collection reported by BARR (1968) as *V. antherici* HOLLOS. Ascospores differ in shape and position of septum so that the following new species must be proposed.

Venturia iridicola BARR, sp. nov. – Fig. 3.

Ascomata immersa 60–100 µm diametro globosa, setis aculeatis 21–30 µm ornata peridio tenui. – Asci bitunicati 33–44 × 10–12 µm. – Pseudoparaphyses cellulosae deliquescentes. – Ascosporae 13–15(–16.5) × 3.5–5(–6) µm viridae vel olivaceae fusoideae in medio uniseptatae.

Holotypus in foliis emortuis *Iridis* sp. „Blanc Sablon, Newfoundland, 19 Jul 1957" a R. T. WILCE 158 lectis in Herb. MASS depositus.

Venturia corni MÜLLER (Fig. 4) is now known from North America, on leaves of *Cornus florida* L. (MASS: Brooklyn Bot. Garden Research Center, Ossining, Westchester Co., New York, 24 Apr 1984, C. HIBBEN).

ALLITT (1984) was able to identify a number of species in a survey of airborne venturiaceous ascospores. She particularly noted dimorphism in ascospores of *V. ditricha:* some dark colored with median septum, others light colored with somewhat submedian septum. Studies should be made to determine whether more than one species is involved.

Key to North American Species of *Venturia*

1. On leaves and shoots of deciduous trees or shrubs 2
1. On herbaceous or other substrates 23
2. On species of *Populus* 3
2. On other plants 6
3. Ascospore septum nearly median, 8–13 × 4–6 µm; forming spots in leaves . . . . . *V. orbicularis* (Peck) Morelet
3. Ascospore septum obviously supra- or submedian, not forming spots 4
4. Ascospore septum supramedian, (10.5–)12–17(–18.5) × 4–6.5 µm; anamorph not known . . . . . *V. viennotii* Morelet
4. Ascospore septum submedian; anamorphs *Pollaccia* 5
5. Ascospores 15–22 × 7–11 µm . . . . . *V. moreletii* Rulamort
5. Ascospores 18.5–23 × 11–13 µm . . . *V. populina* (Vuill.) Fabric.
6. On species of *Salix* 7
6. On other plants 10
7. Ascospore septum supramedian, 9–12 × 3,4 µm; anamorph not known . . . . . *V. minuta* Barr
7. Ascospore septum nearly median 8
8. Ascospores (12–)16–24.5 × 6–9 µm; anamorph not known . . . . . *V. subcutanea* Dearness
8. Ascospores 9–16(–17.5) µm long 9
9. Ascospores 11.5–14 × 3.5–5 µm; anamorph *Pollaccia* . . . . . *V. saliciperda* Nüesch
9. Ascospores 9.5–16(–17.5) × 4–7 µm; anamorph *Cladosporium* . . . . . *V. chlorospora* (Ces.) Karsten emend. Aderh.
10. On Rosaceae *(Pyrus, Malus)* 11
10. On other plants 13
11. Ascospore septum nearly median, 10–15 × 4–5 µm; anamorph *Fusicladium* . . . . . *V. asperata* Samuels & Sivanesan
11. Ascospore septum obviously supra- or submedian 12
12. Ascospore septum supramedian, 10–13.5 × 5–6 µm; anamorph *Spilocaea* . . . . . *V. inaequalis* (Cooke) Winter emend. Aderh.
12. Ascospore septum submedian, (12–)14–20 × 4–8 µm; anamorph *Fusicladium* . . . . . *V. pyrina* Aderh.
13. On *Cornus* 14
13. On other plants; ascospore septum nearly median 15
14. Ascomata nonsetose; ascospore septum supramedian, 10–12 × 4.5–5 µm . . . . . *V. corni* Müller
14. Ascomata setose; ascospore septum submedian, 10–11 × 4.5–5.5 µm; anamorph *Cladosporium* . . . . . *V. systema-solare* (Fuckel) Winter
15. Ascospores 9–11 × 3–5 µm 16

15. Ascospores larger 19
16. Ascospores 9–10 × 3 µm, wall smooth; ascomata nonsetose, on *Prunus* . . . . . *V. pruni* BARR
16. Ascospores 3–4.5 µm wide; ascomata setose 17
17. Anamorph *Fusicladium;* on *Syringa;* ascospore wall verruculose . . . . . *V. syringae* (H. SYDOW) BARR
17. Anamorph not known; on other plants 18
18. On *Fagus;* ascospore wall smooth . . . . . *V. fagi* BARR
18. On *Ulmus;* ascospore wall verruculose . . . . *V. ulmi* MÜLLER
19. Ascospores 10–15 × 3–5 µm; on *Alnus* . . . *V. alnea* (FR.) MÜLLER
19. Ascospores wider 20
20. Ascospores 10.5–15 × 4.5–5.5 µm; in spots in living leaves of *Rhamnus* . . . . . *V. rhamni* (BONAR) BARR
20. Ascospores ranging longer; in other plants 21
21. Anamorph lacking; ascospores 11–15.5 × 5–6.5 µm . . . . . *V. liriodendri* HANLIN
21. Anamorph *Cladosporium* or *Fusicladium* 22
22. Ascospores 11–18 × 4.5–6 µm; anamorph *Cladosporium*, on *Acer* . . . . . *V. acerina* PLAKIDAS ex BARR
22. Ascospores 13.5–16(17.5) × 5.5–6.5(–8) µm; anamorph *Fusicladium;* on *Betula* . . . . . *V. ditricha* (FR.) KARSTEN
23. On *Epilobium,* usually in blackened areas 24
23. On other plants 26
24. Ascospore septum nearly median, 9–14.5 × (2–)3–4.5 µm . . . . . *V. maculaeformis* (DESM.) WINTER
24. Ascospore septum supra- or submedian 25
25. Ascospore septum supramedian, apex sharply attenuated, 10–13.5 × 3.5–5 µm . . . . . *V. asteromorpha* (LIB.) MÜLLER
25. Ascospore septum submedian, 11.5–17.5 × 5–6.5 µm, apex obtuse . . . . . *V. adusta* (FUCKEL) MÜLLER
26. On Polygonaceae 27
26. On other plants 30
27. Immersed in spots in living leaves of *Rumex;* ascospores 13–20 × 4.5–8(–9) µm, septum submedian . . . . . *V. rumicis* (DESM.) WINTER
27. Immersed erumpent, not forming spots in living tissues 28
28. Ascospore septum submedian, 15–24 × 6–7.5 µm; on *Oxyria* . . . . . *V. oxyriae* (ROSTRUP) SACC.
28. Ascospore septum median 29
29. Ascospores 13.5–15 × 3.5–6 µm; on *Rumex* . . . . . *V. canadensis* BARR
29. Ascospores 15–24 × 6–8 µm; on *Polygonum* . . . . . *V. polygoni-vivipari* VON ARX
30. On Rosaceae 31

30. On other plants 32
31. Ascospore septum nearly median, 13–16.5 × 5–6.5 µm; on *Rubus* ..... *V. chamaemori* (KARSTEN) VON ARX
31. Ascospore septum submedian 32
32. Ascospores 10–13 × (2–)3–3.5 µm; on *Potentilla* ..... *V. palustris* SACC., BOMM. & ROUSS.
32. Ascospores larger 33
33. Ascospores 12–16.5 × (4–)5–6.5 µm; on *Potentilla* ..... *V. potentillae* (WALLR.: FR.) COOKE
33. Ascospores 16.5–19.5 × 6–7 µm; on *Geum* ..... *V. alaskensis* BARR
34. On *Sphagnum;* ascospores 11–14.5 × 4–5 µm ..... *V. turfosorum* MOUTON
34. On other plants 35
35. On dicots 36
35. On monocots 37
36. Ascospore septum submedian, 15–16.5(–19.5) × 4.5–6 µm; on *Gentiana* ..... *V. atriseta* REHM
36. Ascospore septum nearly median, 13.5–18 × 6–8 µm; on *Achillea* ..... *V. achilleae* SIVANESAN
37. Ascomata globose, setose apex erumpent; ascospores 13–15 (–16.5) × 3.5–5 (–6) µm; on *Iris* ..... *V. iridicola* BARR
37. Ascomata sphaeroid, not erumpent, forming blotches in leaves .. 38
38. Ascospores 10–12 × 4.5–5.5 µm; on *Yucca* ..... *V. weiriana* (PETRAK) BARR
38. Ascospores 17.5–23 × (5.5–)6.5–8 µm; on *Triglochin* ..... *V. juncaginearum* (LASCH) BARR

Platychora

P. alni (PECK) PETRAK (Fig. 5) remains the sole North American species. In addition to the collections from Alaska and New York, it has been reported from Québec and Yukon Territory in Canada (GINNS, 1986).

Coleroa

This is *Coleroa* subgenus *Coleroa* of BARR (1968). Subgenus *Hormotheca* is reinstated at generic level and is removed to the Polystomellaceae (BARR, 1987b). FARR (1979) has excellent illustrations of *C. chaetomium* and the European *C. petasitidis* (FUCKEL) FARR. *Coleroa sporoboli* (GREENE) BARR upon further reflection is better disposed in the Dimeriaceae. The superficial hyphae and ascomata, septate setae, and short subglobose asci suggest its dis-

position as another synonym of *Lasiostemma erysipheoides* (ELLIS & EVERH.) FARR.

On the other hand, *Endocoleroa* with the sole species *E. concinna* PETRAK does not seem to be separable from *Coleroa*. VON ARX & MÜLLER (1975) transferred the species to *Venturia,* but the subcuticular radiating cells of subiculum and the entire aspect of this species that forms blotches in living leaves are in accord with other species of *Coleroa*. All three North American species have the septum submedian in the ascospores.

Coleroa concinna (PETRAK) BARR, comb. nov. Fig. 6.

Bas.: *Endocoleroa concinna* PETRAK. – Sydowia 22: 389. 1969 (1968).

The species is known from the type locality, Clarksville, Albany Co., New York, 8 Apr 1945, H. D. HOUSE (NYS, isotype).

Key to North American Species of *Coleroa*

1. Ascospores (9–)12–15.5 × (4–)5–6.5 µm; on *Rubus* . . . . . *C. chaetomium* (KUNZE: FR.) RABENH.
1. Ascospores 3–5 µm wide 2
   2. Ascospores 9–12 × 3–5 µm; on *Geranium* . . . . . *C. circinans* (FR.) WINTER
   2. Ascospores 12–15 × 4–5 µm; on *Waldsteinia* . . . . . *C. concinna* (PETRAK) BARR

Pyrenobotrys

B. ERIKSSON (1974) discussed *Stigmatea* and the problems in typification of the genus. She utilized *Pyrenobotrys* to replace *Stigmatea* for two species, *P. conferta* and *P. compacta*. A third species *P. pulchella* (Fig. 7) is included here (BARR & al., 1986). All three species occur on ericaceous hosts, form small, compact groups of usually setose ascomata that are erumpent and superficial from intramatrical stromatic tissues, and have the septum supramedian in the ascospores.

Key to North American Species of *Pyrenobotrys*

1. Ascospores (11.5–)15–18(–19) × 5–7 µm, on *Vaccinium* subgenus *Vaccinium* . . . . . *P. conferta* (FR.) THEISSEN & H. SYDOW
1. Ascospores smaller 2
   2. Ascospores 9–15.5 × 3.5–6 µm; on *Chamaedaphne* . . . . . *P. pulchella* (PECK) BARR
   2. Ascospores (11–)12–15(–18) × 3–5.5 µm; on *Vaccinium* subgenus *Oxycoccus* . . . . . *P. compacta* (PECK) B. ERIKSSON

Phaeocryptopus

No changes or additions are reported for the three North American species. Fig. 8 illustrates ascoma and ascospores of *P. nudus* (PECK) PETRAK.

Dibotryon

The common North American species *Dibotryon morbosum* (SCHWEIN.: FR.) THEISSEN & H. SYDOW (Fig. 9) was illustrated by CORLETT (1976) under *Apiosporina*. When one utilizes presence or absence of free, superficial hyphae to separate genera (e. g., VON ARX & MÜLLER, 1975), a problem arises with retaining *D. morbosum* and *Apiosporina collinsii* within a single genus. The ascomata of *A. collinsii* are seated in superficial hyphae whereas the ascomata of *D. morbosum* are not, but instead arise from a massive, compact hypostromatic tissue that incorporates in the lower regions cells of the host plant. The ascomata are differently shaped also: globose or nearly so in *A. collinsii*, turbinate in *D. morbosum*. Both taxa form apiospores, as does *Platychora alni*. SIVANESAN (1984a) termed the anamorphic state a species of *Cladosporium* in *A. collinsii*, of *Fusicladium* in *D. morbosum*; these differences are of no assistance at the generic level, for both anamorphic genera are known among the species of *Venturia*. It seems essential to return to *Dibotryon* for *D. morbosum* (BARR, 1987b).

Xenomeris

BARR (1968) recognized three species in this genus in North America. Now, however, only *X. raetica* (MÜLLER) PETRAK (Fig. 10) remains as representative of the genus. *Xenomeris juniperi* (DEARNESS) BARR & MÜLLER is again separated from *X. hemisphaerica* MÜLLER. *Sthughesia* was erected to accommodate *S. juniperi* (DEARNESS) BARR in the Metacapnodiaceae of the Chaetothyriales (BARR, 1987a, 1987b). *Xenomeris abietis* BARR, on the other hand, is most appropriately transferred to *Plowrighthia* (now in Dothideaceae, but showing affinities to Dothioracerae) as

Plowrighthia abietis (BARR) BARR, comb. nov.

Bas.: *Xenomeris abietis* BARR. – Can. J. Bot. 46: 842. 1968.

The detailed study by FUNK & SHOEMAKER (1971) provided additional information on this species, including the formation of an *Aureobasidium* or *Pullularia*-like anamorphic state in culture, now termed *Hormonema* state (HERMANIDES-NIJHOF, 1977). FUNK (1980) also discovered and described *Sclerophoma xenomeria* FUNK as anamorphic state. Both ascospores and conidia in culture produce identical *Hormonema* colonies.

Gibbera

The genus is reduced to a small group of species, i. e., most of those in subgenus *Gibbera* (Barr, 1968) and the taxa in subgenus *Venturioides* are removed to *Protoventuria* (see below). In its narrow concept, *Gibbera* includes species whose setose or nonsetose ascomata are borne on an erumpent pulvinate hypostroma without free hyphae; conidiophores may be present. Three North American taxa inhabit ericaceous hosts: *G. vaccinii, G. vaccinicola* (Fig. 12), and *G. grumiformis*. *Gibbera cercocarpi* (Fig. 11) on rosaceous leaves is retained in the genus with slight hesitation. This species has a smaller, less erumpent hypostroma whose hyphae are pallid in leaf tissues but other features are comparable to those in *Gibbera*. *Gibbera distegiae* (Tracy & Earle) Barr (*G. andersonii* Shoemaker, 1963) has been reassigned to *Dothidotthia* as a synonym of *D. aspera* (Ellis & Everh.) Barr (Barr, 1989). B. Eriksson (1974) found both *G. vaccinii* and *G. grumiformis* to be common in Fennoscandia, although few North American collections are known.

Some North American taxa that Sivanesan (1975) transferred from *Amphisphaeria* to *Gibbera*: *A. atrograna* (Cooke & Ellis) Sacc., *A. confertissima* Ellis & Everh., *A. pilosella* Ellis & Everh., do not belong in *Gibbera*. I suggest *Immotthia* as a more suitable disposition. It is possible that they are all variants of a single species, as is also *Amphisphaeria deformata* Ellis & Langlois. Sivanesan (1984b) described and illustrated several extralimital species of *Gibbera* and their anamorphic states. These latter are sporodochial, with conidiophores arising from hypostromatic tissues that also produce ascomata. The conidiogenous cells and conidia permitted Sivanesan (1984b) to place the anamorphic states of species of *Gibbera* in *Stigmina, Virgariella,* and *Dictyodochium*. Minute pycnidia, containing presumed spermatia, also occur in several of these species.

Key to North American Species of *Gibbera*

1. Ascospores 7.5–10 µm wide, septum nearly median. 2
1. Ascospores 3.5–6.5 µm wide, septum nearly median or supramedian; ascomata nonsetose 3
   2. Ascomata short setose, on *Vaccinium;* ascospores 13–17.5 µm long. . . . . *G. vaccinii* (Sowerby: Fr.) Fr.
   2. Ascomata not setose, on *Cercocarpus, Purshia;* ascospores 21–30 µm long . . . . . *G. cercocarpi* (Ellis & Everh.) Barr
3. Ascospore septum supramedian, 11–16 µm long; on *Vaccinium* . . . . . *G. vaccinicola* (Dearness & House) Barr
3. Ascospore septum nearly median, 15–19.5 µm long; on *Arctostaphylos*. . . . . *G. grumiformis* (Karsten) Barr

Apiosporina

The type species *A. collinsii* (SCHWEIN.) VON HÖHNEL (Fig. 13) is the only one accepted at present in the genus. This species is widespread in leaves of *Amelanchier* spp. and was described and illustrated by CORLETT (1975). The anamorphic state is a species of *Cladosporium* (SIVANESAN, 1984a).

Metacoleroa

The type species is *M. dickiei* (BERK. & BROOME) PETRAK (Fig. 14), on leaves of *Linnaea borealis* L. var. *borealis* in Europe and var. *americana* (FORBES) REHDER in North America. The ascomata arise from a thin subcuticular hypostroma and are surrounded by superficial hyphae. CORLETT & KOKKO (1978) described and illustrated the species.

Acantharia

Only the type species, *A. echinata* (ELLIS & EVERH.) THEISSEN & H. SYDOW (Fig. 15) is known in North America from California and Oregon on leaves of *Quercus* spp. SIVANESAN (1984b) described and illustrated the anamorphic state as *Fusicladium* sp. The extralimital *A. hamata* (PENZIG & SACC.) VON ARX has an anamorphic state in *Stigmina* (SIVANESAN, 1984b) but *A. aterrima* (COOKE & WINTER) VON ARX and *A. elegans* (SYDOW & P. SYDOW) VON ARX bore no associated anamorphic states.

Protoventuria

Numerous species, mostly described under *Antennularia*, produce both intramatrical and superficial hyphae that may form margined spots or dark blotches. The small, usually setose ascomata are superficial. *Antennularia* REICHENBACH is a *nomen ambiguum* (HUGHES, 1970) and is replaced by *Protoventuria* (BARR, 1971; B. ERIKSSON, 1974), although still utilized by some (REMLER, 1974; VON ARX & MÜLLER, 1975; O. ERIKSSON & HAWKSWORTH, 1987). *Protoventuria* is based upon *P. rosae* (DE NOT.) BERLESE & SACC. This species, with a modern description by MÜLLER & MENON (1955), is included in the key below to show relationship with other taxa of the genus, although it is not known from North America. The species that were arranged in subgenus *Venturioides* of *Gibbera* (BARR, 1968) are scarcely separable from species of *Protoventuria*, for they may have slight amounts of superficial hyphae as well as intramatrical hyphae. Both B. ERIKSSON (1974) and SIVANESAN (1984b) have remarked on the heterogeneity of *Gibbera* in the broad sense, and the best solution is to tighten the concept of *Gibbera* (see above) and to

transfer the taxa of subgenus *Venturioides* to *Protoventuria*. Thus far no anamorphic states have been reported for any species of *Protoventuria*.

Some taxa in the Dimeriaceae, notably species of *Lasiostemma*, may be similar in appearance to species of *Protoventuria* and may present problems in identification. In the species of *Lasiostemma* only delicate subcuticular hyphae develop (FARR, 1979) and for all practical purposes the ascomata are quite superficial. The ascospores in species of *Lasiostemma* are hyaline becoming light yellowish brown or light dull brown, and do not have the green to olivaceous pigments so characteristic of species in *Protoventuria* and the other Venturiaceae.

The diagnoses of two new species and necessary combinations in *Protoventuria* follow.

Protoventuria angustispora BARR, sp. nov. – Fig. 16.

Ascomata 106–220 µm diametro sphaeroidea dispersa superficialia, setae atrobrunneae non septatae vel septatae 45–90 µm longae. – Asci bitunicati (37–)45–72 × (7.5–)10–13.5 µm 4- vel 8-spori. – Pseudoparaphyses cellulosae deliquescentes. – Ascosporae (11–)13–15(–18.5) × 4–6 µm viridae olivaceae fusoideae in medio septatae.

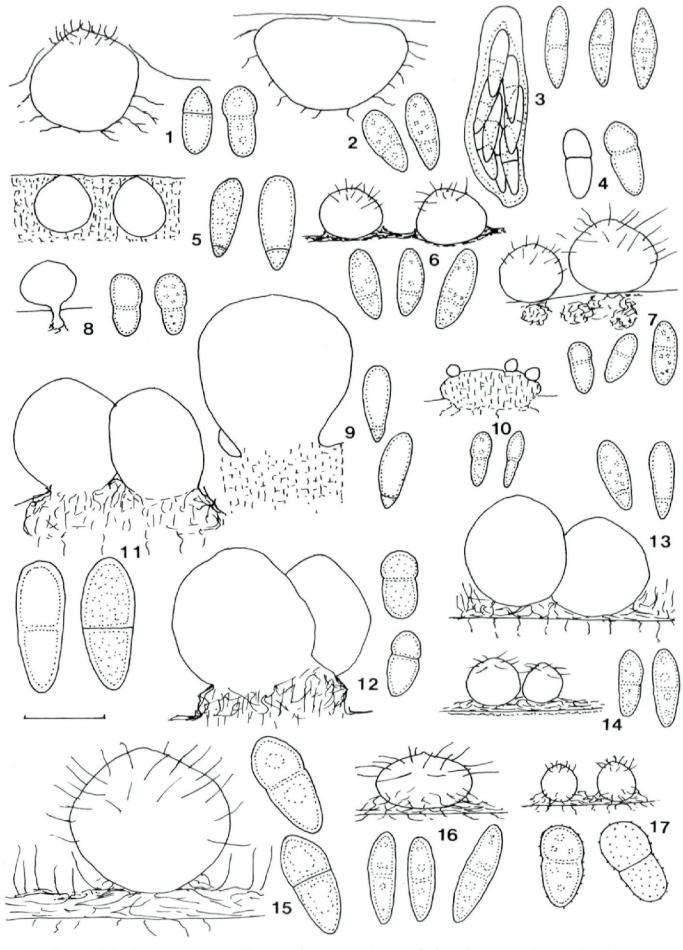
Holotypus in ramulis *Rhododendri albiflori* HOOK. "trail near cabin, Garibaldi Lake, Garibaldi Provincial Park, British Columbia, 4 Aug 1952" a M. E. BARR n. 630 lectis in Herb. MASS depositus.

Two other collections are known (MASS): Mt. Albert, Gaspesian Prov. Park, Québec, 22 Aug. 1957, M. E. BARR 2275 and Mt. Katahdin, Baxter State Park, Maine, 3 Aug 1962, M. E. BARR 3552.

This species was mistakenly identified as *Antennularia rhododendri* VON HÖHNEL (BARR, 1968; as *Protoventuria rhododendri* (VON HÖHNEL) BARR, 1971). Specimens from Switzerland, kindly sent by Dr. E. MÜLLER, who pointed out the misidentification, proved to be the true *P. rhododendri*. The ascospores are considerably wider, (13–)16–24 × 11–12.5 µm and that fungus, not yet known from North America, seems closely related to *P. latispora*.

Protoventuria arizonica BARR, sp. nov. Fig. 17.

Ascomata 90–105 µm diametro globosa dispersa superficialia, setae atrobrunneae apicales vel 50 µm longae. – Asci bitunicati 40–45 × 16–19 µm. – Pseudoparaphyses cellulosae. – Ascosporae 13–17 × 6.5–8 µm olivaceae obovoideae in medio septatae, pariete verruculosa.



Figs. 1–17. Venturiaceae: outlines of ascomata with hyphae or stromatic tissues in relation to substrate, ascus, ascospores. 1. *Venturia inaequalis*. 2. *V. rumicis*. 3. *V. iridicola*. 4. *V. corni*. 5. *Platychora alni*. 6. *Coleroa concinna*. 7. *Pyrenobotrys pulchella*. 8. *Phaeocryptopus nudus*. 9. *Dibotryon morbosum*. 10. *Xenomeris raetica*. 11. *Gibbera cercocarpi*. 12. *G. vaccinicola*. 13. *Apiosporina collinsii*. 14. *Metacoleroa dickiei*. 15. *Acantharia echinata*. 16. *Protoventuria angustispora*. 17. *P. arizonica*. Standard line = 150 µm for ascomata, 15 µm for ascus and ascospores.

Holotypus in foliis emortuis *Cercocarpi ledifolii* NUTT. "North Rim of Grand Canyon, Arizona, 18 Aug. 1973" a M. E. BARR n. 6096a lectis in Herb. MASS depositus.

Protoventuria cassandrae (PECK) BARR, comb. nov.

Bas.: *Venturia cassandrae* PECK. – Ann. Rep. New York State Mus. 38:104. 1885.

Protoventuria myrtilli (COOKE) BARR, comb. nov.

Bas.: *Venturia myrtilli* COOKE. – J. Bot. (London) 4: 245. 1866.

Protoventuria gaultheriae (ELLIS & EVERH.) BARR, comb. nov.

Bas.: *Venturia gaultheriae* ELLIS & EVERH. – J. Mycol. 1: 153. 1885.

Protoventuria kalmiae (PECK) BARR, comb. nov.

Bas.: *Venturia kalmiae* PECK. – Ann. Rep. New York State Mus. 28: 82. 1876.

Protoventuria andromedae (REHM) BARR, comb. nov.

Bas.: *Trichosphaeria andromedae* REHM. – Ascom. Fasc. X, n. 491. 1878.

Protoventuria ramicola (B. ERIKSSON) BARR, comb. nov.

Bas.: *Gibbera ramicola* B. ERIKSSON. – Svensk Bot. Tids. 68: 208. 1974.

Protoventuria major (BARR) BARR, comb. nov.

Bas.: *Antennularia alpina* var. *major* BARR. – Can. J. Bot. 46: 850. 1968.

Protoventuria elegantula (REHM) BARR, comb. nov.

Bas.: *Venturia elegantula* REHM. – Hedwigia 24: 241–242. 1885.

Key to North American Species of *Protoventuria*

1. On substrates not belonging to Ericaceae 2
1. On hosts belonging to the Ericaceae or Empetraceae 8
   2. Ascospores large, 25.5–33 × 8–11 µm; ascomata scattered to gregarious, sphaeroid . . . . . *P. rosae* (DE NOT.) BERLESE & SACC. . . . . .
   2. Ascospores smaller, up to 18 µm long. 3
3. Ascospores 7.5–12.5 µm long 4
3. Ascospores 13–18 µm long; ascomata scattered to gregarious, not forming blotches 6
   4. Ascomata scattered to gregarious, setae often recurved, on *Ribes;* ascospores 7.5–10 × 3.5–4.5 µm . . . . . *P. grossulariae* (AUERSW. & FLEISCHH.) BARR
   4. Ascomata gregarious, forming dark blotches 5
5. On *Quercus,* setae straight; ascospores 9–12 × 3.5–6 µm . . . . . *P. quercina* (PERS.) BARR
5. On *Nemopanthus,* setae recurved; ascospores 10–12.5 × 3.5–4 µm . . . . . *P. curviseta* (PECK) BARR

6. Ascospores wide, 13–17 × 6.5–8 µm; setae short, on *Cercocarpus* ..... *P. arizonica* BARR
6. Ascospores narrower, 4–6 µm wide 7
7. On periderm of *Acer,* ascomata sphaeroid, setae short; ascospores 13.5–18 × 4.5–6 µm ..... *P. vancouverensis* DEARNESS
7. On dung, ascomata globose, setae elongate; ascospores 13–16.5 × 4–6 µm ..... *P. fimiseda* (MOUTON) BARR
8. Ascomata gregarious, forming dark blotches or in spots in leaves 9
8. Ascomata scattered to gregarious, not forming blotches nor in spots in leaves; ascospore septum nearly median 15
9. Ascomata sphaeroid, setae recurved, on *Leucothoe;* ascospores 7.5–12 × 4.5–5 µm, septum supramedian ..... *P. maculosa* (ELLIS) BARR
9. Ascomata globose, setae straight; ascospore septum nearly median 10
10. Ascospores 15–21 × 4.5–9 µm 11
10. Ascospores smaller 12
11. In margined spots on *Chamaedaphne;* ascospores 15.5–21 × (4.5–) 6–9 µm ..... *P. cassandrae* (PECK) BARR
11. Forming blotches on *Andromeda;* ascospores 15–18 × 4–5.5 µm ..... *P. andromedae* (REHM) BARR
12. Ascospores 10–13.5(–15) × 3–5(–7.5) µm, ends usually acute 13
12. Ascospores (9–)12–17.5 × 3–6.5 µm, ends obtuse 14
13. In margined spots of *Kalmia* ..... *P. kalmiae* (PECK) BARR
13. Forming blotches on *Oxydendrum* ... *P. oxydendri* (BARR) BARR
14. In margined spots on *Gaultheria* ..... *P. gaultheriae* (ELLIS & EVERH.) BARR
14. Forming blotches on *Vaccinium* ... *P. myrtilli* (COOKE) BARR
15. Ascospores 8.5–15.5 µm long 16
15. Ascospores (11–)12–25.5 µm long 19
16. Ascospores narrow, 8.5–13(–15) × 2–4 µm 17
16. Ascospores wider, 9–15.5 × (2–)3–5.5(–6) µm 18
17. On *Vaccinium,* setae elongate, usually septate ..... *P. ramicola* (B. ERIKSSON) BARR
17. On *Rhododendron,* setae short, septate at times ..... *P. arxii* (MÜLLER) BARR
18. Ascomata with few nonseptate setae, on *Arctostaphylos* .... *P. alpina* (SACC.) BARR
18. Ascomata with numerous usually septate setae, on *Ledum, Cassiope, Empetrum* ..... *P. variisetosa* (BARR) BARR
19. Ascospores 16.5–25.5 × 5.5–8 µm; on *Vaccinium* ..... *P. elegantula* (REHM) BARR
19. Ascospores (11-)12–19.5(–25.5) µm long 20

20. Ascospores narrow, 15–19.5 × 3–3.5 µm; on *Arctostaphylos* ..... *P. major* (BARR) BARR
20. Ascospores wider, 4–9 µm wide 21
21. Ascospores 12–18 × 6–9 µm; ascomata globose, on *Phyllodoce, Cassiope, Arctostaphylos* ..... *P. latispora* (BARR) BARR
21. Ascospores narrower, 4–6 µm wide; ascomata sphaeroid 22
22. Ascospores 12–18 × 4.5–6 µm; on *Ledum* ..... *P. ledi* (BARR) BARR
22. Ascospores (11–)13–18(–25.5) × 4–6 µm; on *Rhododendron* ..... *P. angustispora* BARR

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