

Abrothallus

After Hawksworth, 1983, Keissler, and others

Ascocarps immersed then sessile, round, flat then convex, the margin thin, disappearing, the disc black, almost waxy. Asci clavate, rounded and often thickened above, 4-8-spored, the spores 1-septate, brown. Paraphyses branched, septate. Hypothecium brown. All species lichenicolous.

1. Apothecia with an irridescent green pruina when young, 0.3-0.7 mm diam. Vegetative hyphae generally not turning blue in Lugol's iodine. Epihymenium K+ greenish. Hymenium I-. Spores (10-)14-18(-22) x (4-)5-7 um. Anamorph Vouauxiomyces santessonii. Sometimes forming galls. On Parmeliaceae, Usneaceae, and Stictaceae lichens. Arizona. A. parmeliarum (Sommerf.) Arnold

1. Apothecia epruinose, 0.15-0.3 mm diam. 2

2. Apothecia arising on pinkish terminal galls on Usnea spp., forming "pseudocephalodia". Doubtfully distinct from A. parmeliarum. A. usneae

2. Apothecia arising directly on the host thallus. 3

3. Ascospores 9.5-11 x 3-5 um. Anamorph Vouauxiomyces truncatus usually present and preceding the formation of the apothecia. Parasymbiotic on Parmelioid lichens (Flavoparmelia caperata, Parmotrema chinense). A. microspermus Tul.

3. Ascospores 9-13 x 5-7 um. Anamorph usually absent. On Melanelia, Xanthoparmelia, Pseudephebe, Nephroma. Vegetative hyphae usually turning blue in Lugol's solution (but sometimes not, e.g., in the specimen from Arizona). Arizona; Greenland. A. bertianus DeNot.

ADD:

Vegetative hyphae blue in Lugol's. On Vulpicida pinastri. Alberta. A. peyritschii (Stein) Kotte

Pseudothecia substipitate. Spores 11-4 x 5-6 um. On Cavernularia (and other lichens). California. A. prodiens (Harm.) Diederich & Hafellner (see Diederich, 1990, for K reactions)

Acarospora

Thallus yellow. On Caloplaca spp.A.
stapfiana

Adelococcus

After Triebel, et al., 1991 and Hawksworth, 1983

All species lichenicolous.

On Acarospora spp. (A. fuscata, A. glaucocarpa and A.
macrospora). Spores 11.5-16 x 7-10(-13) um (in Mexican specimen
5-5.5 um wide), 8 per ascus. Baja California;
Greenland. A. alpestris (Zopf) Theiss. & H. Sydow

Apiosporella

A. caudata = Cercidospora caudata

Arthonia

Parasitic Species

After Hawksworth, 1983, and others

1. **Ascospores 1-septate.** 2
1. **Ascospores 2-3-septate.** Ascomata with a continuous hymenium, unilocular. Ascospores exceeding 5 μ m in width, 2-3-septate. A. glaucomaria s. lato. 3
 2. **Ascomata 0.1-0.2(-0.3) mm diam.,** reddish brown. Hymenium red (directly) in Lugol's iodine. Hypothecium dark brown. Paraphysoids with apical cells 4-5 μ m thick. Spores sole-shaped, 1-septate, 10-14 x 3.5-5 μ m. On thallus and apothecia of members of the Pyxinaceae (e.g., Phaeophyscia) and Teloschistaceae. Arizona; Greenland. A. epiphyscia Nyl.
 2. **Ascomata 0.2-0.5(-0.8) mm diam.** Discoloring the host apothecia blackish. Spores 1-septate, sole-shaped. Hypothecium hyaline to \pm pigmented. On Lecanora dispersa group, Rhizoplaca spp., Protoparmelia badia, and Psoroma hypnorum. Greenland; Colorado, New Mexico, Arizona. A. clemens (Tul.) Th. Fr. s. lato
3. **On corticolous/lignicolous lichens.** Very similar to A. glaucomaria, but living in the thallus and apothecia of the Lecanora pallida group. Arizona. A. subfuscicola (Lindsay) Triebel (syn. A. pallidae)
3. **On saxicolous lichens.** 4
 4. **Spores 3-septate, 13-16(-18) x 5-6(-8) μ m.** On apothecia of Lecanora rupicola, turning them black. Ascocarps black. Asci arranged in compact black ascomata, 8-spored. Hypothecium colorless. Epithecium dark. Widely distributed in montane regions. Arizona. A. glaucomaria s. str.
 4. **Spores mostly 2-septate (rarely 3-septate), 11-19 x 3.5-5.5 μ m.** In the hymenium of saxicolous species of Lecidella. Infected apothecial discs with an irregular and rough surface, mostly convex. Thecial elements relatively scarce, often intermixed with those of the host. Minnesota; California, New Mexico. A. intexta

ADD:

A. fusca

Several other spp.

Arthopyrenia

No lichenicolous species yet reported from N. America; the lichenicolous species presently assigned to this genus may belong in other genera.

Arthrorhaphis

Ascospores 8-11-septate, (35-)50-70(-100) x 2-4(-5) um. On Baeomyces rufus at first, later forming an independent citrine green powdery thallus. A. citrinella

Asterophoma

After Hawksworth

Conidiomata pycnidial, arising singly, uniloculate, scattered or loosely aggregated, globose, superficial or half-immersed, dark brown to black, ostiolate; walls composed of radially oriented elongated dark brown pseudoparenchymatous cells becoming attenuated and projecting slightly at the exterior to give the whole a star-like appearance. Conidiophores absent. Conidiogenous cells enteroblastic, interdigitated with the inner wall cells and lining the pycnidial cavity, acrogenous, narrowly ampulliform to broadly subcylindrical, phialidic, occasionally biphalidic, not proliferating, hyaline. Conidia subcylindrical, hyaline, simple, smooth-walled, minute, aggregated into a slimy mass which is extruded through the ostiole as a whitish drop.

On Calicium glaucellum and C. trabinellum. Conidiomata singular, 1-celled, 30-42 μ m diameter, the wall entire, an ostiole present. Conidia subcylindrical, 1.5-3(-3.5) x 0.5-1.5 μ m, extruded in a mucilaginous white drop. Conidiogenous cells hyaline, occasionally biphalidic. British Columbia.A. mazaedicola

Bacidia

Apothecia superficial, convex, ca. 0.75 mm diam., reddish yellow to nearly black. Asci clavate, 8-spored, 60-90 x 16-18 μ m; ascospores fusiform, hyaline, 20-40 x 5-8 μ m, mostly 3-septate, sometimes 5-septate; paraphyses slender, with swollen yellowish brown tips cohering to form an epithecium; hymenium I+ blue. Scattered over vague gray patches on thalli of Peltigera spp. Not yet known from North America. B. killiasii

LITERATURE:

Dennis, 1981.

Biatoropsis

B. usnearum Räsänen

Basidiomata extremely variable in form, size and color, generally subspherical and convex with a constricted base, often with lobate margins, sometimes flattened or with a concave central part, rarely effuse and covering larger areas around the branches of the the host; surface smooth, rarely tuberculate, cartilaginous, pale pinkish, reddish brown, dark brown or black, 0.2-2.5 mm diam.; context hyphae 2-3 um wide, mostly unifrom, the walls not markedly thickened, clamps absent; haustorial branches frequent, mother cell subspherical or sometimes elongate, 2.5-4.5 um diam., haustorial filament 0.5-1 um thick, 3-7 um long. Hymenium hyaline, sometimes reddish brown in upper part and then yellow in 5% KOH; thickness variable, containing numerous probasidia. Basidia, when mature, clavate to subcylindrical, with 1-3-transverse septa, 20-44 x 3-6.5 um; epibasidia 2-3 um thick, to 85 um long. Basidiospores subglobose to ellipsoid, with a distinct apiculum, 4.5-8 x 4-7.5 um. Anamorph hyphomycetous, often present, forming long branching chains of hyaline, ellipsoid, simple conidia, 3-5 x 2-3.5 um. On Usnea spp. Yukon to Arizona, east to central Rocky Mountains.

Forming pale pinkish to brownish convex galls ("carpoids") 0.5-2 mm wide on tips of branches of caespitose and pendulous Usnea spp. Heterobasidiomycete. British Columbia. "B. usnearum Räsänen" (see Diederich & Christiansen, 1993)

Literature: Diederich, P. and M. S. Christiansen. 1994. Biatoropsis usnearum Räsänen, and other Heterobasidiomycetes on Usnea. Lichenologist 26(1): 47-66.

Buellia

After Hafellner (Karschia)

1. On foliose lichens or Caloplaca spp.2
1. On crustose, areolate to effigurate thalli, rarely on Caloplaca spp.4
2. Apothecia on species of Parmelia s. lato, especially Melanelia, or on various crustose lichens (Acarospora, Aspicilia, Caloplaca, Rinodina, and Buellia). In juvenile

stage without visible thallus, later independent, with nitid brown thallus. Spores 2-celled, 10-15 x 6-8 um. Arizona; widespread.B. badia

2. Apothecia not on Parmelia spp.3

3. Apothecia on species of Physciaceae. Spores 2- to 4-celled, finely warty, 16-21 x 6.5-7.8-8.5 um.B. pulverulenta

3. Apothecia on Xanthoria elegans, rarely on other Xanthoria or Caloplaca species. Spores submuriform, 14-20 x 9-11 um.(Diplotomma nivalis)

4. Apothecia on thalli of Chaenotheca species. Spores 7-10 x 3-4 um.B. schaereri

4. Apothecia on crustose saxicolous lichen thalli. Hypothecium brown.5

5. Parasitic lichen (i.e., forming its own lichenized thallus?) on Dimelaena oreina. Spores 15-18 x 7-9.5 um.B. imshaugii

5. Not parasitic (but may be partially epiphytic?). Thallus indistinct, UV-. Spores 10-15 x 5-7 um.B. punctata

Apothecia sessile on host thallus, black, at first with small, concave disc and thick margin, then disc flat and margin thin, 0.25-0.5 mm diam.; in median section with rather coarse "foot". Escipulum dark brown, with distinct amphithecium. Hypothecium dark brown. Hymenium hyaline, 70-80 um high. Epihymenium brown. Asci "lecanoral", broadly clavate to cylindrical, with distinct amyloid apical apparatus, somewhat associated with gelatin. Spores to 8 or rarely fewer, 45-55 x 17-24 um. Paraphyses septate, mostly branched only in the upper third, scarcely conglutinate, 2-2.5 um thick, with dark brown tips, these to 6 um thick. Spores 2-celled, brown, both cells equal, rarely somewhat constricted at septum, 14-15.9-18 x 6-7-6-9 um. Hymenial gel I+ blue. On Lecanora straminea, British Columbia to Alaska. B. adjuncta

..... B. zahlbruckneri

Buelliella

After Fink, and Hafellner (Karschia)

Rev. 1/88

Ascocarps sessile on the host thallus, first erupting and punctiform, later opening up. Excipulum uniformly thin, pseudoparenchymatous. Spores thin-walled. All parts I-.

1. Apothecia not more than 0.2 mm across. Spores 14-18 x (5)6-8 um. Excipulum brown, distinctly pseudoparenchymatous. Epihymenium pale brown. On Pertusaria sp., Florida.B. minimula

1. Apothecia reaching 0.5 mm across. Spores 16-18 x 6.5-8.5 um. Excipulum thin, densely encrusted with purple-black or blue-black. Epihymenium blue-black. On Trypethelium carolinianum, Florida.B. trypethelii

On Caloplaca. Arizona. B. cf. inops
Calicium

After Tibell, 1975

On siliceous rock underhangs in very humid habitats; parasitic? on Lepraria spp. Thallus often well developed, thick, sorediose, yellowish or greenish, P-, K- (rhizocarpic and ?usnic acids). Apothecia ± sessile or short-stalked, 0.2-1 mm high, black, slightly pruinose on lower part of exciple; stalk I-. Spores 12-16 x 4-6 um. Canada.C. corynellum

Caloplaca

After various authors

Rev. 1/94

1. Spores 13-16 um long. 2
1. Spores mostly under 13 um long. 3
 2. Spore septum 3-5 um. Typically on Aspicilia or Lecanora, Arctic. C. invadens
 2. Spore septum very thin. On other lichens on rock, New Mexico. C. dispersa
3. Amphithecium dark reddish, grayish to black, or disappearing; spores 8-13 x 5-7.5 um; isthmus 2-2.5 um. On wide variety of lichens, widespread. C. epithallina
3. Amphithecium orange-ochraceous, thick. Spores 11-14 x 5.5-8 um; septum 2.5-3.5 um thick. Parasitic on Aspicilia on rocks. C. insularis

ADD:

Thallus parasitic on crustose lichens on calcareous rocks. Thallus yellow orange, conspicuous; discs and margins orange. Rare, Ontario. C. cf. inconnexa

Carbonea

On Candelariella and Lecidea. Ascospore apices rounded, 7-12(-13) x (4-)5-6(-7) um. Epithecium smoky blue to greenish blue or emerald green. Widespread, montane to alpine. Alberta, Wyoming, Utah, California. Arizona, BAja California.C. vitellinaria

Catillaria

On Lecania sp. on maritime rocks, Washington and British
Columbia. C.? sp.

Cecidonia

After Triebel & Rambold, 1988

LECANORALES. On crustose lichens on rock, forming cecidia (galls). Apothecia black, to 0.6 mm diam., umbonate, the excipulum well developed, carbonaceous to dark pigmented. Hymenium to 110 um high, hylaine, I+ blue, I(conc.)+ blue to intense red. Paraphyses not moniliiform. Asci 8-spored; tholus Lecidea-type; spores hyaline, simple. Pycnospores bacilliform. On Lecidea or Porpidia spp, forming galls.

On Lecidea spp. Arctic-alpine. C.
umbonella Triebel & Rambold (1988)

Cercidospora

After Hafellner, 1987, and Keissler

Ascomata perithecioid, sunken in the thallus or ascocarps of the host, with "präformiertem" ostiole, without papilla, under the lens the exposed part appearing black. Excipulum at base pale bluish, brownish to hyaline, in the ostiole region intensely pigmented, blue-black, blue-violet, blue-green, or other colors, small celled, not distinctly paraplectenchymatous, composed of a kind of short-septate "textura intricata". Asci fissitunicate, cylindrical, I-; endoascus somewhat thickened apically and in the center of the thickening with a small invagination. Paraphysoids filiform, anastomosed. Spores 4-8, often with aborted spores present, hyaline, with 1 or several cross septa, the lower cell(s) often distinctly narrower; perispore very thin, disappearing.

1. Ascospores 1-celled, at most with some cells with more than one septum. On crustose to lobate or small umbilicate lichens. 2

1. Ascospores with more than one septum. On fruticose or large foliose lichens. These two species are not yet recorded for N. America, but their hosts are common here. 5

2. Ascospore cells very unequal in size, the lower cell extended and attenuated, (19-)22-25(-27) x 5-6(-7) um. On Teloschistaceae (e.g., Caloplaca spp. and Xanthoria elegans). Spores 4-8 per ascus. Widespread. Greenland; Arizona. C. epicarphinea (Nyl.) Grube & Hafellner (incl. C. caudata Kernst.)

2. Ascospore cells equal, or moderately unequal with lower cell somewhat narrowed. Not on Teloschistaceae. 3

3. Ascospores mostly 8 per ascus, 13-18(-23) x 3.5-6(-8) um, the lower cell somewhat narrowed but not attenuated. Apothecia few, 1-4 per areole, immersed, then slightly projecting, with slightly "eingedrückter" ostiole, globose or ovoid, 100-250 um, appearing as bluish-black dots under dissecting scope. Asci ± cylindrical. Paraphyses filiform, 1 um thick. Hymenium I-. Spores hyaline, oblong or fusiform, 1-septate. On thallus and apothecia of Lecanora spp. of the L. poltropa group, subg. Placodium, and on Rhizoplaca. Wyoming, Arizona. C. epipolytropa (Mudd) Arnold

3. Ascospores mostly 4 per ascus, (16-)20-24 x 5-7 um, the lower cell not or only exceptionally narrowed. On Lecanora muralis group and Rhizoplaca spp. Perithecia immersed, globose, black. Asci 4-8-spored. Spores fusiform, hyaline. Alberta,

Oregon, Colorado, Nevada, California, Utah, Arizona, New Mexico;
Mexico; Greenland.C. ulothii
Körber

**4. Spores 3-septate. Asci mostly 4-spored; spores 20-26 x
5-6 um. On Stereocaulon. C. stereocaulorum**
(Arnold) Hafellner

**4. Spores (3-)4-6-septate. Asci mostly 8-spored; spores
18-23 x 4.5-6 um. On Solorina crocea. C. lichenicola**
(Zopf) Hafellner

Chaenothecopsis

After Tibell, 1975

1. Parasymbiont/parasite on Chaenotheca spp.2
1. Parasitic on thallus and ascocarps of Arthonia (A. cf. platygraphella). Maine. C. brevipes
2. Growing on Chaenotheca chrysocephala.
..... C. consocians
2. Growing on other species. 3
3. Capitulum (reddish parts) K+ green or blue-green. On Chaenotheca stemonea and C. trichialis (both with Stichococcus).
.....C. viridireagens
3. Capitulum K+ red-purple, or K- to brownish. 4
4. All parts of apothecium N-, K-, or hypothecium greenish, K+ brownish. Apothecia 0.6-1 mm high, black. Spores 5.5-6.5 um, 1-septate; septum darker than outer walls. Growing on Chaenotheca trichialis which contains Stichococcus,
on wood.
Canada.C. epithallina
4. All parts of apothecia internally with diffuse, greenish yellow pigment, K+ red or purple (dissolving). Apothecia 0.4-0.8 mm tall, black or stalk rarely brown below; capitulum 0.15-0.38 mm wide; stalk 0.04-0.1 mm wide. Spores 5.4-7.8(-9.5) x 2.2-2.7 um, 1-septate, the septum colorless or pale brown and much thinner than outer wall, the surface smooth. On wood of pines (rarely birch), usually on thallus of Chaenotheca brunneola, which contains Dictochloropsis or Trebouxia, but sometimes associated with Stichococcus ("C. lignicola"). C. pusiola

Chromatochlamys

Ascospores (15-)20-27 um wide, muriform. C. muscorum v.
muscorum

Clypeococcum

After Hawksworth, 1983 and Triebel, et al., 1991

Ascomata immersed, occurring in groups and united by a dark colored clypeus. Ascospores (9-)10-12(-13) x (4-)5-6(-6.5) um. On thallus of Hypocenomyce scalaris, seriously damaging the host, the infected squamules becoming brown, bleached and finally killed. Minnesota. C. hypocenmyceae D. Hawksw.

Conida

On Caloplaca sp. Epithecium bluish black, I+, K-. California.
Reported from N. America by Keissler, 1933..... C.
coerulescens Zopf

Corticifraga

After Hawksworth; also see Hawksworth & Santesson, 1990

1. Apothecia immersed, with a distinct excipulum, circular, dispersed, not in neat circular groups, parasymbiotic, discs almost colorless to pale brown, sometimes confluent, 200-500 μm diam.; ascospores 1-septate when mature, 12-16 x 4-6 μm . On Peltigera.C. fuckelii (syn. Phragmonaevia fuckelii)

1. Ascomata arising in discrete necrotic circular infection spots, brown but soon becoming black; paraphyses brown capitate; ascospores (1-)3-septate, (19-)20-22.5(-24) x (4-)4.5-7(-8) μm . On Peltigera. Not yet reported for N. America. C. peltigerae

Cyphelium

After Tibell

Parasitic or parasymbiotic on Pertusaria (e.g., P. amara or P. albescens; usually causing darkening of the thallus and partial suppression of production of soredia) on bark. Apothecia sessile, 0.3-0.6 mm wide, not pruinose; excipulum thick throughout and distinctly thickened at base. Hypothecium convex. Spores 11-15 x 6-8 um, slightly constricted at septum, with spirally streaked upper surface which becomes irregularly broken in old ones; fissures rather numerous and deep. On trunks of old oaks.C. sessile

Dacampia

Ascospores with 3-5 transverse septa, 20-40 x 7-12 um, smooth-walled, red-brown, somewhat attenuated at the apices. On Solorina, Leptogium, or unidentified crustose lichens. Not yet reported from N. America. D. hookeri (Borrer) Massal.

Dacampiosphaeria

Not yet reported for N. America.

Paraphyses persistent, branched and anastomosing. AScomata ± immersed in convex deformations of the host thallus, crowded, (100-)150-250 um diam.; asci bitunicate, 4-spored; ascospores 3-septate, the end cells sometimes pale brown to subhyaline, (19-)20-30(-34) x (7-)8-11(-12) um. On Peltigera.
D. rivana (de Not.) D. Hawksw.

Dactylospora

After Hafellner, 1979

Rev. 1/88

1. **Apothecia on Lobaria spp.** Excipulum and hypothecium d. red-brown. Spores finely warty, 12-14-17 x 4.5-5.2-6.5 um, L:W = 2.7:1.D. lobariella
1. **Apothecia on crustose lichens.**2
 2. **Spores parallel several-celled.**3
 2. **Spores mostly 2-celled, at most occasionally several-celled.** 6
3. **Spores at least partly 5 or more septate.** 4
3. **Spores mostly to 3-septate.** 5
 4. Spores 3-7-septate; hypothecium brown, usually interspersed with dark violet blue granules. On crustose lichens over mosses, especially Biatora spp. Michigan. D. deminuta (Th. Fr.) Triebel
 4. **Spores 15-23(-27?) x 4-6 um**, (3-)5-septate (to -7-septate or muriform according to Hawksworth); hypothecium dark. On Protothelenella sphinctrinoides on moss. D. urceolata (Th. Fr.) Arnold
5. **Spores 12.5-15-19 x 5-5.9-7.5 um.** Excipulum and hypothecium in cross-section dark brown. Spores mostly 4-celled, but some 2-celled or 5-celled to 6-celled, very rarely also with incomplete longitudinal septum. On Ochrolechia spp. on soil, moss, etc. Colorado, Massachusetts, N. Carolina.D. glaucomarioides (Willey ex Tuck.) Hafellner
5. **Spores somewhat shorter and mostly somewhat narrower.**6
 6. **Spores (9.5-)12-15(-16) x (3.5-)4.5-6(-7) um**, 1-2(-3)-septate. Hypothecium grayish brown. On Pertusaria and Ochrolechia. D. parellaria (Nyl.) Arnold
 6. **Spores 9-11.5-15 x 3.5-4.3-5 um.** Excipulum in cross-section red-brown; hypothecium red-brown or spottily red-brown. Most spores 4-celled, some also 2-celled, narrow ellipsoid. On Pertusaria or rarely Ochrolechia.D. parasitica
7. **Asci polysporous.** Exciple and hypothecium dark brown. Spores 2-celled, occasionally also several celled, 7-8.9-11 x 4-

4.9-6 um. On Pertusaria.D. pertusariicola

7. **Asci 8-spored or occasionally with fewer than 8 spores.**
8

8. **On saxicolous or terricolous lichens** with green algae. 9

8. **On lignicolous lichens** (e.g., Pertusaria). Apothecia narrowly bordered, excipulum brown in cross-section, hypothecium hyaline to brownish. Spores 12-13.4-15 x 6-7.3-8.5 um. The report by Hasse, on Lecanora muralis, from southern California, is probably based on a misidentification.
.....D. inquilina

9. **On Baeomyces.** Epihymenium red-brown, K+ purple. Spores 9-11.6-14.5 x 4-5.2-7 um. Vermont (reported by Keissler, 1933, as Karschia).D. athallina

9. **On other hosts.** 10

10. **On Pertusaria or sterile whitish crusts.** Apothecia over 0.25 mm diameter. Spores 9-11.4-15 x 4.5-5.9-7.5 um. Hypothecium hyaline to brownish, distinctly paler than excipulum. Arizona; Greenland. Closely related to D. amygdalariae.D. saxatilis
(Schaerer) Hafellner v. saxatilis

10. **On other hosts.** 11

11. **Spores larger** than those of D. amygdalariae, thin-walled. On various representatives of Amygdalaria and other Porpidiaceae as well as Pilophorus. Thecial pigments K+ purple. D. purpurescens

11. **Spores smaller.** Similar to D. purpurescens, but restricted to Amygdalaria. Alaska; Canada, northern U.S.; Greenland. D. amygdalariae

ADD:

Apothecia scattered or in small groups of two to seven, erumpent, black, smooth; disc flat, to 0.7 mm diam. with a low margin. Asci clavate, thick-walled, to 40 x 15 um, 8-spored; ascospores irregularly biseriate, elliptical, light brown, 10-15 x 3.5-5 um, 1-3-septate; paraphyses slender, with one or two olive brown apical cells 4-6 um wide. Leciographa parellaria (= ? Dactylospora parellaria)

D. attendenda

Diploidia

After Lamb [Lyngby?], 1940 (E. Greenland)

On thallus and apothecia of Rhizoplaca chrysoleuca and R. melanophthalma, Lecanora spp., and Lecidea spp. Ascocarps black, spherical, 0.1-0.15 mm diam., slightly sunk in the host; spores brown, 1-septate, $7 \times 3-4$ μ m, differentiated in large numbers from the inner thecial tissue, and lie in masses within the receptacle. D. lecanorae (Vouaux) Keissl.

Diploschistes

Spores (20-)25039(-35) x (8-)12-15 um, with 5 transverse and 1-2 longitudinal septa; asci usually 4-spored. On Cladonia, later becoming independent, with C+ rose thallus. D. muscorum

Diplotomma

Thallus white, at first parasitic? on Xanthoria and Caloplaca, later perhaps free. Apothecia at first immersed in the host, becoming adnate, to 0.5 mm broad. Spores 3-septate to muriform with 1 longitudinal septum, 15-20 x 9-12 um. Arctic-alpine. D. nivalis

Echinothecium

After Keissler

Mycelium forming black network (distinctly visible with lens) of thick-walled torulose hyphae spreading over surface of the host lichen. Ascocarps superficial, black, globose or depressed-globose, very small (40-80 um), scattered, with hairlike brown projections, ostiole simple. Exciple pseudoparenchymatous. Asci ovoid or ovoid-swollen, with thick and short "foot", tips somewhat thickened. Paraphyses absent. Spores 8 per ascus, irregularly arranged, long-ovoid, rounded ends, hyaline, 8-9.5 x 4-4.5 um, 1-septate, one cell somewhat narrower. On Parmeliaceous and Lecanoraceous lichens. Arizona.E. reticulatum Zopf

Endococcus

After Hawksworth, 1983

1. **Spores thin-walled**, narrow, 13-21 x 5-8 μm . On Dimelaena oreina and Rhizocarpon geographicum. Arizona, N. Carolina, Virginia. E. perpusillus Nyl.

1. **Spores thick-walled**. 2

2. **Ascospores (7-)9-10(-12) x 4-6(-7) μm** , thick-walled. Perithecia mainly immersed. Usually on Porpidia, or Tephromela armeniaca, also Carbonea and Physcia. Widespread. Alaska, Colorado, Texas, Arizona; Greenland. E. propinquis (Körber) D. Hawksw.

2. **Ascospores 12-16(-20) x (4-)6-7(-9) μm** , thick-walled, broadly ellipsoid with the ends broadly rounded, or ("E. stigma") with one or both ends strongly attenuated. On various crustose lichens (e.g., Acarospora, Porpidia, Aspicilia, Rhizocarpon). British Columbia; New England; Oregon; Colorado; Greenland. E. rugulosus Nyl. (syn. E. stigma)

Epilichen

1. On Baeomyces. Thallus citrine to yellowish green, absent at first. Hymenium 70-100 um tall. Ascospores (9-)11-17 x 6-10 um. E. scabrosus

1. On thallus and ascocarps of Lecidea tessellata. Apothecia typically with distinct margin and plane disk. Asci Rhizocarpon-type or Lecidea-type. Nova Scotia, Colorado, Utah, Arizona, Mexico. E. stellatus Triebel

Everniicola

After Hawksworth, 1983, and others

Conidia 7-10(-11.5) x 1.5-2 um, variously curved or bent (\pm L-shaped), forming pale brownish necrotic patches on thallus of Evernia or Nephroma arcticum. E. flexispora (D. Hawksw.)

Fayodia

Basidiomycete, forming agaricoid basidioma. On Peltigera. F. striatula

Guignardia s. lato

On Sarcogyne novomexicana. Arizona. G. sp.

Hawksworthiana

Conidia 1-septate, arising singly, slightly truncate at base, hyaline or pinkish at maturity 15-25 x 5-6.5(-7) um; conidiogenous cells (15-)20-25(-30) x 6(-8) um. Forming gall-like convex swellings. Hypohomycete, parasitic on Peltigera spp. British Columbia. H. peltigericola (D. Hawksw.) U. Braun. (Syn. Ramularia peltigericola D. Hawksw.)

Hobsonia

Sporodochia pinkish or crimson.
group. H. christiansenii

On Phyiscia tenella

Illosporium

After Hawksworth, 1980

Conidiogenous cells exposed, not in pycnidia. Conidia catenate, simple, irregularly ellipsoid or subglobose, hyaline, separating with difficulty, mainly (4-)6-7 um diam.; conidiophores not clearly differentiated, forming compact pale pink sporodochia 200-3000 um diam. On Peltigera.I. carneum
(anamorph of Nectriella robergii)

Immersaria

Thallus brown, shiny (at least when wet); hymenium 80-100 um; spores 14-20 x 8-11 um. Apothecia mostly strongly immersed. On various crustose lichens. I. athroocarpa

Karschia

On Lecanora oreinoides. Baja California. K. sp.

Ascomata apothecioid, black, at first immersed, closed, then opening to expose a flat disc, sessile, 0.15-0.2(-0.25) mm diam., dispersed on thallus and apothecia of saxicolous Caloplaca spp. Escipulum ca. 25-30 um thick, the outer part dark brown, the inner part pale brown, composed of pseudoparenchymatous cells, 5-7 um (lumen 3-4 um) diam. Hypothecium hyaline or pale brown, stipitate. Hymenium hyaline, 45-55 um tall. Paraphysoids scarce, branched and anastomosed, 2.5-3 um (lumina 1.5-2 um) thick, the apical cells brown pigmented, to 6 um (lumina to 4 um) thick. Epihymenium dark brown, ca. 10 um tall. Asci bitunicate-fissitunicate, with distinct ocular chamber, broadly clavate, 34-50 x 14-17 um, 8-spored. Ascospores ellipsoid, 1-septate, rarely 2-3-septate, constricted at septum, thin-walled, smooth-walled, remaining hyaline for a long time, finally pale brown, (13-)16-17(-18) x 6-8(-8.5) um. Some brown vegetative hyphae visible near base of ascomata, to 5 um diam. Hymenial gel pale blue or unchanged in Lugol's iodine. Arizona. K. inops Triebel & Rambold in R. Sant.

Apothecia scattered, superficial, sessile, shallow cup-shaped, smooth, black; disk flat or slightly convex, to 1 mm across, without prominent margin. Asci clavate, thick-walled above, to 40 x 12 um, 8-spored; ascospores irregularly biseriate, elliptic-clavate, the upper cell slightly wider than the lower, 9-12 x 3-4.5 um, brown; paraphyses cylindrical, slightly enlarged towards the tip, embedded in yellowish mucilage, their tips coated by dark brown amorphous matter. On decorticated wood. "K. lignyota (Fr.)"

Lahmia

After Keissler

Ascocarp sessile to stipitate, globose to urn-shaped or cup-shaped, mostly flat, thin margined. Exciple pseudoparenchymatous. Paraphyses furcate above, septate, thin, the tips swollen, forming a thick, pigmented epithecium. Asci clavate, stalked, mostly 8-spored. Spores hyaline, acicular to threadlike, straight or curved, many septate.

Spores 20-40(-70) x 2-2.5 um, at least 8-celled. Hypothecium hyaline. On Baeomyces.L. fuistingii

Lecidea

After Hertel, 1970

1. **Medulla I+ violet.** Hypothecium hyaline or pale ochre. 2

1. **Medulla I-.** [If paraphyses free and tholus of asci amyloid, see Lecidella spp.] 3

2. **Thallus gray,** mostly large. Thallus K- or K+ yellow. On various crustose lichens, especially Aspicilia spp. L. tessellata s. ampl.

2. **Thallus brown.** (Immersaria athroocarpa)

3. **Hypothecium colorless to slightly ochre.** Paraphyses coherent. Thallus yellow or yellowish white. Epihymenium green-brown to brown. Cortical zone of excipulum brownish. Spores 9-13 x 5-6 um. On various crustose lichens. L. sulphurea

3. **Hypothecium golden brown to brown-black.** Thallus yellowish brown, dark brown to almost black. Exciple carbonaceous. 4

4. **Thallus (at least when moist) shiny, pale brown to dark brown.** Spores 8-12 x 4-6 um,. On Lecanora rupicola. Rimularia insularis

4. **Thallus olivaceous brown-black (sometimes with reddish tone).** 5

5. **Thallus C+ red, often also P+ yellow.** Spores 6.5-8.5 um. On various crustose lichens. Rimularia furvella

5. **Thallus (if present) C-, P-.** Spores 3.5-5 um wide. On Rhizocarpon. Lecidea intrudens

Lecidella

After Hertel, 1970

1. Hypothecium hyaline to slightly ochre. 2
1. Hypothecium golden brown. Paraphyses free. Tholus strongly amyloid. Spores 9-15 x 6-9 um. Exciple dark. Epihymenium blue-green. L. carpathica s. lato
2. Thallus white, + shiny. 3
2. Thallus yellowish, yellow, or greenish yellow. 4
3. Thallus bullate-areolate; areoles often somewhat folded. Medulla P+ yellow. Hymenium 45-65 um. Spores 7-14 x 4-8 um. Exciple with broad, opaque brownish gray marginal zone. Apothecia often somewhat pruinose. L. bullata
3. Thallus flat-areolate; areoles smooth. Medulla P-. Hymenium 60-80 um. Spores 11-18 x 6.5-10 um. Exciple with usually narrow, blue-green to brown marginal zone. Apothecia always epruinose. L. stigmathea
4. Thallus C+ yellow-orange. Tholus of asci strongly amyloid. Epihymenium and marginal zone of exciple bluegreen. Apothecia 0.2-0.8 mm diam. L. viridans
4. Thallus C-. Tholus at most entirely weakly amyloid. Epihymenium and marginal zone of exciple dirty brownish. Apothecia 0.4-1.8 mm diam. (Lecidea sulphurea)

Leciographa

After Dennis

Apothecia sessile, erumpent, black, subgelatinous; asci 8-spored; spores becoming brown, 27-septate; paraphyses forked; hymenium I+ blue.

L. lamyi

Leptosphaeria

Not yet reported from N. America.

Ascomata immersed, not in convex deformations of the host, scattered, 75-125 um diam.; asci bitunicate, 8-spored; ascospores 3-septate, almost hyaline to pale yellowish brown, 19-21(-22) x 4.5-6(-6.5) um. On Peltigera. L. clarkii
D. Hawksw.

Lethariicola

After Lumbsch & Hawksworth, 1990

Ascomata at first immersed, subglobose and perithecioid, later becoming erumpent and opening to become apothecioid, either by radial splits in the exciple or not, arising singly or loosely aggregated, black; exciple massively developed, dark brown to black, brittle, composed of thick-walled interwoven short celled hyphae (textura intricata), pale brown inside and to almost black at outer margin, the margin lacking external marginal hairs, with small periphysoids in lower parts; hamathecium of persistent delicate filiform paraphyses, septate, unbranched, not or slightly swollen at apex; centrum I-; asci narrowly cylindrical, with a single functional wall alayer, short stalked, the apex abruptly thickened and with an internal apical beak sometimes evident when young; discharge by apical rupture; outer membrand I- or slightly bluish, other tissues I-; 8-spored. Spores irregularly overlapping monostichously, ellipsoid, rounded at apices, colorless, smooth walled, lacking gelatinous sheath, 3-septate to submuriform. Anamorph unknown.

1. Ascospores 3-septate transversely, lacking longitudinal septa, (12-)14.5-17 x (4-)5-5.5(-6) um; exciple fissured. On Letharia and Foraminella. Oregon and Washington. L. cucularis (syn. L. sipei)

1. Ascospores 3-5(-6)-septate transversely, with (0-)1(-2) incomplete longitudinal septa, (10-)14-17(-19) x (4-)6-8(-10) um; exciple not fissured. On Lecanora. Not yet reported from N. America. L. figulina

Lettauia D. Hawksw. & R. Sant.

After Ihlen & Tonsberg, 1996

1. On Loxospora L. santessonii
1. On Cladina L. cladoniicola

L. santessonii Ihlen & Tonsberg

Ascomata apothecia, 0.2-0.4 mm diam., slightly immersed in host thallus, scattered or in groups; disc more or less flat, pale brownish; exciple distinct, uneven, paler than disc, consisting of radiating hyphae. Hypothecium hyaline. Hymenium hyaline, 37-54 um high, K/I+ blue; epithecium hyaline to pale orange. Hamathecium formed by paraphyses; paraphyses slightly branched or unbranched, not anastomosed, to 2 um diam., with slightly swollen apices to 2.5 um. Asci elongate-clavate to broadly clavate, 42-52 x 10-12 um, upper part of innermost layer and periascal gel K/I+ blue, 6-8-spored. Ascospores + distichously arranged, narrowly ellipsoid to ± cylindric-fusiform, with rounded ends, hyaline, (1-)2-3-spertate, (12.5-)14.5-18.7(-20) x (2-)2.9-4.5(-5) um. On Loxospora pustulata, Tennessee

L. cladoniicola D. Hawksw. & R. Sant.

On Cladina rangiferina, Tennessee. [See Bibl. Lichenol. 38: 138 (1990) for description]

Ihlen, P. G. and T. Tonsberg. 1996. The lichenicolous genus Lettauia in North America. The Bryologist 99: 32-33.

Lichenochora

After Triebel, et al., 1991

PHYLLOCORALES (see Hafellner, 1989)

Perithecia densely aggregated, completely immersed (visible under the dissecting scope only as small black dots), pyriform, ca. 200-250 um long, ca. 175-200 um broad; wall brown, around the ostiole darker than at the base, ca. 20-30 um thick, pseudoparenchymatous (textura angularis); cells tangentially flattened, ca. 10-15 x 4-5 um. Periphyses numerous, mostly hyaline, ca. 25-35 x 2-4 um; some filamentous hyphae visible between the young asci (ca. 3 um broad). Asci cylindrical, unitunicate, thin-walled, ca. 78-85 x 9-12 um, 8-spored. Spores uniseriate, 1-septate, hyaline, smooth-walled, broadly ellipsoid, (10.5-)12-15(-16) x 8-9(-9.5) um. Some brownish vegetative hyphae ca. 4-5 um diam. present near base of perithecia. Epiplasma orange ("dextrinoid reaction") in Lugol's solution. Tissues K-. Numerous lipid drops present in all parts of the perithecium. On thallus and apothecia of Xanthoria elegans, causing small galls. Utah. L. xanthoriae
Triebel & Rambold

ADD:

Parasitic on Phycia and Phaeophyscia spp. British
Columbia. L. thallina (Cooke) Hafellner

Lichenocodium

After Hawksworth, 1983, and Keissler

COELOMYCETES

1. Pycnidia mainly exceeding 0.1 mm diam. 2

1. Pycnidia mainly 0.05-0.1 mm diam. Conidiophores (2-)3-3.5(-4) um wide. 3

2. Conidia (2-)2.5-3.5(-4) x 2-3 um. On podetia of Cladonia pyxidata and other cup-forming species, discoloring them brownish. Arizona. L. pyxidatae (Oudem.) Petrak & H. Sydow.

2. Conidia mainly over 3.5 um long. On thallus and apothecia of Teloschistaceae (Xanthoria) and Parmeliaceae (Melanelia and Tuckermannopsis). Sonora, Mexico. L. xanthoriae M. S. Christ.

3. Conidiogenous cells (5-)7-9(-11) um tall; conidia 3-4(-7) x 4-4.5 um. On Usnea, Bryoria, Cladina, Ramalina, Physcia, Melanelia, Neofuscelia, and Xanthoparmelia. Forming gray green spots, limited then spreading over entire apothecia. Pycnidia ± immersed, black, globose to oblate or lens-shaped, (0.04-)0.05-0.08(-0.12) um, the ostiole simple. Exciple pseudoparenchymatous. Mainly occurring in the apothecia, which are turned dark brown to black, only rarely spreading beyond. L. usneae

3. Conidiogenous cells (4-)5-7(-8) um tall; conidia (2.5-)3-4.5(-5.5) um diam. Pycnidia (0.03-)0.04-0.08(-0.1) mm diam. On Lecanora, Rhizoplaca, Parmelia s. lato, or Evernia. Turning the apothecia of Lecanora conizaeoides jet black. On Parmeliaceous lichens a single pycnidium is usually found in each infection spot, the surrounded by a black margin. Arizona. L. lecanorae (Jaap) D. Hawksw.

ADD:

On Pertusaria. Conidiophores simple, brownish, densely tufted, 20-25 x 2.5 um, densely tufted; conidia brownish, 3.5 x 2 um. Florida (reported by Keissler, 1933). L. lichenicolum v. buelliae Keissler

Lichenodiplis

After Triebel, et al., 1991, and Hawksworth, 1983

COELOMYCETES

Conidia 1-septate, sometimes with a marginal frill, 4-7.5 x 2-3 um. Conidiogenous cells annellate. In apothecia or more rarely the thalli of corticolous species of Lecanora, Rhizoplaca, Pertusaria, Caloplaca, Xanthoria, Evernia. Arizona. Conidia similar in shape, color and size to ascospores of Muellerella lichenicola, but basal ends of the conidia squared-off due to their mode of development. L. lecanorae (Vouaux) Dyko & D. Hawksw.

Lichenosticta

Conidiogenous cells arising in irregular branched chains of almost rectangular cells which ramify through the pycnidial cavity; conidia arising at the apex of the chains and also laterally, lacriiform, narrowed to a pointed base, (6-)6.5-10(-11) x (2-)3-4.5(-6) um. Coelomycete. Parasitic on underside of squamules of Cladonia. Newfoundland; British Columbia. L. alcicornaria (Lindsay) D. Hawksw.

Lichenostigma

After Triebel, et al., 1991

Asci arising in locules in a pseudparenchymatous stroma.
Ascospores (8-)10-13(-14.5) x 5-7(-8) um. On Diploschistes,
perhaps becoming lichenized when living on the apothecia of the
host. Utah, Colorado, Arizona. L. rugosa Thor

Lichenothelia

On yellow species of Acarospora. California,
Arizona. L. sp.

Marchandiomyces

After Diedrich, 1990

Colonies superficial or slightly immersed, orange to pink and red; sclerotia 50-150 um diam.; sporodochia 100-500 um diam., with cells 6-10 um diam. Conidiophores developing at the surface of the sporodochia, simple or septate, ellipsoid, claviform or subcylindrical, 15-35 x 3-9 um. Conidiogenous cells 9-11 x 4-9 um. Conidia 11-15 x 7-10 um. On various foliose lichens (e.g., Melanelia, Phaeophyscia, Physcia, and Xanthoria). M. corallinus

Melanomma

After Dennis

Pseudothecia gregarious, superficial, at least a maturity, black. Asci cylindrical. Ascospores uniseriate or biseriate, brownish, with more than one septum.

M. oxysporum

Merismatium

M. coccisporum

On Mycobilimbia or Rimularia. Manitoba; Minnesota;
Utah. M. decolorans (Rehm ex Arnold) Triebel

Microcalicium

After Tibell, 1978

Rev. 1/94

1. Apothecia with long stalks (3-14 times the diameter of the capitulum); mature spores ellipsoid, 1-septate, 5.5-8 um long.
On various lichens on rocks, or roots.M. arenarium

1. Apothecia sessile or subsessile; mature spores cylindrical, 3(-7)-septate, 9-15 um long. On other Caliciales, sometimes directly on bark or wood of old pine trees. M. disseminatum (synonym M. subpedicellatum)

Miriquidica

See Lecidea segregates

On Lecanora rupicola. M. intrudens

Muellerella

After Hawksworth, 1983

VERRUCARIACEAE. Asci with more than 8 spores; spores small and non-septate (or 1-septate?)

1. Perithecia (pseudothecia) 0.05-0.11 mm diam., usually + completely immersed; ascospores brown, 5-7(-8) x 2-3(-4) um, more than 64 per ascus. In apothecia of Mycobilimbia sabuletorum, Caloplaca, Fulgensia and Lecanora species and Pyxinaceous genera, almost always on calcareous rocks. Colorado.M. lichenicola (Sommerf.: Fr.) D. Hawksw.

1. Perithecia (0.05-)0.15-0.2(0.4) mm diam., usually + superficial and immersed only at the base; ascospores dark brown, 6-9(-12) x (2-)4-5(-6) um, broadly elliptical, with one medium septum but only slightly constricted. Pseudothecia scattered, globose, black. Asci cylindric-clavate, to 95 x 23 um, thick-walled above, sessile; spores irregularly arranged. On Haematomma, Porpidia, Lecidea, Caloplaca, and other crustose lichen thalli, almost always on siliceous rocks. M. pygmaea. 2

2. Spores 34-64 per ascus. 3

2. Spores mostly ca. 32 per ascus, 7.5-13 x 3.5-6 um. On Lecidea, Acarospora, etc. Alaska, Colorado, Arizona. v. pygmaea

3. Spores 6.5-9 x 4-6 um. Mainly on silicolous species of Rhizocarpon. Colorado., Arizona. v. ventosicola (Mudd) Triebel

3. Spores 5.5-8.5 x 2.5-5 um. On Lecidea s. lato, Bellmerea, yellow Acarospora spp., Protoblastenia, Lecanora, etc. Wyoming, Colorado, Arizona, New Mexico. v. athallina

ADD:

M. melanostigma

Nectriella

After Hawksworth, 1980, 1983, and Dennis

Perithecia subglobose, smooth, brightly colored, erumpent; otherwise like those of Nectria.

Ascospores (11-)12-15(-17) x (4-)4.5-7 um, hyaline, 1-septate, elliptic-cylindric, only slightly constricted at septum, smooth, containing several oil drops; to 8 per ascus, biseriate; Ascomata immersed within host tissue, then splitting it to expose their apices, ovoid, smooth, to 0.25 mm across, light red, brownish red to pale orange. Asci clavate, to 85 x 13 um. Anamorph Illosporium carneum. On Peltigera thalli.N. robergii (Mont. & Desm.) Weese

Nectriopsis

Cells of perithecial apex globose, often catenate. Spores ellipsoidal to oblong, (5-)6.7-10.6(-12.5) x (1.5-)2.203 um, equally 2-celled, not constricted, smooth to finely spinulose, colorless. On Dimerella, or on fungi, or not obviously fungicolous or lichenicolous.N. mindoensis (Petrak) Samuels

Nesolechia

After Keissler, and Dennis

Apothecia sessile, erumpent, black, subgelatinous; asci 8-spored; ascospores hyaline, non-septate; paraphyses forked; hymenium I+ blue.

Spores almost spherical. Hypothecium brown, K-. On Parmelioid lichens. Florida (reported by Keissler, 1933). N. thallicola

N. oxyspora = Phacopsis oxyspora

Opegrapha

Ascomata elongated, lirelliform. Ascospores 3(-5)-septate, 19-21(-27.5) x 5-6(-6.5) um. On Stereocaulon. O. stereocaulicola

"Opegraphoidea"

After Hedrick

Similar to Opegrapha but parasitic. [It still could belong in Opegrapha, since other species of the genus are parasitic].

Thallus immersed in that of host. Apothecia short and very narrow, 1.5-2.5 x 0.08-0.1 mm, partly immersed to superficial, scattered and straight to clustered and variously irregular, the disk closed and indicated by an obscure, depressed black line, to rarely open, black, concave to flat, the exciple black; hypothecium thick and dark brown; hymenium pale yellowish brown; paraphyses hyaline, slender, branched and interwoven; asci broadly clavate, the apical wall moderately thickened; spores to 8, hyaline to finally brownish, ellipsoid, with one end often more pointed, 3-septate, the cells cylindrical, 13-15 x 4.5-5 um. A non-lichenized fungus on Staurothele umbrina [But Fink lists the photobiont as Trentepohlia!]. Ohio. O. staurothelicola Fink

Peridiothelia

On bark, not really lichenicolous, but erumpent through the thallus of Lecanora impudens. Arizona. P. grandiuscula (Anzi) D. Hawksw.

Phacopsis

After Keissler, Hafellner, 1987, and Triebel & Rambold, 1988

The three species below all form galls

1. Exciple present. Spores \pm lemon-shaped. Ascocaps in groups, (semi-)immersed, globose, later projecting, flat and narrow-bordered, soon \pm convex and immarginate, brown-black, matt, to 0.3(-0.5) mm, without distinct marginal structures. Exciple brown, pseudoparenchymatous. Asci clavate-ovoid, with thick short stalk, broadly rounded at top, apical wall thick. Spores 8 per ascus, in 2-3 rows, ellipsoid-fusiform or ellipsoid-"kahnförmig", hyaline or slightly yellowish, straight, simple, with 1-2 large oil drops, 14-22 x 5-7 μ m. Epihymenium red-brown, K-; hypothecium \pm hyaline; hymenium I++ blue. On Parmelioid or usneoid lichens, sometimes causing galls. Arizona, British Columbia.P. oxyspora (Tul.) Triebel & Rambold (syn. Lecidea oxyspora, Nesolechia oxyspora)
1. Exciple absent. Spores otherwise. On fruticose lichens. 2

2. Hypothecium dark brown. Spores oblong, 13-16 x 3-4 μ m. On Bryoria spp. Asci with Lecanora-type apical apparatus (not bitunicate as stated by Hawksworth). British Columbia.P. huuskonenii--see Hawksworth
2. Hypothecium hyaline. Spores ellipsoid, 13-15 x 5-7 μ m. On Letharia spp. Asci 45-60 x 20-30 μ m, in a gelatin, broadly cylindrical to slightly clavate, 8-spored; wall several layered, strongly thickened apically; apical apparatus Lecanora-type; dehiscence rostrate. Paraphyses somewhat branched and anastomosing, conglutinate, 2-3 μ m thick; tips slightly clavate to 5 μ m thick, with small, brown pigment cap; epihymenial gel slightly brown. Spores hyaline, 1-celled, thin-walled, without internal wall thickenings and without perispore. Pycnospores bacilliform, straight, 6-7 x 2 μ m. British Columbia to California; Idaho.P. vulpina--see Keissler

Phaeopyxis

Apothecia small, black-brown, nitid, turgescens, + distinctly marginate, 0.1-0.25(-0.3) mm diam., plane, sessile, crowded, roundish, partly confluent. Excipulum laterally to 10-20 μ m thick, dark brown to black-brown. Hypothecium brown, 20-35 μ m tall. Hymenium 35-40(-45) μ m tall, colorless to pale brown. Paraphyses 1-2 μ m thick; lumina 1-1.5(-2) μ m wide. Epihymenium dark brown to black-brown, 5-10 μ m. ASci (sub-)cylindrical, (30-)35-50 x 7.5-8.5 μ m; ascus wall apically ca. (1-)1.5-2(-2.5) μ m, laterally 1-1.5 μ m thick, I+ pale bluish. Spores ellipsoid, (7-)8.5-10.5(-12) x 2.5-3.5(-4) μ m. Brown pigmentation K+ violet-brown. On Cladonia spp., occasionally inducing galls. Newfoundland. P. punctum (Massal.) Rambold, Triebel & Coppins

Phaeospora

After Zopf, Dennis, and Hawksworth, 1983
(also see Keissler under P. parasitica)

VERRUCARIACEAE. Pseudothecia scattered, minute, immersed; asci thick-walled, 4-8-spored; ascospores 3- or more-septate, brown.

Pseudothecia semi-immersed, black, scattered. Asci thick-walled, 8-spored. Spores 4-celled, brown, (13-)17-19 x 5.5-8(-9) um, ellipsoid or oblong-ellipsoid, the tips pointed. Hamathecium ansemt or gelatinized. On thallus of Mosigia gibbosa, Rhizocarpon concentricum, and other crustose lichens.P. rimosicula
(syn. Pyrenulella endococcoidea)

Phaeosporobolus

Conidia multicellular, composed of discrete subglobose cells, brown, arising in closed pycnidia.

1. Conidiomata with an outer pellicle-like hyphal covering, (30-)50-70(-90) um diam.; conidia irregularly ellipsoid, 15-25 um long. On Usnea, Phyiscia, and various other macro- and micro-lichens. P. usneae

1. Conidiomata lacking an outer pellicle-like hyphal covering (20-)30-75 um diam.; conidia irregularly subglobose, (9-)10-15(-17) um diam. On Ochrolechia and Pertusaria spp. P. alpinus

"Pharcidia"

After Bouly de Lesdain, and Dennis

VERRUCARIACEAE. Pseudothecia small, immersed in lichen thalli or apothecia; asci thick-walled, 4- or 8-spored; ascospores hyaline, 1-3-septate.

Parasite on discs of Lecanora muralis. Ascocarps black, numerous, minute, hemispherical, polished, first totally immersed, then sessile, free. Paraphyses few, simple; asci numerous, clavate; spores 8 per ascus, hyaline, 1-septate, 13-17 x 6-6.5 um, the loculi equal or almost; hyemnum I+ fulvescent. Mexico.P. squamariae
(description from Bouly de Lesdain)

Phragmonaevia

see Cortifgraga

Phylliscum

Forming purplish peltate scales on Ochrolechia frigida.
P. demangeonii

Placographa

After Dennis

Apothecia elongated, black. Asci 8- or more spored; spores hyaline, simple.

Not yet reported from N. America.

Pleosphaeria

Parasymbiotic on Lichenothrxi riddlei. Pseudothecia ovoid to pyriform, 200-300 x 100-170 um; peridium brown; asci obclavate to cylindrical, bitunicate, 50-60 x 12-16 um. Paraphysoids scarcely developed; paraphysoids formed below ostiole; spores muriform, 8 per ascus, ellipsoid, darkening, 17-24 x 6-13 um. P. lichenothricis

Plectocarpon

P. lichenum--See Hawksworth

Polycoccum

After Hawksworth, 1983, Hawksworth & Dietrich, 1988,
and Mudd, 1861

Rev. 4/90

1. Ascospores 8 per ascus, mainly exceeding 16 mm in length,2

1. Ascospores 4 per ascus.

2. Ascospores olive-brown, coarsely verrucose with protruding warts, the cells \pm equal, 18-21 x 10.5-14 um, often also with muriform spores. On Placopsis gelida. Ascomata maculiform, scattered; nucleus white; paraphyses distinct, lax, flexuose, mixed with a hyaline watery substance; asci short, cylindrical, 4-spored, constricted opposite each spore; spores subrotund or broadly oblong, their outline irregular, filled with a dark red or nearly black protoplasm, obscurely bilocular. P. gelidarium (Mudd) D. Hawksw.

2. Ascospores at first hyaline but becoming brown when mature; cells unequal, 16-23(-28?) x 6-9.5(-12?) um. On Sporastatia or Lecidella. Colorado, Arizona. P. sporastataiae (Anzi) Arnold

3. Ascomata (50-)100-150 um diam. Spores 14-18 x 7-8.5 um, the cells \pm equal or upper one slightly larger, 4-8 per ascus; asci sometimes 4-spored, but then with 4 abortive spores visible in younger asci; asci subcylindrical. On yellow or brown Acarospora spp. P. microstictum

3. Ascomata mainly over 150 um diam. Spores mainly over 12 um long and 7 um wide, the cells \pm equal in size. 4

4. On Squamarina sp. Ascospores (15-)19-22(-26) x (6-)7-9(-10) um, upper cell somewhat larger. Ascomata 60-120(-150) um diameter. Asci elongate-clavate to subcylindrical. Record from Canada is probably a misidentification of P. squamarioides.
P. epicrassum

4. On other lichens. Ascospore cells \pm equal in size. 5

5. Ascospores 14-18(-21) x 7-9 um. On Physcia, Heterodermia, and Xanthoria. Forming wart-like galls. Material from Baja California has slightly smaller spores than usual. On usually

saxicolous host lichens. Baja California; Greenland.
P. galligenum Vezda

5. Ascospores (18-)19-26 x (5.5-)6-7(-8) um. On Placopsis gelida. Ascomata 75-100 um, black, punctiform, aggregated into little groups; nucleus grayish white; paraphyses indistinct. Asci elongate-clavate, 8-spored; spores obtusely fusiform to fusiform, at times slightly constricted in the middle, dark olive or nearly black.P. squamarioides

Some other species (not yet reported from N. America):

On Peltigera:

Ascospores (12-)13.5-16(-18) x 4-6(-7) um, smooth walled; asci 8-spored; ascomata 125-175 um diam. P. peltigerae (Fuckel) Vezda

Ascospores 26-35 x 8-10 um, verruculose; asci 4-spored; ascomata 300-500 um diam. P. crassum Vezda

On Stereocaulon:

Ascospores unequal in size, the septum in the lower third, 14-22 x 8-10 um, 8 per ascus. Forming galls to 2.5 mm diam. P. trypetelioides

On pyrenocarpous lichens on hard limestones:

Spores 8 per ascus, 25-36 x (12-)14-18 um, coarsely verrucose. Perithecia to 0.3 mm diam. P. marmoratum

Polysporina

Thallus immersed in host. Spores 4-5.5 x 2-3 um. Apothecia superficially resembling those of Carbonea vitellinaria but frequently have brownish tinged, umbonate disks. On saxicolous crustose lichens, e.g., Acarospora, Buellia, Lecanora and Candelariella. Wyoming; Arizona. P. lapponica (Schaerer) Degel. (syn. P. dubia)

Psorula

Thallus shell-like squamulose to concave-foliose. On Spilonema
paradoxum. P. rufonigra

Pseudodiscus

Asci bitunicate, I- or at most the gelatin slightly bluish; dehiscence of "Jack-in-the-box" type. Pseudothecia delicate, short-stalked, sessile on a subiculum. Spores hyaline. On Alaska yellow cedar, but not reported from N. America. P. nootkatensis

Pyrenidium

After Hawksworth, 1983, Triebel, et al., 1991, and others

Ascospores (31-)34-39(-45) x (7.5-)10-12.5(-14) um, elongate-ellipsoid to broadly fusiform, (1-)3-4-septate, On Placopsis gelida. P. hyalosporum

Ascospores (17-)19-30(-34) x (7-)8-11(-12) um, dark brown, 3-septate, with distinct central pore and pale brown ends. Perithecia immersed to erumpent, (0.1-)0.15-0.25 mm diam. On various crustose or macrolichens on various substrates (e.g., yellow Acarospora spp., Trapeliopsis granulosa, Baeomyces rufus, Peltigera, Leptogium, Massalongia, Diploschistes, Caloplaca, Teloschistes), sometimes forming gall-like formations. Arizona, Minnesota; Mexico; Greenland. P. actinellum

Refractohilum

After Hawksworth, 1980

Conidia not distinctly catenate, simple, obpyriform to cymbiform with a highly refractive thickened base, (15-)18-21(-25) x 6-8(-9) um; conidiophores clearly differentiated, arising singly from bullate gall-like swellings on the host; conidiogenous cells annellides with numerous distinct anellations. On Peltigera. R. peltigerae

Rhabdospora

After Keissler

Pycnidia housed in groups, immersed, black, globose, 50-100 um.
Exciple rather loose and thin, brown. Conidiophores simple.
Conidia 20-30 x 2 um. On Lecanora, Opegrapha, and
Bacidia.R. lecanorae

Rhizocarpon

Thallus dark gray to brownish. Apothecia highly convex to immarginate. Spores 16-22 x 9-12 um, muriform. On Dimelaena spp.R. renneri

Thallus yellow. Apothecia flat to convex and without distinct margin. Spores 9-14 x 4-6 um, 2-celled. On Sporostatia spp.R. pusillum

R. viridiatrum

Rhizogene

On leaves and branches of Symphoricarpos speices. Loculi immersed in stromatic discs, in circular arrangement. Asci with only the tips showing. Spores 10-11.9-13 x 5-6.3-7 um. Reported from N. America by Hafellner (Karschia). R. impressa

Rhymbocarpus

see Skyttea

Rimularia

See Lecidea segregates for more info.

1. **Thallus C+ red.** On various crustose lichens. R.
furvella

1. **Thallus C-.** On Lecanora
rupicola. R. insularis

Rinodina

1. On Peltigera. Ascospores not strongly thickened at apices nor at the septum; apices paler; 26-35 x 11-14 um.
R. turfacea

1. On Lecanora rupicola group. At first endokapylic (without visible thallus in juvenile stage), then with independent small brownish thallus. Spores Physcia-type. Arizona. Similar to Buellia badia. R. insularis (Arnold) Hafellner

Robergia

After Hedrick, and Dennis

Apothecia completely immersed, flask-shaped, having thier long axis parallel with that of the twig, ending in a curved neck which opens by a pore. Asci cylindrical; ascospores thread-like.

Perithecia 0.3-0.8 mm diam., partly immersed, covered by a thin, whitish thalloid veil, the apex visble, black, sometimes surrounded by a white border, the ostiole minute, usually invisible, sometimes covered by a white layer; exciple complete, thick above and thin below, brownish below; paraphyses unbranched, coherent, indistinct; asci soon breaking down; spores 8, hyaline, long acicular, to 39-44-septate, 170-250 x 2-3 um, parallel arranged. On a pale crustose lichen with protococcoid algae, on trees, Texas. R. pupula (syn. Belonia americana; description is based on that)

Sarea

S. difformis

Scutula

After Hawksworth, 1983 and Keissler

Ascocarps sessile, erumpent, black, subgelatinous, globose then round and cup-shaped, flat and thin-margined, then convex and immarginate. Asci ovoid or clavate, thick walled especially above, 8-spored. Spores ovoid, clavate or ellipsoid, 1-septate, hyaline, often with oil drops, biserially arranged. Paraphyses filiform or branched, septate, the tips enlarged and colored. Hypothecium thick, mostly colored. Hymenium I+ blue then red or violet.

1. Hymenium I+ blue then violet. Spores 11-20 x (3-)3.5-6(-6.5) um. On Stereocaulon. Epihymenium brown. Apothecia 0.15-0.3 mm diam.; epithecium dark reddish brown; hypothecium pale yellowish brown. "S". stereocaulorum

1. Hymenium I+ blue then wine red. Spores 7-15 x 4-7 um. On Peltigera. Epihymenium sooty brown.S. tuberculosa

ADD:

Ascomycete. Apothecia 0.4-0.15 mm across. Paraphyses strongly coherent. Parasitic on Peltigera. British Columbia. S. miliaris (Wallr.) Trevisan

Skytella

After Rambold & Triebel, 1990

HELOTIALES

Apothecia pale orange to yellowish, 0.3-0.7(-1) mm diam.,
immarginate, sessile, arthonioid; apices of asci I-; ascospores
(8.5-)10-12(-14) x 2.5-3.5(-5) um. On Peltigera. S.
mulleri

Skyttea

After Triebel, et al., 1991 and Hawksworth, 1983

ONDONTREMOID

Apothecial disc urceolate, the opening pore-like or cruciate, the recurved exciple margin extending into hairs. Spores under 10 um long.

On saxicolous and corticolous individuals of Tephromela atra and Lecidea s. lato, sometimes causing gall-like formations. Ascus apex constantly with an internal apical beak. Hairs extending from exciple margin 40-50 x 2.5-3 um. Spores 7-8 x 3.5 um. Arizona. S. elachistophora (Nyl.) Sherw. & D. Hawksw. (syn.: Rhymbocarpus elachistophora)

Sphaerellothecium

After Triebel, et al., 1991

PYRENOMYCETES. Ascocarps extremely small (40-80 um diam.). Spores 1-3-septate. Pseudothecia without hair-like protrusions. Growing obligately within the epinecral layer of crustose lichens, forming a characteristic net of dark brown, thick-walled hyphae.

1. Spores (6.5-)7.5-8(-8.5) x 3-3.5 um. Ascomata perithecioid, growing entirely superficially, black, \pm spherical, ca. 25-35(-40) um diam.; walls brown, ca. 5-10 um thick, of 1-2 layers of thick-walled pseudoparenchymatous cells; cells tangentially somewhat flattened, 4-5 x 3-4 um diam. Hamathecium absent. Asci broadly saccate, only 2-3 per ascoma, thick-walled, bitunicate-fissitunicate, with ocular chamber, ca. 16-20 x 8-9 um. Spores irregularly arranged, 1-septate, not or slightly constricted at septum, brown, smooth-walled, ellipsoid, with rounded apices, Vegetative hyphae superficial, brown, torulose, branched and anastomosed, forming a reticulum; cells subglobose to quadrangular, dark brown, 4-6 um diam., especially the outer cell wall thickened. Epiplasma orange ("dextrinoid reaction") in Lugol's iodine, K-. On thallus and apothecia of Teloschistes chrysophthalmus. Baja California. S. subtile Triebel & Rambold

1. Spores over 8.5 x 3.5 um. 2

2. Spores small, 9.5-10.5 x 5-5.5 um; ascomata small. On species of Lecidea and Immersaria. Spores 1-septate. Alberta; Wyoming, Colorado, Utah, California, Arizona S. abditum Triebel

2. Spores 11.5-14 x 5-6.5 um; ascomata slightly larger. On Protoparmelia badia, Sporastatia testudinea, Tephromela armeniaca, Rhizoplaca melanophthalma. Sometimes in the epihymenial gallertic layer of decaying apothecia. Wyoming, Colorado, Arizona. S. contextum Triebel

ADD:

Forming a superficial dark brown mycelium on the thalli of various lichens, e.g. Ochrolechia spp. and Parmelia s. l. British Columbia. S. araneosum (Rehm ex Arnold) Zopf

Sphinctrina

After Poelt & Vezda, Fink, and others

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1. **Spores ellipsoidal.** On thin lichen thalli, e.g., Pertusaria.
Baja California. S. tubaeformis Massal.)

1. **Spores ± spherical.**2

2. **Apothecia sessile or with a very short stalk; excipulum
in section reddish, K+ red.** On Pertusaria or rarely
Diploschistes, mainly on old oak or beech trees.
Minnesota. S. turbinata
(Pers.) De Not.

2. **Apothecia with a distinct stalk at least as high as the
capitulum; excipulum dull brown, K-.**3

3. **Stalk about as high as the capitulum, black; spores 7-10 um,
with distinct ornamentation of minute warts.** On various crustose
lichens over wood or bark. Minnesota. S. anglica Nyl.

3. **Stalk slightly longer than the capitulum (0.8-2.4 times as
long), pale to dark brown; spores 4-6 um, with indistinct
ornamentation.** On Pertusaria or Diploschistes, particularly on
old deciduous trees. S.
leucopoda

ADD: On Lecanora pachysoma on rock, Baja California. S.
sp. (= S. tubaeformis?)

Steinia

Asci 16-spored. Spores 5-7 um diam. On
Peltigera. S. geophana

Stigmidium

After Keissler, Dennis, Zopf, and Hawksworth

Spores hyaline, 8 per ascus.

1. **Parasymbiotic in perithecia of marine (intertidal) Verrucaria spp.** Ascomata to 0.15 mm diam; periphyses absent; ascospores (10-)14-15(-20) x 4-6

um. S. marinum

1. **Parasitic on various non-marine lichens.** 2

2. **On foliose or fruticose lichens.** 3

2. **On crustose or squamulose lichens.** 4

3. **On Dacampia hookeri sensu Poelt (=? Solorina sp.) on soil.** Spores 9.5-14 x 2-4.5 um, 2-4-celled, in 2 or 3 rows, elliptic-cylindric, with four oil drops. Pseudothecia spherical, black, scattered or subglobose, to 100 um, immersed in or erumpent from the hymenium of lichen apothecia. Asci clavate or ventricose, thick-walled, subsessile, up to 45 x 15 um. Paraphyses absent. S. schaereri
(Massal.) Trev.

3. **On Thamnolia.** Ascospores 13-14 x 4.5-5 um. Ascomata mainly less than 0.1 mm diam. S. frigidum

4. **On Lecanora.** 5

4. **On other genera.** 6

5. **On apothecia and rarely the thallus of corticolous Lecanora spp.** (e.g., L. carpinea, L. intumescens, and L. pulicaris). S. congestum (Körber) Triebel

5. **On apothecia of saxicolous members of Lecanora, including L. cenisia, L. swartzii and members of subg. Placodium.** Very similar to S. schaereri. Arizona, Colorado, New Mexico, Sonora. S. atryneae (Arnold) Hafellner

6. **On brown and yellow species of Acarospora.** Ascocarps sessile, black and globose, often in rows along the margins of the host areoles. Arizona; Sonora. S. fuscatae Arnold

6. **On Psora or Toninia.** 7

7. **On Psora crenata or P. decipiens.** Alberta; Arizona. S. psorae

7. **On Toninia spp.** New Mexico, Arizona. S. tabacinae

Thamnogallia

After Hawksworth, 1983 and Triebel, et al., 1991

PHYLLACHORALES: PHYLLACHORACEAE

Gall-inducing, forming bullate deformations. Asci unitunicate; spores non-septate, hyaline. Paraphyses unbranched. Ascomata wall subhyaline to pinkish brown or olivaceous around the ostiole. Interascal tissue (hamathecium) of persistent unbached filiform paraphyses. Spores 8-10(-11) x 3-5 um. Perithecia 0.1-0.15 mm diam. On Thamnotia. Wyoming, Colorado.
T. crombei (Mudd) D. Hawksw.

"Thelidiella"

After Hedrick

Similar to Thelidium but thallus parasitic and inconspicuous.

Thallus immersed in that of the lichen host and invisible. Perithecia 0.06-0.09 mm across, dimidiate and partly immersed, black, seated 1-several on single squamules or apothecia of the host, the superficial portion hemispherical to obscurely subconical, the ostiole only very rarely and tardily visible. Lower part of exciple hyaline. Paraphyses gelatinizing and disappearing early. Asci broadly clavate, the wall not much thickened in the apical region. Spores 8, hyaline, ellipsoid-dactyloid, 1-septate, the upper cell larger, becoming slightly constricted at the septum, 9-11 x 3-4 um, irregularly arranged. A non-lichenized fungus on Caloplaca ("Blastenia neomexicana"). New Mexico. T. blastenicola Fink

Thelocarpon

After Hawksworth, 1980

Asci multispored; ascospores simple, hyaline, ellipsoid, 4-6 x 1.7-2 um or (6-)8-10(-12) x 3 um; ascomata wall thick and subhyaline. On Peltigera, Solorina, and Baeomyces.T. epibolium var. epithallinum

Tichothecium

Differs from Discothecium only in its many-spored asci.

Vouauxiomyces

After Hawksworth, 1983

1. Conidia 6.5-8 x 4-5.5 um. Anamorph of Abrothallus microspermus. Pycnidia black, semi-immersed. On Flavoparmelia caperata. Arizona. V. truncatus (B. de Lesd.) Dyko & D. Hawksw.

1. Conidia (7-)7.5-10.5(-11.5) um. Anamorph of Abrothallus parmeliarum. On Parmeliaceae, Usneaceae, and Stictaceae lichens. Vouauxiomyces santessonii

Zwackhiomyces

Parasitic on discs of Caloplaca and on thallus of Acarospora spp. Paraphyses absent (gelatinized). Asci I- (yellow), oblong-ellipsoid and oblique-ellipsoid, short-stalked, swollen, straight or slightly curved, acuminate at the tips, the wall there thickened, 48-56 x 14-18 um. Spores 8 per ascus, biserial, 2-celled, hyaline, oblong-ellipsoid, 16-20 x 3.5-4 um, the lower cell narrower and more acuminate than the other. Exciple 200 um across. Southern California; Mexico. Z. dispersus (syn. Pharcidia dispersa, Mycoporellum epistigmellum--description partly from Hasse)

Z. euplocinus