

Amygdalaria Norman
(LECANORALES: PORPIDIACEAE)

After Brodo & Hertel (1987) and others

Rev. 5/94

Thallus superficial, areolate to weakly squamulose-areolate (with a suggestion of subumbilicate squamules), often as single areoles; areoles often coarse, cream-colored whitish to rose-tinged gray to brown, with smooth upper surface. Cephalodia occurring between the areoles, distinct, thick, middle-size to large, shrubby clavate, rose-gray to brown-black. Photobiont protococcoid; cephalodia with Stigonema or Gloeocapsa.

Apothecia usually deeply immersed in or between the areoles, but sometimes elevated, with or without a proper margin, sometimes bordered by the thallus; disks black or brown-black, flat to concave; thalline exciple brown; true exciple often poorly developed, of conglutinated, radially oriented hyphae. Hypothecium thick, dark brown to black and carbonaceous, then well developed and cupulate, K+ reddish; exciple thin, colorless to brown-black, without amphithecium. Hymenium high (100-170 μ m), I+ blue. Paraphysoid-like hyphae thin, loosely reticulate anastomosing, septate, especially in the upper part where they are often \pm moniliform, not or slightly swollen at apex. Asci Porpidia-type, elongate-clavate, thick walled, slightly amyloid, depositing a thin outer layer of amyloid gelatin; tholus with a strong ring (or tube), the sides of which are I+ deep blue. Spores ellipsoid, simple, colorless, smooth, large (often over 20 μ m long), when young with a compact gelatinous perispore (halonate).

Pycnidia immersed; conidia bacilliform. Gyrophoric acid often present, sometimes with lecanoric acid, or other orcinol depsides or β -depsidones. On somewhat base-rich, siliceous rocks (especially basalts) or sometimes on soil.

This genus is essentially an "aspicilioid" counterpart of Porpidia, with the apothecia usually immersed.

1. Thallus sterile, thick areolate to verrucose, often dispersed.

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1. Thallus fertile, with black to dark red-brown apothecia between or within thallus areoles.4

2. Thallus cortex or medulla K+ yellow, P+ orange (stictic acid) and either C+ red (gyrophoric acid) or C-; cephalodia usually with Stigonema. Thallus with yellowish or "creamy" tones predominating: pale orange-yellow to pale yellow-brown to brownish gray or brownish pink; areolate to verrucose, \pm "bullate", convex or flat, the areoles often becoming lobate, 0.6-2.0(-3.0) mm diam.; thallus margin

indefinite; prothallus absent; cephalodia always present and usually large and conspicuous, variable in texture and color, most frequently brownish-gray, occasionally blue-gray pruinose, containing Stigonema, but sometimes with smooth to "brain-like" pink cephalodia (containing Gloeocapsa) on the same thallus; immersed between areoles or sessile and hemispherical. Apothecia immersed in depressions in areoles forming a pseudo-lecanorine margin, but occasionally flush with surface, 0.4-0.9-1.6 mm diam., black, sometimes somewhat pruinose; proper exciple thin, inconspicuous; hymenium 160-180(-210) μ m; epihymenium brownish olive to olive; proper exciple thin laterally, rarely thick; hypothecium black, distinct, bowl-shaped; spores 19-24.0-29.5 x 9.5-12.5-14.5 μ m, with a compact or diffuse gelatinous episporium. Chem.: strain I (90%) gyrophoric, trace of lecanoric, stictic, constictic, ? menegazzic; strain II (10%): stictic, constictic and ? menegazzic (lacking gyrophoric). On shoreline rocks in or just above the salt-spray zone, as well as on exposed alpine ridges. British Columbia, Washington.A. subdissentiens (Nyl.) Inoue & Brodo

2. Thallus cortex and sometimes medulla K-, P-, C+ red (gyrophoric acid), or C- and KC+ pink-orange (confluent acid).
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3. Thallus bullate areolate, eroding into granular soredia at least in part; cephalodia large, hemispherical, pink, containing Gloeocapsa; medulla C+ red, or rarely C-. Thallus with yellowish tones predominating: mostly yellowish pink to grayish yellowish pink or yellowish white, sometimes becoming gray pruinose; dispersed to contiguous bullate-areolate, with many of the older areoles eroding into coarsely granular soredia usually at the base or sides of the areoles rather than at the summit. Apothecia not found in N. Am. material elsewhere. Chem.: Strain I (95%): gyrophoric, often with trace of lecanoric; Strain II (rare): confluent, often with associated unknowns. On somewhat shaded, or, sometimes, fully exposed, siliceous rocks, often near lakes, waterfalls, or the seashore. Arctic-alpine, S to Great Lakes region and Adirondack Mts in east, and Washington in west.A. panaeola (Ach.) Hertel & Brodo

3. Thallus esorediate, usually with flat areoles, becoming rimose-areolate, but sometimes with rounded areoles; cephalodia brown, disk-like to rounded, containing Stigonema; medulla C+ red. On \pm damp siliceous rocks. Canada. Thallus with yellowish or pinkish tones predominating: yellowish white to yellowish gray, yellowish pink, pale orange-yellow, or light yellow-brown; continuous to discontinuous, mostly rimose-areolate, smooth and flat, but areoles sometimes becoming somewhat convex; margin indefinite; prothallus absent; cephalodia brown to gray, rough, prominent or flat and disk-like, between areoles, containing Stigonema. Apothecia mostly depressed into areoles but sometimes flush, usually one per areole, central or at edge of areole giving a pseudo-lecanorine appearance, 0.3-0.5-1.0 mm diam., black, epruinose; proper

exciple usually extremely thin, generally not visible but some material from Iceland has thicker, gray to black margins; hymenium 140-210 μm ; epihymenium brown; proper exciple thin laterally; hypothecium brown-black, bowl-shaped, usually distinct from excipulum; spores 18-26.0-34 x 9.5-13.5-15.5 μm ; episporium gelatinous, compact or sometimes diffuse. Chem.: gyrophoric, trace of lecanoric. On exposed, dry rocks, in N. America mostly at low elevations.A. pelobotryon (Wahlenb. in Ach.) Norman

4. Spores 1-septate, hyaline or becoming brown, with a conspicuous gelatinous episporium, 30-35-41 x 14-17-19 μm ; thallus reddish brown to pink-orange, continuous, smooth or becoming rimose-areolate; black prothallus conspicuous; cephalodia containing Stigonema. [Note: This species is close to R. hochstetteri, but has cephalodia].Rhizocarpon hennseniae

4. Spores non-septate.5

5. Spores non-hyaline (without an episporium), narrower than 10 μm ; hymenium less than 80 μm high; epihymenium green to blue-green.6

5. Spores hyaline (usually with a conspicuous gelatinous episporium); wider than 10 μm ; hymenium over 100 μm high; epihymenium olive to brownish.7

6. Thallus with large (up to 2 mm) verrucae, greenish yellow; cephalodia pink, containing Gloeocapsa; spores 9-12 x 5-7 μmLecidea shushanii

6. Thallus with small verrucae (less than 1 mm) or subgranulose, grayish to yellowish gray; cephalodia brownish, with Nostocoid photobiont; spores 16-22 x 6-9 μmPilophorus pallidum

7. Apothecia developing between thallus areoles or on thallus surface, not immersed; excipulum thick, black, confluent with hypothecium.8

7. Apothecia remaining immersed in thallus, for the most part "cryptolecanorine," not between thallus areoles; excipulum generally thin or disappearing laterally.11

8. Cephalodia absent; thallus silvery gray to chalky gray, K-, C-, KC+ pink-orange (confluent acid) or K+ yellow, C-, KC- (stictic acid). Arctic-alpine.Porpidia superba

8. Cephalodia present, large, conspicuous; thallus not silvery or chalky gray.9

9. Cephalodia pink, hemispherical, containing Gloeocapsa; thallus thick, bullate verrucose, yellowish white to pinkish; medulla C+ red

(gyrophoric acid), or rarely C-, KC+ pink-orange (confluent acid).

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9. Cephalodia brown to reddish, containing Stigonema; thallus dispersed verrucose-areolate, brownish yellow to yellow-brown or oxidated orange; medulla and cortex C-, KC-, K-. Thallus light brownish

yellow to yellow-brown or oxidated orange, dispersed areolate to squamulose, irregularly rimose-areolate or weakly bullate-areolate; cephalodia very variable in shape and color, but usually large, hemispherical, yellowish brown, reddish, or gray, containing Stigonema; prothallus narrow, black, but rarely developing. Apothecia sessile, between the areoles, 0.3-1.5(-2) mm diam., black, brown-black, naked or slightly to intensely rusty orange pruinose; margin thick, non-prominent to prominent, black; hymenium (130-)150-170-200(-300) um; proper exciple well developed, very dark, confluent with hypothecium; spores 25-45 x 12-18 um, halonate.

Chem.: no substances. [Not yet known from N. America]. [A. aeolotera (Vainio) Hertel & Brodo]

10. Verrucae, in part, granular soresiate; apothecia rare; medulla C+ red or, rarely, C-, KC+ pink orange.

Frequent.(A. panaeola)

10. Verrucae entirely esoresiate; apothecia common; medulla C+ red. Rare. Thallus with yellowish tones predominating: yellowish white to yellowish pink; bullate-areolate, with rounded, almost hemispherical areoles; prothallus not conspicuous; cephalodia large, conspicuous, pink, round to angular, between the verrucae, containing Gloeocapsa. Apothecia between areoles, not immersed, black, pruinose or naked, to 2.5 mm diam.; proper exciple forming a thick but not prominent black margin; hymenium to 185 um; epihymenium olive brown; proper exciple thick, brown-black, confluent with hypothecium; spores 18-26.0-35 x 7-12.0-15 um, narrowly ellipsoid to ellipsoid, with gelatinous episporium when young. Thallus cortex C+ pink or red; medulla K-, P- (Chem.: gyrophoric, sometimes with traces of lecanoric), rarely P+ yellow-orange (stictic acid?) in apothecial medulla. On lime-free siliceous rocks in rather moist situations. Alaska,

Yukon.A. elegantior (Magnusson) Hertel & Brodo

11. Thallus verrucose-areolate to rimose areolate, often ± dispersed; apothecial disks often one or two per areole, appearing pseudo-lecanorine; cephalodia usually discrete, either superficial or occurring between areoles.12

11. Thallus continuous, usually smooth, becoming rimose in older areas, but not areolate; apothecial disks scattered or grouped; cephalodia often irregular and entirely immersed in thallus, but occasionally disk-like and superficial.15

12. Thallus medulla K+ yellow, P+ pale orange (stictic acid).

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12. Thallus medulla K-, P-; cortex C+ red or C- (stictic acid absent); thallus dispersed areolate to rimose-areolate, the areoles being flat and angular or, less frequently, somewhat convex and rounded; cephalodia gray-brown, sometimes pruinose, usually flat and disk-like, containing Stigonema.14

13. Cortex C+ pink or C- (gyrophoric present or absent); thallus consisting of thick, rounded, dispersed or contiguous verrucae; cephalodia very large, pink or brownish, cushion-shaped, between areoles, usually with Stigonema, but sometimes with Gloeocapsa.(A. subdissentiens)

13. Cortex C-; thallus continuous, rimose-areolate at least in part; cephalodia often inconspicuous or absent, usually immersed or disk-like, containing Stigonema. On exposed siliceous rocks. British Columbia, Greenland. Thallus rimose-areolate, usually continuous; margin usually definite; surface with gray or brown tones predominating: light grayish reddish brown, brownish gray to yellowish pink, or light orange to grayish yellowish brown or gray, often becoming "oxidated" orange; prothallus thin and black, or absent; cephalodia present or frequently absent (about equally in both chemotypes), brown, immersed between areoles or disk-like, rarely cushion-like, containing Stigonema or rarely Gloeocapsa. Apothecia immersed usually one per areole, flush with surface or slightly depressed, black, epruinose, usually umbonate in grayish thalli (and non-umbonate in brownish thalli), 0.3-0.5-0.8(-1.2) mm diam.; proper exciple thick, easily seen as a non-prominent border around each disk, or sometimes thin and inconspicuous; hymenium 150-180(-200) μ m; epihymenium brown to olive-brown; proper exciple usually thin laterally, but sometimes becoming quite thick, even at base; hypothecium brown-black, usually bowl-shaped and distinct, but sometimes merging with exciple; spores 24-26.5-32 x 11-14-16 μ m; episporium compact, gelatinous. Chem.: stictic and constictic. At low or high elevations, on exposed rocks, often associated with fens and bluffs.A. consentiens (Nyl.) Hertel, Brodo & Inoue (stictic acid strain)

14. Thallus medulla and cortex C-, KC- (without lichen substances); thallus often gray or oxidated orange, less frequently yellowish or pinkish, cracked-areolate; areoles \pm plane; cephalodia, when present usually immersed, brown. Infrequent. Spores 22-27-34 x 9.5-12-14 μ m in brown thalli, 21-24-28.5 x 9.5-13.0-17 μ m in gray thalli.A. consentiens (acid deficient strain)

14. Thallus cortex and sometimes medulla C+ pink, KC+ red (gyrophoric acid); thallus usually with pinkish or yellowish tones, less frequently grayish or oxidated orange, of distinct and sometimes dispersed and strongly convex areoles; cephalodia usually present, immersed to conspicuously

tuberculate, red-brown to gray. Frequent and widespread. (A. pelobotryon)

15. Thallus cortex C+ pink; medulla K-, P- (gyrophoric acid), or rarely C-, KC- (acid deficient); spores narrowly ellipsoid to ellipsoid, 22-28-39 x 9-11.5-15 um, average L/W more than 2.2; apothecial disks frequently umbonate. Thallus with brown overtones predominating: yellowish brown, light brown, yellowish pink, or light orange, smooth and continuous, parts becoming somewhat rimose-areolate in age; prothallus thin, dark brown to black, sometimes absent; cephalodia brownish, forming irregular areas immersed in thallus and almost flush with surface, or sometimes flat and disk-like, containing Stigonema. Apothecia immersed in thallus, flush with surface, (0.3-)0.5-0.8-1.3 mm diam. black, epruinose, often umbonate; proper exciple thin, envelope-like, sometimes thick and distinct, rarely prominent; hymenium 135-210 um high; epihymenium brown; proper exciple brown-black, thin or rather thick laterally; hypothecium brown-black, bowl-shaped, distinct from exciple; spores ellipsoid to narrowly ellipsoid, (22-)23-28.0-39 x 9.5-11.5-15.5 um, average L:W = 2.4; epispore compact, gelatinous. Pycnidia not seen. Chem.: gyrophoric, trace of lecanoric. On partially submerged or dry rocks, subalpine and alpine, British Columbia (Queen Charlotte Islands). A. haidensis Brodo & Hertel

15. Thallus cortex C-, KC-; medulla K+ yellow, P+ pale orange (stictic acid), or rarely K-, P- (acid deficient); spores ellipsoid to broadly ellipsoid, 20-24.5-36 x 11-14-18 um, average L/W less than 1.9; apothecia umbonate or not. Thallus with brown tones predominating: yellowish brown to brownish pink or yellowish pink, grayish reddish brown or light grayish brown, usually \pm smooth and continuous, usually thick, becoming finely rimose with age, or rarely rimose-areolate in part; margin definite; prothallus black, thin or sometimes broad and conspicuous; cephalodia mostly inconspicuous and flush with thallus surface, almost the same color as the thallus, but occasionally pinker or gray, containing Stigonema. Apothecia entirely immersed in thallus; disk flush with surface or somewhat depressed, rarely forming a pseudo-lecanorine margin; disks often clustered in groups of 2 or 3, 0.3-0.6-1.0(-1.3) mm diam.; proper exciple thin or thick and conspicuous; sterile columns (umbos) often occurring in disk; hymenium 140-210 um; epihymenium brownish; proper exciple thin laterally or rarely thick; hypothecium black-brown, usually thin, bowl-shaped; spores broadly ellipsoid to ellipsoid, (20-)22.0-24.5-29.5(-36.0) x 11-14.0-18 um, average L:W = 1.8; epispore compact, gelatinous. Pycnidia not seen. Chem.: Cortex K-, P-. Strain I: medulla K+ yellow, P+ orange (stictic, constictic, unknowns); Strain II: medulla K-, P- (no substances). At high elevations, on exposed ridges or frequently associated with streams. British Columbia. A. continua Brodo & Hertel

[Note: Stictic acid-containing specimens of A. consentiens with unusually smooth thalli may key out here.]

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consentiens (Nyl.) Hertel, Brodo & Mas. Inoue
continua Brodo & Hertel
elegantior (H. Magn.) Hertel & Brodo Syns.: Huilia elegantior, Lecidea elegantior
haidensis Brodo & Hertel
panaeola (Ach.) Hertel & Brodo Syns.: Lecidea panaeola, Huilia panaeola
pelobotryon (Wahlenb.) Norman Syns.: Lecanora pelobotrya, Aspicilia pelobotrya, Lecidea pelobotrya, L. "pelobotrion"
subdissentiens (Nyl.) Mas. Inoue & Brodo

Literature

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