

Arthothelium Massal.
(ARTHONIALES: ARTHONIACEAE)

After Fink, Willey, and others

Rev. 5/94

Thallus crustose, immersed or superficial, effuse or delimited, ecorticate. Photobiont Trentepohlia, Phycopeltis, chlorococcoid, or absent (some species lichenicolous or saprobic and non-lichenized). Ascomata apothecia-like, flat to convex, roundish to elongate, irregular, or stellate, immersed, with a "rubbed down" appearance. Disc red-brown to black, sometimes pruinose. Thalline and proper exciples absent. Epihymenium colorless to red-brown or dark brown. Hymenium usually 1+ blue. Hypothecium poorly developed to well developed and dark red-brown to dark brown. Paraphysoids sparsely to richly branched and anastomosed, the apices usually swollen and red-brown, often capitate. Asci Arthonia-type. Spores 2-8 per ascus, large, ovoid to ellipsoid, colorless, muriform, the upper part sometimes enlarged. Conidiomata Arthonia-like. No substances, or with various substances (incl. xanthonones and anthraquinones). On bark, especially when smooth, in humid, little-disturbed habitats, or some species (non N. American) on leaves.

This genus differs from Arthonia only or at least primarily in having muriform spores, which is artificial, but convenient. More info. could go into this key.

1. Apothecia red or brown, not black. Southern.2

1. Apothecia black (to brown-black), sometimes whitish pruinose, or if reddish brown (A. macounii), then northern.3

2. Apothecia dark red-brown or finally blackening, often white pruinose, 0.35-1 mm diam. Thallus whitish. Spores 20-32 x 12-18 um, 7-11-septate transversely and 3-5-septate longitudinally, oblong-ovoid. Southern California.A. sanguineum

2. Apothecia crimson, small, irregularly oblong, maculaeform, and variously difform. Spores ellipsoid, muriform, 28-40 x 13-16 um. Thallus thin, white, effuse. Florida.A. gregarina

3. Spores rarely less than 9-septate transversely.4

3. Spores rarely more than 7-septate transversely.6

4. Spores over 40 um long.5

4. Spores 15-35 x 10-16 um. Thallus greenish. Apothecia 0.06-0.1 mm across. Florida; possibly Alabama and Louisiana.A. albovirescens

5. Thallus ashy white to grayish; apothecia 0.4-1 mm across; spores 40-62 x 14-20 μ m. Florida.A. distendens

5. Thallus yellowish ashy to whitish; apothecia 0.6-3 mm across; spores 46-68 x 17-28 μ m. Texas.A. macrothecum

6. Spores rarely over 22 μ m long.7

6. Spores rarely under 22 μ m long.10

7. Apothecia very minute, punctiform-verruculose, crowded in centrifugal heaps, at length falling away and leaving irregular spots; not pruinose (but often long remaining covered by bark cells).

Spores ellipsoid, often constricted in middle, 5-7-septate and finally muriform, 18 x 6 μ m. Epithecium, hypothecium and pycnidial wall dark red-brown, K+ green. Thallus thin, white or pale green, thin, leprose, effuse or determinate. No substances. Pycnosporos 4-6 x 1 μ m. On smooth bark of deciduous trees, usually by streams, sheltered.A. ruanum

7. Apothecia not as above.8

8. Disc \pm whitish pruinose.9

8. Disc black, epruinose, round to irregularly angular or sometimes stellate. Spores ovoid-ellipsoid, 4-8-septate transversely and 1-3-septate longitudinally, 14-20 x 7.5-10 μ m. Thallus white or whitish. California.A. abnorme

9. Apothecia 0.15-0.25 mm, immersed to adnate, round to irregular, flat, white-pruinose. Spores oblong-ellipsoid, 5-7-septate transversely and 1-3-septate longitudinally, 17-22 x 8-12 μ m. Southern California.A. pruinascens

9. Apothecia 0.30-1.5 mm, irregular to branched and often distinctly radiate, often in clusters, black, or white-pruinose toward margins. Spores ovoid-ellipsoid, 5-9-septate transversely and 3-5-septate longitudinally, 17-23 x 7-8.5 μ m. Southern California.A. anastomosans

10. Spores under 10 μ m wide. 11

10. Spores over 10 μ m wide. 13

11. Apothecia 0.4-0.8 mm, partly immersed to adnate, oblong to slightly irregular, scattered or 2 or 3 in a group, flat, brownish black to black. Hypothecium dark. Spores oblong-ellipsoid, 4-7-septate transversely and 1-2-septate longitudinally, 21-30 x 8-10 μ m. Thallus greenish gray to ashy. Florida to Texas.A. interveniens

11. Apothecia not more than 0.5 mm. 12

12. Spores oblong-ellipsoid, 5-7-septate transversely and 2-3-

septate longitudinally, 20-25 x 7.5-10 um. Thallus light greenish gray. Apothecia 0.1-0.5 mm diam., immersed, often somewhat irregular, flat to convex, black. Southern California.A. subcyrtodes

12. Spores oblong-ovoid to oblong-fusiform, 5-6-septate transversely, 1-septate longitudinally, 20-32 x 7-10 um. Thallus ashy white, bordered wholly or in part by a black line. Apothecia 0.15-0.5 mm diam.. wholly or partly immersed, often irregular, often clustered, flat, brownish black to black. Illinois.A. hallii

13. Apothecia under 0.5 mm diam. 14

13. Apothecia over 0.5 mm diam. 15

14. Apothecia 0.1-0.25 mm wide, to 1 mm long, irregularly linear and becoming branched, often clustered, immersed, dirty black or thinly white-pruinose. Spores ovoid-oblong, 5-9-septate tranversely and 2-5-septate longitudinally, 27-35 x 11-15 um. Eastern, and California.A. taediosum

14. Apothecia often crowded and heaped together, sometimes confluent, commonly rounded, forming more or less complete rings fallen away in the center, convex, black. Apothecia 0.2-0.5 mm diam. Thallus inconspicuous, whitish to lead-gray, not bordered by a black line. Spores ovoid, muriform, 21-27 x 10-15 um, about 5-septate longitudinally. Epithecium greenish brown, K+ greenish. On smooth bark or broad-leaved woody plants, southern California.A. orbilliferum

15. Apothecia reddish brown to black; epithecium K+ purple-red. Thallus crustose, thin, smooth, matt or slightly shiny, pale greenish gray, smoke gray or medium gray, K-, C-. Ascocaprs common, scattered to clustered, subsessile to nearly sessile, 0.5-0.7(-1.3) mm wide; margins absent; disc ± round, plane to occasionally slighgtly convex, matt, roughened, black or reddish brown. Hymenium 75-80 um, light to dark reddish brown with some hyaline areas, I+ red; epithecium dark reddish brown with uppermost part black, subgranular; hypothecium reddish brown or red; asci ovate; spores 8, hyaline, eventually brown, ellipsoid-clavate, often curved, muriform with 5-7- longitudinal speta and (0-)1-2 transverse sepat in some cells, the end cell always enlarged and non-septate, accounting for up to 1/3 of the spore's length, (25-)28-32(-38) x (8-)10-13 um. On bark (oak and yew), Vancouver I., British Columbia. Possibly a synonym of A. reagens. A. macounii (G. K. Merrill) Noble

15. Apothecia black; epithecium K+ reddish or K-. 16

16. Spores club-shaped, 5-septate transversely, often without longitudinal, upper cell largest (to 1/3 of spore length), 25-36 x

9-13 um. Epithecium reddish brown. Hymenium I+ bluish then reddish or orangish. Apothecia abundant, \pm scattered, immersed level with substratum, irregularly rounded, oblong or difform, brownish black, 0.6-1.1 mm wide, plane. Hymenium 75 um high, hyaline to fulvous-brown; hypothecium reduced, pale, colored like hymenium. Asci ovoid. Spores hyaline, later browning, ovoid, often curved. Thallus thin, smooth, nearly transparent and glossy, green to greenish gray or sometimes white, determinate, K+ yellow to light orange. On bark of Alnus. British Columbia. (Arthonia illicina)

16. Spores ellipsoid to oblong-ellipsoid, 5-7(-9)-septate transversely, always with several longitudinal septa, without an enlarged end cell. 17

17. Spores ellipsoid to oblong-ellipsoid. Thallus immersed, creamy- or gray-white, K-? (no substances). Spores 26-36 x 12-15 um, muriform, with 5-7 transverse septa, most transverse cells with 1-3 longitudinal septa. Apothecia 0.3-1.2 mm wide, or variously irregular or deformed, angulate or oblong, to 1.5-2 mm long, immersed to adnate, flat to convex, black, epruinose (or sometimes obscurely white pruinose?), in section 120-150 um tall; epithecium red-brown, (black and 100 um thick according to Ozenda & Clauzade, 1970) K+ reddish; hymenium and hypothecium pale reddish brown, K- or K+ faintly greenish; paraphysoids 0.5-1 um wide, numerous; apices usually not pigmented and without caps. Thallus usually delimited by brown line, smooth to rimose. Photobiont Trentepohlia. On \pm smooth bark. A. spectabile

17. Spores ovoid-ellipsoid. Thallus very thin, smooth, pale olive gray to grayish olive, K+ yellow-orange (chem.?--could be due to algae showing up). Spores 5-9-septate transversely and 2-5-septate longitudinally, 26-38 x 12-20 um, without enlarged end cell, ovoid-ellipsoid. Apothecia common, \pm scattered, immersed, becoming sessile or subsessile, 0.3-1.0 mm wide, plane to slightly convex, round to slightly irregular, black; hymenium fulvous to mottled brown, up to 120 um high; epithecium black, to 25 um thick (relatively thin compared to description given for A. spectabile by Ozenda & Clauzade); hypothecium colored like hymenium, almost absent. Asci ovoid. Hymenium I+ orange-red. On bark of alder and other trees. British Columbia. A. cf. spectabile sensu Noble

ADD:

Ohio. A. violascens Nyl.

Detailed descriptions:

A. spectabile Massal.

Thallus crustose, immersed, effuse, creamy- to gray- or green-white, K-, C- (no substances), smooth to rimose, epruinose, ca. 0.05-0.1 mm thick; prothallus not seen, but contiguous individuals with a crust-like and black or brown margin; calcium oxalate absent; ecorticate; surface gel absent; medulla absent or inconspicuous; thallus gel absent; hyphae indiscernible; hypomedullary plectenchyma absent. Soredia and isidia not seen. Photobiont Trentepohlia; cells coccal, homoiomerous.

Ascomata numerous, uniascal locules, solitary, developing mutually with thallus, circular, 0.3-1.2 mm wide, or occasionally variously irregular or deformed, angulate or oblong, to 1.5-2 mm long, immersed (can split up at margin then similar to a slightly elevated or sessile ascoma); disc exposed, flat to convex, black, epruinose (or sometimes obscurely white pruinose?); thalline margin and proper exciple absent; ascomata in section 120-150 μ m tall; epithecium red-brown, (black and 100 μ m thick according to Ozenda & Clauzade, 1970) K+ reddish; hypothecium indistinct, pale reddish brown, of same texture as the dark brown ascostroma; hymenium and epithecium not developed; interascal plectenchyma dark brown in a brown clear or slightly granular gel, near the asci the gel is hylaine; calcium oxalate absent; tissues K- or K+ faintly greenish; hamathecium of undifferentiated dark brown plectenchyma (according to Tehler; of paraphysoids 0.5-1 μ m wide, numerous; apices usually not pigmented and without caps, according to Coppins). Asci globose, 85 x 60 μ m. Spores ellipsoid, straight or slightly reniform, (35-)36-38(-39) x (15-)16-17 μ m (to oblong-ellipsoid, 26-36 x 12-15 μ m according to Coppins), muriform, with 5-7 transverse septa, most transverse cells with 1-3 longitudinal septa, smooth, not constricted at flat septa, hyaline.

Thallus I+ blue, K/I+ blue (fading); interascal plectenchyma K- or partly olive black, I+ blue but some parts negative (reaction disappears after 5 min.); asci I-, K/I-. On \pm smooth bark or deciduous trees, in inland localities.

Literature

Coppins, B. J. 1992. Arthothelium. In: Purvis, et al., Lichen Flora of Great Britain and Ireland.

Fink, B. 1935. Lichen Flora of the United States.

Galloway, D. 1985. Flora of New Zealand Lichens.

Noble, W. J. 1982. Lichens of the Douglas fir dry subzone of Vancouver Island, British Columbia.

Tehler, A. 1990. A new approach to the phylogeny of Euascomycetes with a cladistic outline of Arthoniales focussing on Roccellaceae. Can. J. Bot. 68: 2458-2492.

Willey, . 18_. Monograph of Arthonia.