

Cliostomum Fr.
(LECANORALES: BIATORACEAE)

After Gowan (1990), Fox (1992), and Ekman (1997)

Rev. 5/94

Thallus crustose, whitish pale gray or straw-colored, effuse or bordered by a dark prothalline line, \pm smooth and rimose to verruculose to granular or \pm sorediate, usually in part endophloedal or endolithic; hyphae I-. Photobiont chlorococcoid, cells globose, ca. 9-17 μ m diam.

Apothecia biatorine or (in one species) zeorine, pale, or black but sometimes faintly pruinose, 0.4-1.1 mm diam.; disc concave to flat, rarely convex; true exciple well developed, persistent. Proper exciple thin or thick, \pm colorless but appearing straw colored through densely interspersed, minute granules; hyphae 1.7-2 μ m wide, \pm dichotomously branched and anastomosing (more so in species with larger apothecia), radiating; cell walls heavily gelatinized, lumina almost globose, ellipsoid, rectangular, or \pm irregular, not becoming distinctly larger near rim. Hypothecium hyaline, of irregularly intertwined hyphae, different in texture from proper exciple, at first \pm lens-shaped. Sections without pigment or with a greenish (K- or when grayish green K+ pure green, N+ purple) and/or a reddish brown (K+ purplish, N+ orange-red) pigment in epithecium and rim of the proper exciple. Crystals usually present in epithecium and proper exciple, minute to rather coarse, colorless or \pm yellowish, soluble in K. Epithecium straw-colored to dark brown, often minutely granular, the granules dissolving in K. Hymenium 35-50 μ m tall, I+ blue. Hypothecium and subhymenium I-, without algae below, \pm hyaline but appearing straw colored through densely interspersed, minute granules dissolving in K; hyphae densely branched, ca. 1.7-2 μ m (in K). Paraphyses numerous, mostly simple, or sparingly branched and anastomosed in upper part, the apices not thickened, or clavate or capitate, sometimes pigmented. Asci 8-spored, clavate (to clavate-cylindrical), *Biatora*-type; tholus I+ blue, with \pm conical, blunt, sometimes indistinct ocular chamber and a distinctly conical axial body, amyloid reaction darkest next to axial body. Spores hyaline, smooth, mostly 1(-3)-septate, without a distinct perispore, oblong, narrowly ellipsoid, or bacilliform, without ornamentation, 7-20 x 1.5-4.0 μ m.

Pycnidia generally abundant and rather large (100-500 μ m diam.) and often conspicuous and gaping, black, stromatic, unilocular or multilocular; walls hyaline or purplish brown (K+ grayish red or purple, N+ orange-red) above, or blue-green (K-, N+ purple), becoming thinner and \pm hyaline below, sometimes with crystals similar to those in the apothecia, internally convoluted into ca. 1-8 locules, which are criss-crossed by a few branched hyphae; conidiogenous cells cylindrical, 1-1.5 μ m wide, branched, enteroblastic, phialidic, hyaline, often proliferating, producing conidia repeatedly from terminally and sometimes laterally located conidiogenous cells; mixed with the conidiophores are long, cylindrical, slender, \pm branched hyphae of unknown function; pycnosporangia under 5 μ m long, colorless, smooth, simple, drop-shaped, cylindrical, short-bacilliform, or ampulliform, 2.0-7.5 x 1.0-2.0 μ m, L:W = 1.2-6.

Thallus containing atranorin, chloratranorin, fumarprotocetraric acid, protocetraric acid, stictic acid complex, fatty acids (including caperatic and roccellic), zeorin. Apothecia with usnic and/or isousnic acids at least sometimes present.

On bark or wood, rarely rocks.

A segregate of Catillaria, characterized by the ascus tips (tholus most reactive with IKI around the axial mass).

1. Apothecia bright egg-yolk yellow (brilliant orange-yellow). Thallus pale gray, continuous, small (surrounding apothecia), thin, rimose, esorediate [Gowan's description of the thallus (verrucose, the verrucae dissolving into scattered patches of soredia; soredia moderate in texture, whitish; corticate areas light greenish gray or yellowish) refers to an unidentified species of Lecidea s. lato with dark pycnidia (0.1-0.25 mm diam., \pm regular in shape; pycnospores subglobose to ellipsoid, 2-4 x 1-2 μ m) and black apothecia with ellipsoid, non-septate spores]. Apothecia flat to strongly convex, 0.2-0.5 mm diam. when mature; margin concolorous with disk, thin, smooth, sometimes evanescent. Pycnidia half-immersed, 100-125 μ m diam., unilocular, yellow (slightly paler than apothecia) in upper part, colorless in the immersed part; pycnidial wall with yellow crystals in upper part (similar to the crystals found in the epithecium), otherwise unpigmented; conidia bacilliform or narrowly ellipsoid, with two guttulae, 4.5-5 x 1.2-1.5 μ m. Apothecial tissues hyaline; hymenium 25-35 μ m; epithecium granular, yellowish, with granules soluble in K. Spores 8 per ascus, hyaline, bacilliform, mostly 1-septate, some 2- or 3-septate, 11-20 x 2-3.5 μ m, sometimes with biconcave septa. Thallus P+ red-orange, with fumarprotocetraric acid, smaller amounts of protocetraric acid, sometimes divaricatic acid, and sometimes atranorin. On acid-barked trees (Picea, Quercus). Massachusetts; New Brunswick. C. vitellinum

1. Apothecia pale yellow, orange or brownish to blackish. 2

2. Thallus abundantly effuse sorediate, dominated by the soredia. 3

2. Thallus esorediate (although sometimes \pm granular), or with small, inconspicuous soralia. 4

3. Pycnidia usually present, large and black. Soredia 20-100 μ m diam. Thallus P- (without fumarprotocetraric acid). Epithecial pigment brownish. Thallus endosubstratal to thinly episubstratal in esorediate parts. Thallus continuous, white or greenish white. Soredia 20-100 μ m diam. Pycnidia usually present, common, irregular in shape, 0.2-0.5 mm diam., black; pycnospores subglobose to ellipsoid, 1.5-4 x 1.5-2 μ m. Apothecia 0.4-0.9 mm diam. when mature; disk pale yellow to light yellow-orange, flat when young, becoming convex and tuberculate, epruinose; margin smooth, paler than disk, evanescent in old apothecia. Hymenium colorless, 30-45 μ m thick; epithecium brown to olive-brown or almost colorless; exciple hyaline to light yellowish brown. Spores elongate-ellipsoid or short-bacilliform, 8-11 x 2.5-3.5 μ m. Thallus P-, containing atranorin and caperatic acid in thallus and usnic acid in apothecia. On mature trunks of conifers (Picea or Tsuga) in old coniferous forests, New Brunswick; also in western Canada. C. leprosum (Rasanen) Holien & Tonsberg (syn. C. luteolum Gowan)

3. Pycnidia, if present, inconspicuous, colorless except for blue-green ostiole. Soredia 10-35 μ m diam. Thallus P+ red (with fumarprotocetraric acid). Epithecial pigment greenish. Thallus of thin, discrete or continuous, pale yellowish to pale yellow-green areoles, most of which soon dissolve in diffuse, pale sulphur yellow to pale green to yellow-green soralia (sometimes with a brownish tinge), forming a thick crust. Soredia loosely aggregated. Prothallus often present between discrete areoles and along edge of thallus, thin (endophloedal or nearly so), narrow, either whitish or (when meeting other lichens) bluish black. Apothecia rare at least in the northern part of the distribution range, 0.3-0.7 mm diam., at first plane, later becoming \pm

convex, often with thin white pruina. Disc pale yellow to gray-violet to bluish black. Margin concolorous with or paler than disc, pale yellow, pale gray, yellowish gray, bluish gray, or bluish black, distinct and raised in young and medium-aged apothecia, later level, finally excluded. Epihymenium and rim of proper exciple with minute colorless crystals (soluble in K, sometimes lacking) and varying amounts of a green pigment (K-, N+ purple), apothecia otherwise internally unpigmented and without crystals. Excipular hyphae with cell lumina globose to ellipsoidal, 6-11 x 3-8 μ m. Hymenium 40-50 μ m high. Paraphyses 1.0-1.5 mm wide in mid-hymenium, unbranched or sparingly branched in upper part; apices \pm clavate or not at all thickened, 1.2-2.4 μ m. Asci with ocular chamber lacking or low and blunt, axial body distinctly conical, surrounding by a I+ stronger blue zone. Spores ellipsoid, straight or slightly curved, 8-14 x 2.5-4 μ m, 1(-3)-septate. Pycnidia rare, c. 150 μ m diam., almost entirely immersed in esorediate part of thallus, unilocular, with gaping ostiole, ostiolar pigment K-, N+ purple; conidiophores cylindrical, 8-13 x c. 1.5 μ m, unbranched, forming conidia repeatedly. Conidia pyriform (to drop-shaped or almost ellipsoid, or short bacilliform), mostly biguttulate, 2-2.5 x 1.5-2 μ m [according to Ekman; (2.5-)3.5-4.5 x 2.0-2.5 μ m according to ?]. Thallus with atranorin and fumarprotocetraric acid major, nearly always traces of protocetraric acid. On various trees (especially alder), from sea level to c. 630 m, British Columbia to northern California. C. flavidulum Hafellner & K. Kalb

4. Thallus very variable, usually without fatty shine. Disk very variable in color (often on the same thallus), pale yellowish to reddish brown, or light grayish to yellowish brown or brownish black, brownish, pinkish brown or livid, or becoming blackish, but hardly ever consistently yellowish. Apothecia 0.3-0.8(-1.1) mm diam. when mature; disc thinly pruinose; margin thin and smooth to crenulate, concolorous with disk or paler, often appearing like the thallus; hymenium colorless, 40-50 μ m thick; epithecium light brownish to olive-gray; exciple hyaline to yellowish; spores elongate-ellipsoid to bacilliform, mostly 1-septate, occasionally 2- and rarely 3-septate, (7-)10-14(-20) x (2-)3-4 μ m; with 4-6 distinctive oil droplets (sometimes giving the appearance of additional spore cells). Thallus sometimes immersed, usually superficial, continuous to subcontinuous, thin, verruculose, coarsely granulose, or subsorediate, greenish white. Apothecia usually present, flat to strongly convex. Pycnidia common, irregular in shape, 0.1-0.2(-0.3) mm diam., usually present as black dots, the wall K+ purple; pycnosporos ellipsoid, (3-)3.5-4 x (1-)1.5-2 μ m. Thallus usually containing atranorin and roccellic acid. On moderately acid bark and wood, often in rather dry situations (but often in coastal areas in Washington state), more rarely on other organic substrates or on sheltered, \pm vertical rock faces or walls. Coastal, California, Oregon, Washington, British Columbia; Maine..... C. griffithii

4. Thallus thick, warty, rugose and corrugate, often with a fatty shine. Disk consistently pale yellow (according to Ekman; light to medium orange according to Gowan; pale yellow to creamy white according to Fox). Thallus continuous, areolate, coarsely warted (according to Ekman; consisting of scattered or clustered corticate rugae, with areas between rugae endoxylic according to Gowan); surface pale gray to yellowish gray (according to Ekman; rugae pale orange to brownish according to Gowan), esorediate. Apothecia often lacking, 0.4-1.1 mm diam. when mature, sometimes absent; disk flat to convex, thinly pruinose; margin smooth, pale yellow to whitish, paler than disk, sometimes evanescent in old apothecia. Hymenium colorless, 30-50 μ m thick; epithecium brown to olive-brown or almost colorless; exciple hyaline to light yellowish

brown. Spores elongate-ellipsoid, 8-12 x 2-3.5 μ m, 1-septate or rarely non-septate. Pycnidia common, abundant, irregular in shape, 0.2-0.9 mm diam, widely gaping, black, becoming multilocular; wall with a brown, K+ purplish pigment; pycnosporos subglobose to ellipsoid, 1.5-4 x 1.5-2 μ m. Atranorin in thallus; usually usnic acid in apothecia, and sometimes also isousnic acid. Usually on coarse bark of deciduous trees, especially Quercus, less commonly on wood. Known with certainty only from Europe; the report from Coastal British Columbia is based on a misidentification. C. corrugatum (synonym C. graniforme)

Literature

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