

Cyphelium Ach.
(CALICIALES: CALICIACEAE)

After Tibell, and others

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Thallus crustose, powdery, verrucose to \pm areolate, sometimes with small peripheral lobes, thick or thin, superficial or immersed, gray to greenish gray, yellow, greenish or brownish yellow, uniform; cortex 10-35 μ m thick, formed by interwoven hyphae, sometimes interspersed with small yellow or colorless crystals (ecorticate according to Rogers).

Apothecia almost immersed in thalline tissue or sessile; disk black, at first almost closed, later open; margin black, proper, with or without thalline rim; true exciple of variable thickness, laterally usually well developed, forming a distinct raised rim, rarely reduced laterally, blackish brown, sometimes white-pruinose, formed of densely interwoven, sclerotized hyphae; paraphyses simple, thread-like, disintegrating; mazaedium well developed; asci formed singly from ascogenous hyphae with croziers, at first clavate but becoming cylindrical or broadly clavate or obovate, thin walled, unitunicate, with a single functional wall layer, disintegrating at an early stage, the spores being released into a dry black powdery mass (mazaedium). Spores 8, dark brown, 1-septate, with a slight or pronounced constriction at septum, rarely 3-septate to submuriform, rarely simple; wall thick, smooth or with a distinctive ornamentation of irregular cracks or parallel ridges.

Pycnidia small; fulcrum endobasidial?; pycnospores bacilliform. Pulvinic acid derivatives (rhizocarpic, vulpinic) in yellow species; atranorin, chloratranorin, usnic, epanorin, norstictic, or unknowns (β -orcinol depsides and depsidones; tetroneic acid derivatives). Photobiont Trebouxia (?Stichococcus according to Rogers), or absent in lichenicolous species. On bark or wood, or rarely rock.

Calicium is similar but has stalked apothecia. Thelomma is a segregate genus.

1. On rock. Thallus epilithic, effuse, verrucose-areolate, to 5 cm diam.; verrucae irregular, hemispheric or conic, to 1.5 mm diam. and 1.5 mm high, often with a cracked amorphous layer, cervine brown, K⁺ rusty crystals (norstictic acid). Excipulum black, inversely conical, continuous under mazaedium and reaching the upper edge, 70 μ m thick near apex. Apothecia 1-3 per verruca; disk black, epruinose, 0.5-0.7 mm diam., at first immersed, soon becoming partly extruded. Spores only weakly blistered, 1-septate, 11-16 x 7-10 μ m. Coast of southern California to Baja California. (Also see Thelomma spp.)C. brunneum

1. On bark or wood, or parasitic on Pertusaria on bark.2

2. Thallus strongly yellow to yellow-green, not gray or brown. [Also see C. brachysporum]. 3

2. Thallus \pm gray, at most yellowish-gray; spores 1-septate.
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3. Apothecia sessile; excipulum strongly thickened at base. ...4

3. Apothecia immersed; excipulum thin throughout. Apothecia 0.5-0.8 mm, not pruinose.

Thallus with rhizocarpic acid, warty, thickish to almost immersed. Asci pear-shaped.5

4. Apothecia shining black, without pruina, 0.4-0.6 mm. Thallus verrucose, with rhizocarpic acid. Spores 13-15 x 7-9 μ m, surface slightly uneven or with a few irregular and rather shallow fissures, but without striation pattern, ellipsoid, slightly constricted at septum. Apothecia sessile, constricted at base; margin usually somewhat inflexed over mazaedium, shiny black. Thallus greenish yellow, often \pm immersed in substrate, P-, K-, C-, KC-. On wood or twigs of pines, and on wood of Betula and Larix. Alberta and British Columbia, Washington, California.C. pinicola

4. Apothecia yellow pruinose (at least on margin), 0.5-1 mm. Thallus subareolate, with vulpinic acid. Spores 17-22 x 8-10 μ m, surface when mature with deep, irregular fissures but no striation pattern. Envelope of apothecia blackish brown, strongly thickened at base. Thallus bright yellow, warty areolate, the marginal areoles somewhat lobelike and crenate. On conifer trunks and wood. Maine, Minnesota, Michigan, Ontario, Arizona.C. lucidum

5a. Spores 11-13 x 8.5-10 μ m, 1-septate. Otherwise apparently similar to C. tigillare. Thallus thin, areolate, partly dispersed, yellow-green, almost heteromerous, 0.06-0.08 mm thick. Apothecia innate in prominent verrucae, 0.4 mm wide; excipulum dark brown, 0.02-0.04 mm wide, below somewhat thicker. Hypothecium hyaline.. Spores brown, not constricted, apices round, wall smooth. On wood, Southern California. C. brachysporum

5a. Spores over 13 μ m long. 5b

5b. Spores 1-septate, 17-21 x 9-11 μ m, surface smooth. With epanorin and 2 unidentified compounds in addition to rhizocarpic acid. Thallus intensely yellowish green, verrucose, of variable thickness, sometimes almost immersed, K-, P-, C-, KC-. Apothecia immersed in verrucae, epruinose, 0.5-0.8 mm diam; excipulum uniformly thin, rim-like. Spores broadly ellipsoid. On wood, especially of conifers, and post and rails in old forests. Boreal to temperate, Alaska, south to Connecticut, Illinois, Kansas, and California. On bark or wood of conifers, widely distributed through northern and western U.S. Maine to Wyoming, southwest to California and Colorado) and Canada (Alberta to Newfoundland).C. tigillare

5b. Spores weakly muriform, very irregular in outline, 13-32 x 11-19 μ m. With rhizocarpic acid only. Thallus yellowish green, verrucose, of variable thickness, K-, P-, C-, KC-. Apothecia immersed, not pruinose, 0.5-0.8 mm diam.; excipulum thin, rim-like. On wood, particularly dry, weathered fences.C. notarisi

6. Apothecia immersed in thalline warts, not thin; envelope uniformly thin. Thallus gray, warty. Spore surface smooth. Asci pear shaped.7

6. Apothecia sessile; spherical when young, gradually opening apically and expanding to form a flat, eventually slightly convex disc with a persistent, cup-shaped black excipulum; envelope strongly thickened at base.8

7. Thallus K+ reddish brown, with ochraceous pigment in basal part of the verrucae and near the excipulum. Spores (21-)22-23 x 11.5-14 μ m, \pm broadly ellipsoid. Apothecia 0.3-0.4 mm wide. Thallus dark gray, verrucose. Apothecia immersed in verrucae with a distinctly

incised base, not pruinose. Excipulum thin, rim-like. On dry, weathered wood. Southern California. C. trachyloides

7. Thallus K-, without ochraceous pigment. Spores 21-23 x 10-12 um, narrower.

Apothecia 0.5-0.8 mm. (C. tigillare)

8. 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

8. Independent lichen with its own thallus, verrucose or verrucose-areolate.

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9. Spores 7-8(-12) x 5(-6) um. Apothecia to 0.6 mm, the immature disc and the rim with a yellow streak. Thallus low-verrucose or verrucose-areolate, K+ rusty crystals (norstictic acid).

On Quercus, California. C. chloroconium

9. Spores over 12 um long and 8 um wide. Apothecia without yellow streak; with ± whitish pruina on margin.10

10. Apothecia 0.4-0.7 mm. Spores 13-17 x 8-11 um, constricted, surface when mature with deep fissures giving rise to a very rough areolate pattern. Thallus K-, P-, C-, without substances. Thallus faintly greenish gray to brownish gray. On trunks of Picea engelmannii and Thuja plicata, and on dead, decorticate stumps of conifers in shaded and humid situations. Alberta, British Columbia, Montana. C. karelicum

10. Apothecia 1.5-2.5 mm. Spores 14-19 x 8-11 um, surface when mature with minute, spirally arranged ridges, appearing striated. Thallus K+ yellow to reddish brown, P+ yellow, C-(3 unknowns, including a yellow pigment according to Purvis; usnic acid and atranorin according to Galloway). Apothecia abundant, sessile. Exciple strongly thickened at base. Thallus well developed, gray, On wood, particularly old fence posts, etc., and acid bark (pines and oaks), western coastal states, inland to Idaho and Colorado, north to Alaska and NW Territories. C. inquinans

ADD:

Thelomma spp.

Detailed Descriptions

C. inquinans (Sm.) Trevisan

Thallus granular to verrucose, light to dark gray, usually well developed but sometimes almost immersed into the substrate.

Apothecia sessile, 0.9-1.3 mm diam., 0.4-0.7 mm high, short cylindrical to lenticular, with a faint white pruina on the outer surface of the edge of the excipulum. Excipulum 80-170 µm thick laterally, consisting of strongly sclerotized, interwoven hyphae and with a 6-9 µm thick, gelatinous layer at the surface. Excipulum strongly thickened at the base, to 450 µm high, medium-dark brown, consisting of intricately interwoven, sclerotized hyphae. Hypothecium to 170 µm high, dark brown, consisting of periclinally arranged, sclerotized hyphae. Asci cylindrical, persisting until the spores are nearly ripe, 42-55 x 4.5-6 µm. Spores uniseriately arranged, broadly ellipsoid, 15-18 x 9-10 µm. Young spores have an ornamentation of mainly longitudinally arranged, very minute ridges, which are disrupted by a few irregular cracks during the maturation of the spore.

Pycnidia at first spherical to slightly flattened, 80-140 x 55-70 µm, semi-immersed in the thallus. First with punctiform ostiole, later with irregularly split ostiolar area. Conidiophores branched. Conidiogenous cells short cylindrical 3.0-4.0 x 2.5-3.0 µm, conidia produced acrogenously and pleurogenously, non-septate, hyaline, cylindrical, 3-4.0 x 1 µm, narrower towards one end.

Thallus K⁺ yellow to reddish brown, C⁻, P⁻, P⁺ pale yellow or P⁺ yellowish red, contains placodiolic acid and sometimes a yellow, unidentified pigment.

On wood.

C. tigillare (Ach.) Ach.

Spores 1-septate, 17-21 x 9-11 µm, surface smooth. With epanorin and 2 unidentified compounds in addition to rhizocarpic acid.

Thallus intensely yellowish green, verrucose, of variable thickness, sometimes almost immersed, K⁻, P⁻, C⁻, KC⁻. Cortex with numerous minute yellowish green crystals.

Apothecia immersed in verrucae, epruinose, 0.5-0.8 mm diam; excipulum uniformly thin, rim-like. Excipulum thin, ca. 30-40 µm thick laterally and not or only slightly thickened at the base, of blackish brown, irregularly arranged and strongly intertwined hyphae with thickened walls. Hypothecium 55-85 µm high, of medium brown, strongly intertwined hyphae. Mazaedium black, non-pruinose. Asci pyriform, rupturing at very early stages, with 2-3-seriate spores. Spores broadly ellipsoid.

Rhizocarpic acid.

On wood, especially of conifers, and post and rails in old forests. Boreal to temperate, Alaska, south to Connecticut, Illinois, Kansas, and California. On bark or wood of conifers, widely distributed through northern and western U.S. (Maine to Wyoming, southwest to California and Colorado) and Canada (Alberta to Newfoundland).

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