

ADDITIONAL SPECIES OF CLADONIA TO GO SOMEWHERE IN THE "NATURAL" KEYS:

[Eventually I need to put all species descriptions of Cladonia in alphabetical order in a single document, but I don't have the heart (or stomach, or liver) for it at the moment, so I'm dumping things in this document in any old order, i.e., none].

Primary thallus squamulose, persistent, thin and fragile toward edges but quite thick (> 1 mm) toward base, to 2.5 cm long, to 8 mm wide, deeply incised, sublinear, longitudinally involute, the lobes sinuate, 1-2 mm wide, with infrequent accessory lobules at margins; upper side greenish to glaucescent greenish; lower side fibrillose, whitish, darkening toward base and central portions. Mature podetia not seen; tiny (ca. 50 µm) brown globose to subglobose structures (primary tissue) abundant on surface, a few lichenized stalks to 3 mm tall with very narrow scyphus-like formations (to 1 mm) seen. Apothecia brown, borne along margins of squamules. Pycnidia marginal or laminal on primary squamules. K+ yellow, KC+ yellow, P+ orange, UV-, containing atranorin, stictic and norstictic acids. Growing with bryophytes in deep shade, in damp area near stream, Idaho. C. andereggii Hammer

Primary squamules persistent, ascending, dense, 4-50 mm long, 1-5 mm broad, deeply incised (lobate to branched in the best development), light green to light yellowish green, surface scabrose; undersurface white, greenish white, gray at melanotic base, or entirely brown to purplish violet, ecorticate or commonly corticate, sometimes developing an algal layer, esorediate. Podetia rarely present, scattered, unbranched, 5-10 mm high, 0.5-1 mm wide, with irregular schyphi, 1.5-3 mm across, imperforate, flat, brown, not proliferating; margins dentate or squamulose; surface yellow green, color of upper part ± uniform, color of base ± the same as upper portions or somewhat melanotic; cortex present; surface very smooth or areolate; podetial squamules occasional, mostly perpendicular to surface; soredia and granules absent; podetial wall entire. Apothecia rare, on the cup margins, brown. Pycnidia on margins of schyphi, scarce. Thallus P+ red, K- or K+ pale yellow. Chemotype 1 (most common): fumarprotocetraric and protocetraric; chemotype 2: fumarprotocetraric and abundant atranorin (no protocetraric). Conviresic acid (Cph-1) and confumarprotocetraric (Cph-2) or other unidentified trace compounds accessory in both chemotypes. On mineral soil in rocky heath, or directly on rock, in full sun. Queen Charlotte Islands and southern coast of Alaska. Close to C. cervicornis and C. macrophyllodes. C. schofieldii Ahti & Brodo

Cladonia ecmocyna ssp. occidentalis Ahti

Primary squamules evanescent, rarely persistent, ascending or horizontal, dispersed, 1-3 mm long, 0.5-1.5 mm broad, crenulate, medium to grayish yellow-green, undersurface white, ecorticate, esorediate. Podetia arising from center of squamules, clustered, often dense, unbranched or very irregularly once or twice branched; axils closed; podetia 30-80 mm high, 0.5-1.6 mm wide, mostly lacking schyphi, or with infrequent, oblique (1.0-3.6 mm) schyphi; surface light to grayish yellow-green, dark yellow-brown at tips, or whitish to greenish gray, with bluish hue caused by pruinosity; necrotic base turning yellowish gray or pale gray, rarely blackened; cortex present; surface smooth to white-checked; podetial squamules absent or occasional, especially close to base; soredia and granules absent; podetial wall entire or rarely perforate. Apothecia often produced along the cup margins, dark brown. Pycnidia common, often solitary

at tips of podetia, pyriform, constricted at base. Thallus P+ red, K+ pale yellow, UV- or UV+ dull. Fumarprotocetraric and protocetraric, atranorin, and CpH-2. Usually on mossy rocks near sea level in lowland areas over most of its range, but in higher mountains towards the north, British Columbia to Oregon. Differs from typical subspecies in that podetia are thinner, pale glaucescent, tips becoming brownish violet, scyphae absent or narrow, podetial squamules absent, or sparse towards base. C. emocyna ssp. occidentalis Ahti

Primary squamules persistent, ascending or horizontal, dense, 1-2.5 mm long, 1-1.5 mm wide, crenulate, thick, pale green to yellowish green to olive-brown or yellowish brown, undersurface white, ecorticate, esorediate. Podetia clustered or dense, unbranched or 1-2 times branched, 5-7 mm high, 1.5-3 mm wide, with broad scyphi, 1.5-7 mm across, closed, proliferating from the margins; margins entire; surface yellow-green, olivaceous, or brown, \pm uniform, or becoming brown at tips; base \pm the same as upper portions; cortex present; surface areolate, or with rounded, peltate squamules; podetial squamules occasional or abundant, strongly decumbent or peltate; soredia and granules absent; podetial wall entire. Apothecia common, dark brown, 0.5-2.5 mm diam., on the cup margins, often on short thick stipes, strongly convex. Pycnidia often scarce, inconspicuous, on cup margins, black, sessile. Thallus P-, K-, UV+ weak blue-white. Sekikaic and homosekikaic. On mossy rocks in full sun. British Columbia, Washington; Great Lakes Region. Cladonia novochlorophaea (Sipman) Brodo & Ahti (syn. C. merochlorophaea v. novochlorophaea)

C. chlorophaea group:

Primary squamules persistent, ascending or horizontal, dispersed, 0.5-2 mm long, 0.4-1 mm broad, entire or crenulate, rounded or ligulate, gray green to pale yellow-green,; under surface white, ecorticate, esorediate. Podetia loose or scattered, unbranched, 10-47 mm high, 1-2.5 mm wide, with broad scyphi, 2-8 mm across, closed, proliferating from the center or margins of the cups, producing up to four or five tiers; margins entire or dentate; surface gray-green, yellow-green or brown to reddish brown, mottled, base strongly melanotic; cortex present or absent; areoles thick, convex, greenish or brownish when fresh, turning almost white in old podetia and standing out against the blackened, decorticate sterome; podetial squamules occasional, small, rounded entire to crenulate, perpendicular to surface, strongly decumbent or peltate; soredia granular, diffuse, on upper half of podetia or covering podetia except for base, present within cups; podetial wall entire. Apothecia rare, on the cup margins, brown, strongly convex to hemispherical, 1-2 mm diam. Pycnidia sparingly produced, at cup margins, at first globular, sessile to subsessile, later short-stalked, short cylindrical to pyriform, red-brown, constricted at base. Thallus P+ red, K-, UV+ bright blue-white or UV-. Chemotype 1: grayanic and often 4-O-methylgrayanic (with minor satellites) and always fumarprotocetraric acid with satellites; chemotype 2: 4-O-methylcryptochlorophaeic and fumarprotocetraric aggr.; chemotype 3: fumarprotocetraric aggr. (including protocetraric and CpH-2) alone. On mineral soil, wood or moss, wet or dry habitats, in full sun. Alaska to California. Cladonia albonigra Brodo & Ahti

Section Cladonia (near C. pyxidata):

Primary thallus squamulose, persistent, 7-12 mm long, 3-8 mm wide, entire to irregularly crenate-lobate to shallow subdigitately lobate; upper surface glaucescent green to olivaceous; lower surface white to ashy, darkening towards base, with veins appearing toward base, subfibrillose, flattened to involute, wrapping around podetia in some and sometimes appearing cyathiform, esorediate or with granular soredia-like structures forming beneath margins. Podetia from upper side of primary squamules, 3-10(-20) mm tall, unbranched, scyphus forming; cortex lacking from base, or with immediate basal area corticate; granulose, soft-appearing pillow-like structures (80-200 um in diam.) appearing immediately above base, giving rise to small peltate squamules and isidioid structures, rarely enlarging to form podetial squamules,; exposed inner layer impellucid, white to brownish, surface barely fibrillose; scyphi 1-8 mm diam., closed, shallow, frequently with punctiofrm opening to center of scyphus interior, abundantly covered with granulose soredia and peltate squamules, enlarging and deforming with age, margins producing numerous (5-23) digitate proliferations, apices of proliferations blunt or expanding to form scyphi, rarely giving rise to further proliferations. Apothecia often lacking, or occasionally numerous but immature, dark reddish brown. Pycnidia not seen. K+ yellow, KC-, P+ orange-red, containing atranorin, bourgeanic, fumarprotocetraric and protocetraric acids. California. On thin soil. C. pulvinella Hammer (treated earlier by Hammer & Ahti, 1990 as C. cf. humilis)

Section Cladonia (near C. verticillata):

Podetia rare, small, scyphus-forming, simple or sparingly branched; cortex continuous, esorediate; proliferations from scyphus centers common but poorly developed, usually in only one tier; interior cavity of branches not contiguous with interior cavity of podetia; scyphus interiors closed, without peltate squamules; base not blackened. Primary squamules persistent and common, thickly turf-like, ca. 5-10 mm long, without conspicuous raised bumps on upper sides; lower sides often with a gray-reddish tone, arachnoid. K+ yellow to dingy brown, KC+ yellowish, P+ red, UV-, containing fumarprotocetraric acid and atranorin. On stabilized sand dunes, California. C. firma (Nyl.) Nyl.

Section Cocciferae

PRIMARY THALLUS persistent, consisting of elongate, incised, suberect to imbricate, green squamules, 2-5 mm long and 0.5-1 mm wide; underside arachnoid, white, turning orange-yellow at the very base, occasionally an orange streak extending higher up; rhizomorphs of hypothallus orange, often clearly visible in the soil, extending several cm outward from the squamules.

PODETIA when mature (fertile) 0.5-1.5 cm tall, rather stout, 0.5-2 mm thick, sometimes absent and apothecia sessile on squamules, simple to sparingly branched; ascyphose but sometimes with scyphoid axils; **surface** greenish gray (rarely browning), rather smooth, areolate-corticate, or, more frequently, verruculose-granulose to heavily microsquamulose, esorediate; with few decorticate patches.

PYCNIDIA on basal squamules, sometimes on podetial microsquamules near tips of podetia; usually fairly large, 0.2-0.4 x 0.15-0.2 mm, ampullaceous, sessile to shortly stalked; containing red slime; conidia 8-10 x 1 um.

APOTHECIA very common, purple red, coalescent to form 2-5 mm wide compound discs, initially with tiny, often darker red, botryose ascogonial primordia (trichogynes visible) at tips of very young podetia; **spores** 11-12 x 5 um, simple, oblong.

CHEMISTRY: K+ yellow, P+ yellow. Thamnic and didymic acids as constant major secondary substances and inconstantly traces of usnic (rarely), decarboxylthamnic, condidymic and subdidymic acids.

ECOLOGY AND DISTRIBUTION: On bare to humus-covered soil, more rarely on rotting wood or tree bases, e.g. Pinus or Quercus, in submesophilous oak-pine woodlands at 1650-3880 m, but also collected in treeless mountain pastures. Often forming large, conspicuous patches of richly fertile podetia and well-developed cushions of squamules. Mexico (Chiapas, Chihuahua, Sinaloa, Durango, Jalisco, Mexico, Michoacan, Oaxaca, Puebla, Veracruz); Arizona (unpublished record)

NOTES: Distinguished from C. cristatella by its gray color due to absence or trace quantities of usnic acid, thamnic and didymic acids as the major substances. and thicker, less branched podetia. Podetia thicker than C. floerkeana, which in N. America contains barbatic rather than thamnic and didymic acids. Perhaps closest to C. abbreviatula, but larger and growing primarily on soil at higher, colder elevations, with different distribution.

Literature

Ahti, T. and L. Guzman-Davalos. 1998. Cladonia jaliscana, a new lichen species from Mexico. Lichenographia Thomsoniana 21-24.