

VI. Axils/cups + open;

Thallus richly branched, with few if any squamules;

Apothecia and pycnidia brown

Section Unciales

Differs from Cladina in that the surface of the podetium is corticate at least in part, and not arachnoid, and squamules are occasionally present, cups are occasionally present, and terminal pycnidia are rather sharp. Almost all are yellow, with usnic acid.

1. K+ yellow, containing atranorin plus unknowns, lacking usnic acid. 2

**1. K, lacking atranorin, KC+ yellow, usnic acid present.
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2. Branching mainly dichotomously; surface with scattered areoles over a loose cortex but not archnoid, pale gray, older parts dying; tips browned. Podetia grouped in swards. Kamtchatka. (C. wainii)

2. Branching mainly tetrachotomous but dichotomy also frequent; surface areolate corticate with rather wide white, arachnoid medullary interspaces. Alaska and NW Canada. (Chasmariae series Megaphyllae: C. thomsonii)

3. P+ red, containing fumarprotocetraric acid; podetia with branches nearly vertical; surface slightly dull arachnoid, areolate in places; inner cartilaginous layer continuous.

Primary thallus absent. Podetia forming compact tufts; compact at base and growing from the apices; branching irregularly by dichotomies or in whorls of 3 or 4, the branches ascending closely to each other; axils open or closed; podetial wall often split; 4080 mm tall, to 2 mm diam.; surface not at all glossy, somewhat arachnoid under a lens, pale gray tinged with yellowish or brownish tints, darker in older parts; cartilaginous layer forming a continuous hollow cylinder around the central canal and forming a series of irregular bulges projecting into this canal; this layer sharply delimited from outer medullary layer in which the algal clusters are located near the periphery in a single discontinuous layer covered by the cortex; few small squamules on the podetia, to 1 mm long and undivided or little lobed, roundead at apex; fertile branches larger than sterile ones and irregularly divided and split in upper part, thus perforate at the apices but without actual cups. Apothecia 12 mm diam., clustered or confluent around the apical perforations, pale to dark brown. Pycnidia at apices of podetia. K+ vaguely yellowish

turning to gray. Usnic acid, accessory ursolic acid. In lichen
heath tundras, tussock tundras, and over boulders in tundras.
Alaska to Hudson's Bay. C. alaskana

**3. P or P+ yellow, lacking fumarprotocetraric acid; podetia with
branches divaricate; surface glossy or matt but not arachnoid;
inner cartilaginous layer continuous or not.**

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4. Often with distinct but small cups; containing barbatic acid.

Cups often denticulate; cortex smooth or verruculose, inner
cartilaginous layer continuous; P. Primary thallus usually
disappearing; Podetia from older dead parts or podetial fragments
on ground, rarely from squamules; in groups or mats; marginal
ones often ± decumbent and tips then curved upwards; 15-20 mm
tall, to 1.5(3.5) mm diam., dichotomously or sympodially
branched, occasionally branching irregularly or from the margins
of the cups in fascicles, often cupless and cylindrical,
sometimes with narrow cups which flare rapidly, the interior
membrane closed, or open into the interior by one or several
small holes; margins of cups with tapering spinelike
proliferations and tips of sterile branches also tapering to
spinescent tips; axils closed or slightly perforated; esorediate;
cortex continuous or more commonly dispersed areolate, the
areoles little raised to rarely verruculose; surface shiny or
dull, impellucid, yellowish or yellowish glaucescent to
glaucescent or olivegreen; inner cartilaginous part of medulla
continuous, not sharply delimited from outer part. Apothecia
solitary or clustered at tips of podetia, midsized, to 2(3.5)
mm diam., brown or yellowish brown or reddish brown. Usnic and
barbatic. On soil rich in humus, in tundras, and in bogs among
mosses and other Cladonias, sometimes forming spectacular
"polsters" (cushions) on rock outcrops in boreal forests. Alaska
to Greenland, S to New York and Great Lakes
area. C. amaurocraea

4. Lacking cups; lacking barbatic acid.

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**5. Podetia silvery gray to creamy white, ecorticate, matt, not
glossy.** (see C. pachycladodes Vainio, in the C.
boryi group, below)

**5. Podetia greenish to yellowish, not white; shiny or
matt.**

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**6. Podetia pale yellowishgreen to brownishgreen with more or
less distinct greenish areoles, axillary perforations common,
inner cartilaginous layer continuous, inner podetial surface**

smooth, cortex glossy. 7

6. Podetia yellowish gray to pale yellowish green, axillary perforations absent on sterile plants, present on fertile, inner cartilaginous layer of irregular strands of coalescent hyphae; cortex matt (except in C. perforata, C. psoromica and C. dimorphoclada). 8

7. Lacking hypothamnolic acid; with accessory squamatic acid, UV+ or UV. Primary thallus usually disappearing; podetia appearing to arise from remains of dead podetia or fragments of other podetia, the base dying and the growth continuing from the apices; 2080(110) mm tall and 11.5(4) mm diam., subcylindrical, cupless, dilated at axils, dichotomously or sympodially or verticillately branched, repeatedly, the whole forming dense mats or tufts; ultimate branchlets spinelike and in small whorls around open perforations; most axils usually perforate; inner cartilaginous layer continuous; inner surface smooth; outer surface smooth and shiny, sometimes with the greenish areoles projecting slightly, light green or deep or pale yellowish; very brittle. Apothecia to 0.8 mm diam., brown, at apices in usually a radiate or sympyrmose arrangement of the branchlets. Rarely with accessory substance A. On sandy soil in open and among mosses in bogs and tundras, arctic to temperate, Alaska to Greenland, S to Ga., Ark., Wash. C. uncialis

7. Containing hypothamnolic acid; UV. Primary thallus unknown. Podetia in tufts or mats, 3060 mm tall, 14 mm diam., cupless, sympodially branched with upper branches whorled; branchlets short, dichotomous or in whorls, spinescent; axils usually perforate; surface smooth, straw colored to yellowish; inner cartilaginous layer continuous, 4050 μ m thick; outer cortex 3060 μ m thick,. Apothecia unknown. On soils rich in humus, especially in open stands of spruce.

Alaska. C. pseudostellata

8. P+ yellow (baeomycesic acid), or P; K, KC+ yellowish, UV+ white, containing squamatic, usnic and accessory baeomycesic acids; podetia with cartilaginous strands in single layer around central canal. Podetia delicate, in lax, tangled, recumbent colonies. Cortex well developed. Primary squamules usually soon disappearing, in some cases in small clusters; to 1 mm long and 0.5 mm broad, simple or sparingly lobed with round apices, occasionally a few similar squamules on base of podetia. Podetia entirely prostrate in flat colonies, or prostrate at periphery of elevated colonies, ascending to erect in center, to 50 mm tall and 0.5-0.6 mm diam.; forkings far apart at base and long sympodia

developed there; branches towards apex closer together and with dichotomies and whorls both present, the sympodia less evident; majority of axils closed, but perforate axils present in many of the whorls; cupless; creamy yellow with greenish tinge, faintly lustrous, in some parts the greenish areoles separated by paler bands and slightly raised, otherwise the surface smooth. Apothecia small, dark brown to black, single or clustered at tips of ultimate branchlets. On sandy soil, N.C. to Fla. C. subsetacea Robbins ex Evans
8 P, lacking baecomycetic acid; podetia with cartilaginous strands in several series and approaching outer layer. 9

9. Surface glossy, uniform and without greenish areoles of C. uncialis; cortex well developed, distinctly yellowish; most axils gaping perforate; KC+ yellow, P, UV+ white, containing squamatic and usnic acids. Podetia coarse, erect, hollow, perforate. Primary thallus unknown. Podetia in intricate tufts; branching by successive dichotomies and whorls to give rise to complex branch systems, sometimes the branching unequal and forming sympodia, the whorls mainly of threes; axils perforate with circular openings, the larger openings 11.5 mm broad, the apical branchlets short and dividing into 24 very short ultimate branchlets which may or may not show a yellowish brown pigmentation at tips, 4060 mm tall and larger axes 36 mm diam.; pale yellowish gray, ± glossy; surface appearing uniform. Apothecia and pycnidia unknown. On sandy soil. Fla, very rare (Federally listed and protected; do not collect!). C. perforata Evans

9. Surface usually matt (except in C. psoromica and C. _____); perforate axils less common but demonstrable; containing only usnic acid. (C. boryi group; key after Ahti, 1973). 10

10. Podetia usually robust, 37(10) mm thick, rather blunt; branching predominantly polytomous but often very irregular, with cuplike expansions common. 11

10. Podetia usually slender (fertile podetia sometimes robust), 0.52 mm thick, with thin, pointed tips; branching predominantly dichotomous; cuplike expansions absent or infrequent; in gross morphology resembling C. uncialis. 13

11. Extreme tips of podetia P+ yellow (psoromic acid), in herbarium podetia gradually turning distinctly yellow. Inner surface of podetial wall with distinct longitudinal strands besides thinner floccose hyphae; branching more regular, dichotomy common; occasionally with well developed cups. Podetia

branching divaricately, anisotomically trichotomous or dichotomous, sometimes polytomous, 410 cm tall, 25(8) mm thick, cupless or with cups 14 mm broad; axils open or closed; surface yellowgray to yellow, smooth; inner wall with \pm loosely reticulate shallow network of strands; medulla loose; cartilaginous strands rather numerous and well developed. In fell fields and over boulders and on soils. Alaska and British Columbia.C. nipponica

11. Extreme tips of podetia P (or very rarely P+ yellow), in herbarium podetia remaining greenish gray or yellowish gray.
 Eastern N. America. 12

12. Podetia ecorticate; inner surface of podetial wall covered with very loose and thick network of cartilaginous strands and thin hyphae; interior of wall lacunose, with very few scattered cartilaginous strands; cups common; no thin sharp pointed branchlets; no squamatic acid (psoromic acid very rarely present), UV. Primary squamules unknown. Podetia appearing to proliferate from old podetia or from fragments of other podetia; dying at base and growing from apices, 50120 mm tall, 37 mm diam., rarely less, usually expanding toward apices, thickened at axils; cupless or with indistinct cups caused by whorls of branches; branching irregularly, mainly by dichotomies or polytomies, in well developed material the tips expanding and the expanded portion surrounded by a whorl of suberect or divergent branchlets forming a pseudocup with an interior membrane that may be perforate or not, or cribose (sieve like), the branchlets may be further subdivided into very tiny branchlets surrounding minute cups; the apical part usually brown; axils perforate or not; whole podetium tending to becoming cribose with age; ashy gray to yellowish or greenish becoming dark gray or blackish with age, dull, smooth or more usually verruculose. Apothecia and pycnidia, at tips of branchlets, dark brown to brownish black; apothecia small. K, KC+ yellowish, P. On sand or sandy soil. Labrador to New Jersey; Alaska. [Note: Cladina spp. may also key out here].C. boryi

12. Podetia corticate; inner surface of podetial wall almost smooth, slightly tomentose, with indistinct or shallow reticulation of cartilaginous strands; interior of wall of firm tissue with thick cartilaginous strands; cups absent; sharp pointed, thin branchlets common at inflated tips of podetia; contains squamatic acid; medulla UV+ white. Primary thallus unknown. Podetia growing in tufts and mats, 2060 mm tall, to 4 mm diam.; branching, somewhat entangled, the branches turgescerent, dichotomous or polytomous especially in younger parts, also with irregular short branchlets, the tips becoming

inflated and with numerous short branchlets which may be simple or subdivided and widely divergent, occasionally forming whorls, sometimes the whorls resembling shallow cups; axils sometimes perforate, but perforations rather infrequent and often confined to whorls of branchlets; tips blunt or pointed; pale, sometimes with a vague bloom, grayish green or pale yellowish, matt, smooth with areoles scarcely or not at all projecting. Apothecia and pycnidia at tips of branchlets, pale waxy yellow. On sandy soil and on earth over rock. Maine to Florida, west to Wisconsin, Missouri and Arkansas.C. caroliniana

13. Podetia silvery gray to creamy white, ecorticate, matt, not glossy, rugulose at base; inner cartilaginous layer composed of scattered longitudinal strands; outer layer of podetium composed of noncoalescent hyphae proportionally thicker than in the other Unciales (200400 μ m thick). Containing usnic acid only. Primary thallus unknown. Podetia growing in depressed mats or \pm expanded tufts and densely crowded; branching abundantly and irregularly, 2550 mm tall, to 2 mm diam.; lower part branching sympodially, the upper part forking widely; sometimes with whorls of 35 members, more often in pairs; axils closed or open; youngest parts sometimes with pink tint, older parts darkened. Apothecia in clusters, sometimes in irregular whorls around an apical perforation, to 0.3 mm diam., flat or slightly convex, yellowish brown. On sandy soil or sand. Eastern, south to Fla. [Note: Cladina spp. will also key out here] SE U.S., to Fla.....C. pachycladodes Vainio

13. Podetia usually green to greenishgray; corticate or ecorticate but outer surface more compact; podetial wall thinner (100200 μ m), smoother at base, cartilaginous strands in continuous or subcontinuous layer. Podetia P; with rather distinct cortex (sometimes discontinuous); cartilaginous layer not fully continuous, thinner than the rest of podetial wall.

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14. Podetia usually very thin (under 1 mm); Growing in low (12 cm), more or less depressed mats; branching often very irregular, axils often slightly inflated. 15

14. Podetia thicker (14 mm); erect, 48 cm tall; branching fairly regular; inner surface of podetial wall with flat, embedded cartilaginous strands. Primary thallus unknown. Podetia pale greenish gray to yellowish gray, 512 cm tall, to 3 mm thick; branching sparse, isotomic dichotomous, the branches ascending, subulate, smooth, slightly glossy; inner surface smooth with narrow cracks exposing floccose hyphae; inner cartilaginous strands forming continuous uneven layer around central canal,

some strands scattered in medulla; cups usually lacking, to 3 mm broad; axils closed or perforate. Apothecia dark brown, peltate. With abundant "diterpene" crystals on tips. Mainly in alpine tundras in moist sites. North Pacific coast (Alaska and northern British Columbia).C. kanewskii

15. Cortex fairly distinct (but poorly developed?), podetial walls thin (ca. 100180 μ m); even the finest branchlets are clearly hollow rather than solid; inner surface of podetial wall lined with somewhat bulging, \pm continuous, cartilaginous strands. Podetia greenish. Branches often tipped with subcircular cuplike expansions bordered by whorls of radiating branches. Podetia \pm widening upwards, sometimes irregularly inflated, usually 12 mm wide, but may be up to 34 mm or more; without adventive outgrowths, except sometimes towards tips. Thallus P, or rarely P+ yellow, with psoromic acid ("C. psoromica Dey", from N. Carolina, regarded by Huovinen & Ahti, 1986 as a "local chemical race" morphologically indistinguishable from the typical race; the cortex is glossy according to Dey). Eastern U.S., south to Fla.C. dimorphoclada Robbins

15. Cortex absent, surface of podetia somewhat compact to arachnoid; podetial walls thicker (200250 μ m). Eastern Canada. [Note: Cladina spp. will also key out here.]C. labradorica