

IIC. **Thallus (usually?) P+ redorange**
(fumarprotocetraric acid);

Openings in axils often indistinct or irregularly present
Sect. Cladonia: "Furcatae Group"

VIIC1. Podetia sorediate; containing accessory ursolic acid.

1. Podetia microsquamulose, appearing as though coarsely granulose sorediate. (C. scabriuscula; also see C. macroptera?)

1. Podetia without microsquamules, finely farinose sorediate.
Podetia commonly widebranching, surface corticate, apex sorediate, podetial squamules few. Northeastern. P+ red; containing fumarprotocetraric acid and accessory ursolic acid; podetia commonly widebranching, surface corticate, apex sorediate, podetial squamules few (towards base) or absent, the soredia unaccompanied by minute squamules. Podetia sparingly irregularly branched to furcate, with open axils, light mineral gray, 310 cm tall; soredia farinose, diffuse over much of the surface. Primary squamules small, dissected. Apothecia rare, dark brown. Common on soil and mossy rocks in pastures and along roadsides. Northeastern (Great Lakes area to New England and Appalachians).C. farinacea

VIIC2. Podetia esorediate

1. Podetia cylindrical, slender, more or less branched, the branches frequently elongate and intertangled and forming complex branch systems, usually cupless (if podetia showing some cups, with multiple, sievelike membranes, see C. multiformis f. subascypha); apices acute, obtuse, or attenuate; axils usually perforate and occasionally dilated. (C. rangiformis group; key partly after Ammann (unpublished?). 2

1. Podetia funnel or cupshaped, or cupless, simple or sparingly shortbranched; apices attenuate, truncate, or cupforming; axils dilated, often cupforming. 5

2. With microsquamules. Podetia more or less branched, branches elongate and intertangled; K, P+ red; containing fumarprotocetraric acid and accessory ursolic acid. Podetia more or less branched, branches elongate and intertangled; K, P+ red; containing fumarprotocetraric and protocetraric acids, substance Cph₂, and accessory ursolic acid. Primary squamules ca. 2 x 3 mm, soon disappearing. Podetia 510(15) cm tall, 12 mm thick, grayish or greenish white to brown, cupless, relatively sparsely

branched, mainly dichotomous; tips subulate; axils open; surface areolate corticate; cortex smooth, thin, scaling off to form podetial squamules, moderately richly squamules (squamules 23 mm wide, to 4 mm long); upper parts incompletely corticate, microsquamulose to scarcely granulose or scabrose, without true soredia (but microsquamules appearing soredialike). Apothecia to 0.7 mm diam. Usually on damp soil, sometimes also on rotten logs and stumps or thin soil over rocks, in open habitats or in woods (especially disturbed forests). Alaska to Greenland, S to California in the west, to Great Lakes area and Pennsylvania in the east. C. scabriuscula

2. Without microsquamules; often with large squamules. 3

3. Similar to C. scabriuscula but more robust, producing conspicuously large, deeply laciniate podetial squamules; stereome thick, horny. C. macroptera

3. Not as above. 4

4. Podetia K+ yellow (atranorin). Rarely with bourgeanic acid (= Evans substance H). Cartilaginous layer (inner medulla) thick; podetia flexible and robust when dry. Podetia K+ yellow (atranorin), P+ orangered (fumarprotocetraric and protocetraric). Podetia cupless, cylindrical, branching repeatedly by dichotomies or whorls, the axils closed or open; cortex well developed and continuous in younger parts, becoming areolate and the areoles standing out as white spots in a dark matrix on old parts, the paleness due to masses of hyphae rupturing the cortex and becoming exposed, and these spots are associated with calcium oxalate deposition in the outer medulla; squamules scarce; lateral spines common; apices of sterile branches sharp-pointed, the basal parts wrinkled and rimose; glaucescent to olive green or browned in strong light. Primary squamules soon disappearing, midsized, irregularly crenate, to incised-crenate, ascending, flat; upper side glaucescent to pale glaucescent; underside white. Apothecia brown, on tips of podetia or branches. Pycnidia on tips. On dry soil, preferably calcareous, or perhaps sandy. Northeastern (Massachusetts, Connecticut and New York); also reported from Mexico and Jamaica. C. furcata subsp. subrangiformis

4. Podetia K (no atranorin). Podetia cupless; branches laterally fissured in some forms, but usually not. Very variable, ranging from dark brown podetia without squamules to greenish gray podetia with many squamules. Pycnidia ovate. Primary squamules usually disappearing, midsized, 25 mm long and broad, irregularly or subdigitately lobed, the lobes broadening slightly

toward tips, crenate, ascending, flat; upper side glaucescent to olive green or brownish green; underside white; esorediate. Podetia dying at base and growing from apices, 1580(150) mm tall, to 2 mm diam., cylindrical or widening toward the joints; branching repeatedly by isotomic dichotomies or sympodial, sometimes with the branches, especially towards the tips, in whorls, corymbose, and sometimes almost forming cups of branches, the branching usually at quite a wide angle and the podetia entangled to form loose mats; axils commonly widening and perforated or long splitting; cortex continuous or smoothly areolate, the areoles when dispersed separated by whitish lines or bands; with or without squamules; shining or dull, glaucescent to whitish glaucescent to reddish brown or quite dark brown in sun forms, sometimes mottled, the dying parts not becoming white spotted but merely blackening. Apothecia small, at tips of branches or larger than the branchlets and almost spherical, usually dark brown or reddish brown. Pycnidia at tips of branchlets and on tops of primary squamules. On acidic earth, old road banks, mounds of earth from overturned trees, on earth over rocks, usually in fields or open woods but also in quite shaded woods. Boreal temperate, widespread throughout much of N. America south of the tree line. Rare in central states, more common in the east and west. C. furcata subsp. furcata

5. Podetia not forming definite cups. Apothecia on short (under 1 cm tall) translucent podetia or sessile on finely incised or crenate primary squamules. P+ red, containing fumarprotocetraric acid; apothecia on very tiny (to 1 mm tall) translucent podetia or sessile on finely incised or crenate primary squamules. Eastern U.S., except coastal plain. Primary squamules 0.3-0.5 cm long, incised, forming a dense mat. Apothecia usually common, dark brown, sometimes lacking. Common on rotting logs and on mosses over rocks in shady woods. Eastern. C. caespiticia

5. Podetia forming fairly definite cups, with interior partly closed by lacerate or punctured membrane; cups sometimes proliferate; containing fumarprotocetraric acid plus accessory ursolic acid; K. 6

6. Ultimate proliferations irregularly cylindrical. Primary squamules persistent or disappearing, middlesized, 14 mm long, to 0.5 mm broad, digitately lobed, ascending, flat to involute; upper side glaucescent to olive green or brownish; lower side white, darkening towards base, esorediate. Podetia to 45 mm tall and ca. 12 mm diam.; cups flaring rapidly, the margins often

proliferate, the proliferations sometimes developing into secondary ranks of cups; inside of cups with sievelike perforated membrane. Perforations usually radially lengthened; cortex subcontinuous to slightly contiguous areolate; esorediate; squamulose or nt; surface glaucescent or varying towards brown or reddish brown. Apothecia on apices of branches or proliferations, sometimes subcorymbosely arranged, dark brown. K, KC, P+ red. On soil, among mosses, and on rotting logs, in moist habitats. Mostly in the boreal forest, barely entering the tundra, Northwest Territories south to Pennsylvania, Iowa, Colorado and Washington.

C. multiformis

6. Ultimate proliferations of podetia cupforming. Cups small to minute, often poorly developed. Podetia relatively tall, 10-30 mm, irregularly cylindrical, cupless, often \pm fissured; branchless or the upper parts with branches which may be horizontal or ascending, the axils closed; cortex persistent, smooth or \pm squamulose, sometimes becoming areolate with the areoles separated by ecorticate bands; upper part of podetia becoming dispersed corticate and passing into minute to small subpeltate squamules, not sorediate or granulose; surface glaucescent to yellowish or greenish. Basal squamules persistent, small to medium sized, rarely enlarged, erect to recurved; margins entire or with round or linear lobes, or incised; upper side greenish to yellowish green; underside white. Apothecia on tips of branches, light to dark brown or black, minute to medium sized, single or conglomerate. Pycnidia on tips of branches. K, KV, P+ red (fumarprotocetraric). On rich humus and earth in open woods, and on rotten wood. Massachusetts South to Fla along the coastal plain. C. simulata Robbins.