

KEY I. TERRICOLOUS/MUSCICOLOUS
Bright Green-Yellow to Yellow or Orange;

After McCune, 1985

I-A Bright yellow to orange,
K+ cinnamon-brown, orange-brown, or purple;
Sorediate or not

1. Thallus K+ cinnamon-brown or orange-brown, dispersed to almost continuous, consisting of yolk-yellow, heaped or branched granules, which sometimes develop into deeply concave soralia to 1 mm broad and concolorous with thallus; lobes very short, rounded and lifting from the substrate. On soil, mosses, and acid rocks. Arctic; Rocky Mountains; in Montana and Idaho found at 1100-1700 m. Lecanora reagens Norm.

1. Thallus K+ purple. 2

2. Soredia present on upraised thallus margins or laminal; thallus unlobed except in the largest specimens. Widely distributed in North America; misidentified as C. cirrochroa in the older N. American literature. Caloplaca tominii Sav.

2. Soredia absent; thallus sometimes lobed. Often fertile; spores 1-celled. Widespread on soil in exposed habitats in western and arctic N. America. 3

3. Marginal lobes 1-2 mm long and often \pm equally wide; schizidia absent. Fulgensia desertorum

3. Marginal lobes not or only weakly differentiated; schizidia often present. Fulgensia bracteata

I-B. Terricolous/muscicolous

**Thallus vibrant lemon-yellow to yellow-green, K-
Weakly to strongly longwave UV+ (rhizocarpic acid)**

1. Thallus usually extensive, completely leprose, containing rhizocarpic and vulpinic acids. 2

1. Thallus usually in small patches, sometimes dissolving into soredia. On acid peat or amongst mosses. Usually subalpine to alpine, western and arctic. 3

2. Without atranorin. Common and widespread on acidic soil. Chaenotheca furfuracea

2. With atranorin (use TLC or microcrystal tests, not K test). Usually on rock; reported from soil in Michigan. Psilolecia lucida

3. Thallus consisting of scattered to contiguous small, (to 0.5 mm), flat to slightly convex granules or rounded verrucae, which are frequently very thin and fragile, often soon dissolving or erupting into soredia. Brilliant yellowish green. Often parasitic on Baeomyces on acid soils and weathered lime-free rock. Arthrorhaphis citrinella

3. Thallus of larger (to over 1.0 mm), bullate-highly convex, composite squamules or granules, to 1 mm or more wide (but sometimes abraded), usually esorediate. Brilliant yellowish green. On acid soil or decaying mosses, often in crevices on \pm vertical siliceous rock faces. A. alpina

I-C. Terricolous/Muscicolous

**Pale to deep yellow, K-, sometimes bright yellow,
Always longwave UV-, without rhizocarpic acid**

1. Thallus pale yellow, containing usnic acid. (some Lecanora spp. normally found on other substrates; depauperate or juvenile specimens of Squamarina and Lecanora subg. Placodium may also key here)

1. Thallus yellow to deep yellow; usnic acid lacking. 2

2. Thallus entirely leprose and non-effigurate. Containing calycin and vulpinic acid. Usually on rock. Chrysothrix chlorina

2. Thallus granular; margins sometimes becoming effigurate-crenate; color yellow, dull yellow, or deep yellow. Candelariella (especially C. terrigena and C. placodizans, and perhaps C. vitellina or others normally found on other substrates)

KEY II
Isidiate or coralloid-papillate, white or grayish
Terricolous/muscicolous

After Laundon

1. Soredia present, C+ red (orange?). [If soredia C-, see Leprocaulon] 2

1. Soredia absent. 3

2. Thallus of globose papillae or \pm closely crowded, \pm rounded warts, which mostly break up into somewhat raised, rounded, often almost spherical, whitish (ochre when old) soralia. Soralia \pm stalked; soredia pulverulent granular. Thallus P+ strongly yellow-orange. Arctic. Pertusaria geminipara

2. Thallus coralloid, without globose papillae. Soralia not stalked; soredia granular, usually yellowish gray. On acid peat banks. Ochrolechia androgyna s. lato

3. Thallus C+ red (red-orange?), K+ yellow. Thallus without true isidia, but with papillae or spinulose or coralloid structures; several variations. Thallus P-. On mosses or other vegetation, arctic-alpine. Ochrolechia frigida

3. Thallus C-, K+ yellow to orange-brown. 4

4. Papillae ca. 0.5 mm diam., gray. Pertusaria oculata

4. Papillae ca. 1 mm diam., white. Pertusaria dactylina

ADD:

Thallus truly isidiate, with thick, knobby isidia 0.1-0.3 mm across and up to 1.2 mm long; prothallus often conspicuous, paler than thallus. Medulla C-; cortex C+ red? Appalachian-Great Lakes region. Ochrolechia yasudae

Thallus with cephalodia, C+ rose, K+ yellow, P-. Isidia terete, simple, 0.1 mm diam., subglobose, often crowded centrally. Soralia absent. Usually on rock, but rarely on sandy soil. (Placopsis cribellans)

ADD? (not actually isidiate or papillate, but might be interpreted as such):

Thallus composed of minute ecorticate pseudopodetia, whitish, grayish or greenish, sometimes appearing sorediate; C-; often P+ yellow or red. Containing atranorin (but often K-). Leprocaulon spp.

Thallus brownish olive to ashy olive, verruculose, becoming finely branched to coralloid, the branches \pm erect. On mosses, humus or plant remains, Arctic. Lopadium coralloideum

KEY III. TERRICOLOUS/MUSCICOLOUS

Thallus sorediate or finely granular; not bright yellow, orange or red

III-A. Entirely Leprose or finely granular.

Lepraria

III-B. Not Leprose.
III-B-1. Soredia and medulla C+ red or pink

After Laundon, and Wirth 1995

1. Thallus partly subsquamulose or effigurate, whitish gray, irregular, usually in small patches. Trapeliopsis aff. wallrothii

1. Thallus entirely crustose. 2

2a. Thallus medium gray to blue-gray, C+ red, P+ red, consisting of 0.1-0.4 mm thick granules, with argopsin and gyrophoric acid. Algae micareoid, c. 4-7 um diam.

Micarea

2a. Thallus mostly paler. Algae larger. 2b

2b. Soredia farinose (to minutely granular), yellowish green or greenish gray; thallus rather thin, whitish pale gray, gray-green, olivaceous or brownish, inconspicuously areolate or verrucose-granular. 3

2b. Soredia granular, yellowish-gray. Thallus whitish gray or gray, thick. Thallus plane or often composed of convex granules or irregular verrucae. Chiefly on acid peat banks. Ochrolechia androgyna s. lato

3. Thallus fleck-wise orange to rust colored, there K+ violet-red. Thallus extensive, light greenish gray or gray green, producing a single coherent, granular to warty crust (granules c. 0.05-0.2 mm), in places with greenish white to light greenish, convex, soon coalescing soralia, C+ red, P-; soralia 18-25 um diam. With gyrophoric acid. Trapeliopsis pseudogranulosa

3. Thallus not fleck-wise orange to rust colored. 4

4. Thallus pale gray to gray-green, areolate; marginal areoles ± flattened and effigurate; soralia at first discrete, farinose to finely granular, gray-green to dark green. Usually on wood, rarely on plant debris. Trapeliopsis flexuosa

4. Thallus whitish to pale gray or sometimes ± pinkish, usually composed of rounded to warted granules; marginal areoles usually neither flattened nor effigurate; soralia ± irregular, minutely granular, whitish to cream-yellow, rarely tinged greenish gray. Usually on plant debris or rotted wood. Trapeliopsis granulosa

ADD:

Thallus of globose papillae or ± closely crowded, ± rounded warts, which mostly break up into somewhat raised, rounded, often almost spherical, whitish (ochre when old) soralia. Soralia ± stalked; soredia pulverulent granular. Thallus P+ strongly yellow-orange. Arctic. Pertusaria geminipara

Thallus with cephalodia, C+ rose or red, K- or K+ yellowish, P+ red or P-; with soredia or isidia. Usually on rock, occasionally on mosses or sandy soil, arctic to temperate. Placopsis gelida

Soralia P+ pale red-orange (unknown substance), but rest of thallus P-; thallus (at least medulla) K+ yellow, C+ red or at least KC+ red, containing gyrophoric acid. Thallus white or ashy white to bluish gray, thin, coherent to scattered warty-granular, generally of irregularly rounded large warts provided with finely granular soralia which sometimes cover the thallus. On mosses and humus, sometimes soil, arctic, south to Nova Scotia and Washington. Ochrolechia inaequatula

Thallus crustose to small squamules, squamules to 1 mm across, with diffuse greenish to whitish soralia, at times with small, to 0.2 mm wide blastidia (blasting out of the upper surface part of the cortex. Stictic acid, \pm norstictic acid, \pm gyrophoric acid. Baeomyces rufus

III-C. Soredia and medulla C- or C+ yellowish.

1. **Thallus olivaceous green**, thick, continuous, verrucose to rimose-areolate; soralia large, convex, becoming confluent over much of the thallus; soredia coarse. Usually on bryophytes at base of trees. Lecidea epixanthoidiza

1. **Thallus whitish or grayish**; soralia greenish yellow; soredia coarse. On bryophytes at base of trees. Bacidia epixanthoides

ADD:

Thallus thin, indefinite, coherent, dirty loam colored to greenish gray, when fresh somewhat slimy. Soralia pale greenish, soon irregular and coalescing. Trapeliopsis gelatinosa

Thallus, including soralia, C-, P-. Usually fertile. Not definitely known from N. America.
(Ochrolechia alboflavescens)

ADD?:

Thallus composed of minute ecorticate pseudopodetia, whitish, grayish or greenish, sometimes appearing sorediate; C-; often P+ yellow or red. Containing atranorin (but often K-).
Leprocaulon spp.

KEY IV. TERRICOLOUS/MUSCICOLOUS
With neither Isidia nor Soredia; Not Yellow, Orange or Red,

After Laundon, and Wirth 1995

1. **Thallus dark, olive, yellow-green, brown, or black.** 2
1. **Thallus grayish, whitish, or greenish.** 3
 2. **Thallus dark olive or yellowish green**, consisting of discrete, round, translucent, spherical granules, ca. 0.05-0.2 mm diameter. Growing on mosses, wood and old plant remains in moist habitats. [*O. umbellifera* has thallus when fresh of shiny, dark green plump globules with *Coccomyxa* algae, on moist moss covered soil, plant remains, or peat]. *Omphalina* spp.
 2. **Thallus black or dark brown (greenish when wet; in shade light greenish brown).** Thallus warty (C-) or of very small elongated to coralloid granules (C+ red, usually only seen on abraded thalli or in microscopic squashed preparations); granules 25-150 μ m. On acid substrates. On acid peat. *Placynthiella* (e.g., *P. uliginosa*)
3. **Thallus partly subsquamulose**, brownish or greenish, plane, forming an extensive continuous crust. *Baeomyces rufus* f. *subsquamulosa*
3. **Thallus wholly crustose, without subsquamules.** 4
 4. **Thallus subpruinose**, forming an uneven brownish or greenish continuous crust. Thallus crustose to small squamulose, squamules to 1 mm across. Stictic acid, \pm norstictic acid, \pm gyrophoric acid. On acid earth. *Baeomyces rufus*
 4. **Thallus not subpruinose**, but with convex granules. 5
5. **Thallus C+ orange to red.** 5a
5. **Thallus C- to C+ yellowish.** 5b
5. **Thallus with a smoothish crust with convex granules on the surface.** Crust white or gray. P+ yellow or orange. 6
5. **Thallus composed entirely of globular convex granules.** 7
 6. **Granules often lighter than the thallus. Containing baeomycesic acid.** Thallus granular to verruculose, K+ yellow. Granules smooth and convex, white. On acid earth and acid peat. *Baeomyces roseus*
 6. **Thallus granules concolorous with rest of thallus. Containing thamnolic and perlatolic acids.** Thallus pale green, glaucous green, greenish gray or whitish gray; granules often irregular in shape and distribution. Thallus rather soft; granules compacted, forming a continuous very uneven crust. Photobiont cells 6-10 x 3.5-5 μ m. Thallus K+ yellow or orange, KC+ yellow, P+ yellow or orange, UV+ glaucous. On damp ground, acid peat and rotted wood, usually in moist coniferous forests. *Icmadophila ericetorum*
7. **Granules often scattered, white, yellowish-white or brownish white**, convex, rarely plane.

Thallus P-, K+ yellow (atranorin). On acid peat. Pycnothelia papillaria

7. Granules in coralloid groups, grayish or whitish gray, globular. Thallus often darker in the center, C+ red-orange (mostly non persistent), P+ citron yellow, often rounded rosetted, 0.08-0.2 mm thick granules. Alecortic and angardianic acids. On mosses and lichens. Lepraria neglecta

ADD:

Thallus of convex (to hemispherical) areoles, whitish to light gray, often extensive on acid soil banks or open slopes, P+ yellow, K+ yellow, C-. Atranorin, baecomycesic acid, \pm squamatic acid, barbatic acid. Dibaeis baecomyces

Thallus pale olive green to \pm yellow-green or fawn brown (sometimes dark green in narrow crevices), granular-isidiate, rarely thin and rimose, mostly thick, warted and coarsely granular, with short, coralloid, isidium-like protuberances, or extreme morphs with soredia-like, \pm loose granules 40-80 μ m diam. Photobiont cells 5-10 μ m. Usually on rock, but rarely on soil or vegetable matter, supralittoral zone of the seashore. Bacidia scopulicola

Thallus light greenish brown to greenish, of spherical to elongated or coralloid granules, granules 25-150(200) x 25-50 μ m, C+ (at least in squash preparations) red, K-. Placynthiella icmalea

ADD?:

C reaction often weak or fleeting. Ochrolechia frigida

Thallus K+ yellow, C-, containing atranorin. Arctic-alpine. Lecanora epibryon

Thallus very thick (to 3 mm or more), granular-verrucose, tartareous, often with numerous irregular warts forming an uneven, corrugate crust, sometimes with spines or branches; sometimes with a paler zoned margin and a pale prothallus, pale to dark gray. Medulla P-, K-, C+ orange-red, KC+ red, containing gyrophoric \pm lecanoric acids. Probably not correctly reported for N. America. Ochrolechia tartarea

Thallus whitish to yellowish white or gray-green, smooth or granular-verrucose or minutely squamulose, P-, K+ yellow, KC+ yellow, C-, containing atranorin and chloratranorin. Encrusting mosses and low-growing plants, occasionally on soil. Arctic, S to Washington. Usually fertile. Brigantiaea fuscolutea

Usually fertile and usually on bark or wood. Cliostomum griffithii

Thallus composed of minute ecorticate pseudopodetia, whitish, grayish or greenish, sometimes appearing sorediate; C-; often P+ yellow or red. Containing atranorin (but often K-). Leprocaulon spp.

Thallus squamulose, glaucous gray to pale gray or greenish gray; squamules 1-2 mm diam.,

shell- or ear-like, concentrically ridged with raised paler margins, scattered or aggregated to form colonies; soredia often present on surface and margins, green or concolorous; lower surface white tomentose. On bryophytes or other lichens. Normandina pulchella

..... Lecidoma demissum

..... Catapyrenium spp.

..... Psora spp.

..... Toninia spp.

..... Solenopsora spp.

KEY V. TERRICOLOUS/MUSCICOLOUS

Thallus whitish. Alpine

After McCune (199_)

1. Thallus minutely fruticose. 2
1. Thallus crustose. 4
 2. Thallus corticate, C+ red, K-, P-. Thallus warty sometimes becoming coralloid, usually with spiny extensions. Ochrolechia frigida
 2. Thallus ecorticate, C-, K+ yellow or deep yellow, P+ yellow or orange. 3
3. Thallus P+ deep yellow turning orange (thamnolic acid and atranorin); phyllocladia poorly developed and blending onto pseudopodetia; widespread, common in many open habitats. Leprocaulon subalbicans
3. Thallus P+ pale yellow or P- (atranorin and rangiformic acid); phyllocladia and pseudopodetia well developed and differentiated; uncommon. Leprocaulon gracilescens
 4. Thallus P+ yellow, deep yellow, orange-red, or pale orange. 5
 4. Thallus P+ pale yellowish or P-. 7
5. Thallus P+ pale orange, K-, C+ red (gyrophoric acid + unknown substance); thallus warty, grading to fine granules but not forming discrete soralia. [The P reaction is unlike the rich oranges from stictic, norstictic and thamnolic acids; instead it is a dull, pale orange, but nevertheless a distinct reaction]. Also common in arid steppes. Ochrolechia inaequatula
5. Thallus P+ yellow or deep orange, K+ yellow, C-. 6
 6. Thallus P+ yellow (alectorialic acid); thallus smooth, superficially appearing corticate but actually not. Lepraria neglecta
 6. Thallus P+ deep yellow turning deep orange (thamnolic acid + atranorin); thallus fuzzy, obviously decorticate. (Leprocaulon subalbicans)
7. Thallus C+ red, KC+ red, K-. 8
7. Thallus C-, KC- or KC+ yellow, K- or K+ yellow. 9
 8. Soredia not in discrete soralia but rather with a warty thallus grading into small granules; thallus P+ pale orange. (Ochrolechia inaequatula)
 8. Soredia in discrete soralia or the soralia fusing into a continuous, finely sorediate curst; thallus P- (gyrophoric acid only). Ochrolechia androgyna
9. Thallus K+ yellow, containing atranorin, often with porphyrillic and fatty acids, especially roccellic acid; both powdery and granular forms are known; cortex lacking; very common in exposed alpine and subalpine sites.. Leproloma cacuminum
9. Thallus K-, lacking atranorin; forming large, corticate warts, never forming a powdery or finely granular thallus. [Although not usually sterile, juvenile, sterile colonies are occasionally found; these are KC-, C- or C+ yellow]. Ochrolechia upsaliensis

Thallus filamentous

1. Thallus pale, orangish to grayish green. Tropical or subtropical. Coenogonium
1. Thallus dark, brown-black. Temperate. 2
 2. Hyphae straight; cells elongated, rather dark under the microscope. Racodium rupestre
 2. Hyphae contorted or entwined; cells shorter, rather pale under the microscope. Cystocoleus

