

CORTICOLOUS/LIGNICOLOUS LECANORA

Most sections compiled from various authors;
A few, where noted, from single authors

Rev. 1/94

II-A CORTICOLOUS/LIGNICOLOUS.

**Thallus or apothecial margin yellow, yellow-green to gray-green
Non-sorediate.
Discs often yellowish**

1. Thallus C+ orange. Thalline margin of apothecia excluded, discs becoming biatorine.2

1. Thallus C-. Thalline margin persistent or not.3

2. Thallus greenish gray to yellow-gray or light greenish yellow. Apothecial margins light yellow and granulose, when young the exciple crenulate and containing algae; disks pale yellow to greenish (or flesh-colored to brownish?). Thallus very thin, granular to granular-areolate, forming small discrete patches, smooth. Apothecia sessile, slightly constricted below, in small groups; thalline margin generally slightly paler than thallus, at first crenulate but gradually becoming excluded and represented by a few irregular granules; disc flat to somewhat convex, pale yellow-green, more rarely pinkish or brownish; epithecium brownish, with coarse granules; hymenium 65-85 μ m; paraphyses 1-2 μ m wide, branched and anastomosed, apices not swollen; asci broadly clavate, long-stalked; spores (8-)10-14(-16) x 4-5 μ m, narrowly ellipsoid. Thallus P-, K-, C+ orange-red. On bark and wood.L. confusa

2. Thallus immersed or greenish grey to yellowish or greenish black, K+ yellowish. Apothecial margins pale flesh-colored, when young the exciple smooth and lacking algae; disks pinkish brown to greenish black (pale yellow to pale brown or dark flesh-colored, rarely medium or dark brown, according to [Thomson?]). Thallus thin, subgranular, uneven, effuse. Apothecia discs waxy, concolorous with thallus, \pm immarginate, convex, solitary or crowded, 0.1-0.5 mm diam. Epithecium granular, yellowish, with numerous crystals; hymenium hyaline or pale straw colored; paraphyses simple, capillary, ca. 1 μ m thick; asci clavate; spores biserial, ellipsoid with rounded ends, straight, 11-20 x 7-12 μ m. On conifer bark and old wood. Artic-boreal, S to Arizona.L. symmicta

3. Apothecial margins persistent, containing algae; discs usually plane, flesh-colored, greenish brown or dark. (L. varia group).4

3. Apothecial margins excluded, and/or lacking algae; disks becoming biatorine. II-A-1 (L. symmicta group).

4. Discs bright yellow to brownish orange, 0.4-1 mm, sessile, flat to slightly convex, the margin thick, concolorous with thallus, crenulate. Spores oblong-ellipsoid, 10-16 x 4-5 um. Thallus thin, granulose to densely warty, greenish gray. On wood. New England to Florida and Louisiana.L. cupressii

4. Discs flesh-colored, greenish brown or dark, usually plane.5

5. Thallus P+ yellow, KC+ yellow (Ch: usnic acid, psoromic acid), K- or slightly yellowish, C-. Spores (7-)9-11.5(-13) x 5-7(-8) um. Thallus straw yellow to greenish-grey, yellowish gray or dark green-gray, somewhat shiny when areolate, of dispersed to contiguous rounded granules, sometimes thickening into a ± areolate crust; prothallus inconspicuous. Apothecia 0.4-1(-2) mm diam., dispersed to closely aggregated, not compacted, sessile, slightly constricted at base; thalline margin well developed, entirely to crenulate or convoluted, persistent, raised; discs pinkish brown to greenish brown, ± flat. Epihymenium ± colorless, inspersed with minute granules; hymenium (60-)70-80(-90) um; paraphyses 1-2 um wide, sparsely branched and anastomosed, apices slightly thickened. Pycnospores 12-22 x 0.5-1 um, thread-like to arc-like. On old wood. Boreal. Widespread, but frequently misidentified; N. American material that is P+ red (protocetraric acid) merits further study.L. varia

5. Thallus P-, K+ yellowish. Apothecia to 1 mm diameter. 6

6. Containing usnic acid. Apothecial margin with few algae. Disks yellow, green or brown. Spores narrowly ellipsoid, (7-)10-14 x 3-4(-6) um, slightly curved. Thallus not well delimited, thin, continuous or discontinuous, uneven, rarely with some pulverulent, farinose granules, whitish, whitish yellow, or pale yellowish green, decorticate, spreading in irregular patches, 2-4(-5) cm across. Apothecia abundant, to 1 mm diam., generally crowded, at first cupuliform, becoming plane and finally swollen, convex and distorted; disc smooth, grayish yellow to pale brown, sometimes darker brown in old fruits; margins 0.1-0.2 mm thick, concolorous with thallus, ± granular, excluded at maturity; epithecium 3-8 um thick, colorless, often with abundant granular crystals; hymenium 35-65 um; asci clavate; paraphyses 1-1.5 um thick, simple or sparsely branched, septate; apices not swollen. Thallus K+ yellow, KC+ yellow, C-. On bark.L. strobilina

6. Containing isousnic acid. Thallus yellowish-greenish, granular, weakly developed. Apothecia green-black, flat or slightly convex, the margin yellowish, entire or crenate. Spores (12-)15-18 x 4-5(-6) um. Pycnospores (9-)11-14 um long. On conifer twigs and wood.L. mughicola

ADD:

Pycnidia abundant; conidia broadly falcate, over 1.5 μ m wide.

Spores broadly ellipsoid, 7-10(-13) x 4-6(-7) μ m; apothecia to 0.4-0.75 mm diam., often densely aggregated and then becoming angular by compression, sessile, scarcely exceeding the thallus granules; thalline margin thick, prominent, entire, verrucose to crenulate, persistent but becoming inconspicuous with age; disc pale red-brown, flat to slightly convex, sometimes slightly pruinose at first. Epithecium olive green to brown; hymenium 45-65 μ m; paraphyses 1.5-3 μ m, sparsely branched, especially above, apices 2.5-4 μ m wide, olivaceous brown, capitate. Thallus to 5 cm or more across, of dispersed to \pm contiguous granules, forming poorly delimited but often extensive patches, yellowish gray to gray; prothallus indistinct. Pycnidia frequent, black; pycnosporos 7-8(-9) x 1.5-2.5(-3) μ m, broadly fusiform to arc-like, truncated at the base. Thallus P-, K-, KC-, C- (isousnic acid) (atranorin and one unknown pigment according to Hawksworth & Dalby). On wood, more rarely dead bark, generally in exposed situations. Very common on conifer wood, at least in California.L. saligna

Pycnidia sparse or absent; conidia filiform or narrowly arc-like, not exceeding 1.5 μ m in width. Thallus of dispersed granules or inconspicuous. Apothecia to 0.25-0.4(0.8) mm; discs often white or bluish gray pruinose.

Apothecia scattered or in small groups, sessile, somewhat constricted at the base; discs yellow-brown to red-brown or pinkish red or blackish brown; thalline margin remaining smooth, packed with algae, usually persistent but thinner with age, finally excluded, entire to slightly crenate, \pm white to brownish gray. Apothecial margins and thallus yellow to yellow-green, K \pm yellow. Spores (7-)8-12(-16) x 2.5-4(-6) μ m, narrowly ellipsoid. Epihymenium brownish to olivaceous, interspersed with granules [not, according to ?]; hymenium 45-75 μ m; paraphyses 1.5-2 μ m wide, branched and anastomosed, apices 2.5-3.5 μ m wide, yellowish brown, slightly swollen, capitate; asci broadly clavate. Thallus of scattered granules or \pm inconspicuous, not clearly delimited, gray, yellowish or greenish gray. Pycnosporos of two types: macroconidia 7-10(-14) x 1-2 μ m, curved; microconidia 3-5 x 1 μ m, bacilliform. Thallus P- or P+ red in parts, K- or weakly yellowish, C-. On coniferous bark or wood. [Spores narrow, 7-12 x 3-4.5 μ m; apothecia 0.2-0.4 mm diam., discs slightly pruinose. = L. piniperda typical morphotype according to Brodo].L. piniperda

II-A-1. L. symmicta Group

7. Spores 3-5 x 2-3 um, ovoid. Thallus very thin, smooth, pale green-gray to ashy or whitish, sometimes disappearing. Apothecia to 0.25 mm, sessile, the disc concave or flat to slightly convex, yellowish to reddish brown, the margin thin, concolorous with thallus, sometimes disappearing. Spores 5 um long. On pine bark, Tennessee.L. minutella

7. Spores over 5 um long and 3 um wide. 8

8. Discs bright yellow-orange to dark flesh-colored, convex. Thallus immersed or thin. On conifer bark and on wood. Spores 7-14 x 3-6 um. (L. symmicta)

8. Discs ± yellowish, brownish, grayish or blackish, ± plane. 9

9. Spores 6-10(-12) x 2.5-4.5 um. Discs yellow, brown, olive or grey. Thallus finely granulose, pale yellow to dull grey, or immersed. Apothecia to 0.5 mm diameter.L. subintricata

9. Spores 10.5-13 x 4.5-5.2 um, oblong. Thallus indistinct, pale yellow, C-. Apothecia to 0.6 mm, appressed; the discs plane, pale brownish, to blackish (?); the margin thin, entire, yellow to gray-yellow, K-, containing algae. Epithymenium livid to black-livid, K+ olive. On rotten wood, S. Dakota.L. lividolutea Räsänen non Magnusson

ADDITIONAL SPECIES:

Usually on rock, but occasionally on wood;

Thallus of ± contiguous areoles with crenulate margins or minutely lobed; discs often becoming blackish. L. intricata

Thallus inconspicuous or of dispersed granular or convex areoles, not lobed or crenulate; discs usually remaining yellowish or yellow-green. L. polytropia

II-B CORTICOLOUS/LIGNICOLOUS. Sorediate.
Thallus at least partly \pm yellowish.

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1. Soredia \pm gray. Apothecial margins usually persistent. ...2

1. Soredia light yellow, P- (or sometimes P+ in L. flavopunctata).3

2. Soralia greenish grey, effuse, forming over the whole thallus, often indistinct, coarsely granular, often predominating. Thallus P+ orange-red (fumarprotocetraric acid), K- or weakly yellowish, C-. Apothecia 0.4-1(-1.5) mm diam., frequent, sessile, narrowed at base, often at or beneath level of soredia; thalline margin crenate to granular, pulverulent, sorediate or irregularly flexuose, persistent; disc usually plane or concave, flesh-colored or greenish-brown or green-gray, sometimes pinkish (or black when parastitized by Lichenocodium lecaniae). Epihymenium hyaline to pale yellow-brown, generally with granules dissolving in K- (or not granular?); hymenium (45-)55-70(-85) μ m; paraphyses 1.5-2.5 μ m, branched (especially towards tips) and anastomosed; tips to 3 μ m wide, not or slightly swollen; asci broadly clavate, apical dome I+ blue with an I- internal cone, recalling the Bacidia-type; spores 10-14(-16) x 4-6(-7) μ m. Pycnosporos 12-22 x 0.5-1 μ m, arc-like to thread-like. Thallus coarsely granular, thick, \pm continuous, gray-green, often with pale brown lesions with felted white margins, due to Athelia arachnoidea. Bark or wood, usually in or around cities with high levels of sulfur dioxide pollution; Seattle, WA, Vancouver, BC, and several other cities (especially eastern ones).L. conizaeoides

2. Soralia bluish gray, well delimited. Thallus well-delimited, continuous to areolate or verrucose, pale or cream-yellow to yellow-white or greenish yellow. P-, C+ orange (thiophanic acid) throughout. Compact pseudocortex present, especially surrounding soralia, (20-)30-40 μ m thick. Medullary hyphae 5-6 μ m diameter, the walls 1-2 μ m thick. Apothecia rare, becoming very convex, reddish to medium brown or brownish yellow; margins usually lecanorine, sorediate. Hymenium poorly defined at base; paraphyses thick-walled. On wood along seashores.L. orae-frigidae

3. Thallus C+ deep yellow or orange to reddish (containing the xanthone thiophanic acid), plus usnic acid and zeorin. Thallus effuse and granular to cracked-areolate, usually forming circular to elongate patches, yellowish green, sometimes with radially oriented crystals evident on the surface. Soredia initially arising from discrete, somewhat excavate, 0.1-0.3 mm, lens-shaped soralia, soon confluent and diffuse, covering the thallus, farinose, pale yellow to lemon yellow; prothallus inconspicuous or

when on smooth bark, bluish gray. Apothecia, when present 0.3-0.8(-1.5) mm diam., sessile, not constricted below, sometimes angular by compression; thalline margin at first crenulate, sometimes sorediate, becoming excluded as the discs become biatorine; discs pale yellow, pinkish or brownish (to darkened), sometimes pruinose, flat to slightly convex. Hymenium 35-55 μ m; paraphyses 1.5-2 μ m, sparsely branched and anastomosed, apices not or slightly thickened; spores 10-16(-17) x 4-7(-7.5) μ m, broadly ellipsoid. Thallus P-, K+ yellow. (On bark and wood, generally in well-lit or other xeric situations, occasionally also on dry siliceous rocks.L. expallens

3. Thallus C-, without xanthonenes.4

4. Containing atranorin, but not usnic acid. Thallus areolate, thick, K+ yellow, KC- Soredia raised in places to form soralia. On wood.(L. subfusca group: L. farinaria)

4. Containing both atranorin and usnic acid. 5

5. Thallus containing usnic acid, isousnic acid, and atranorin, plus accessory stictic and cryptostictic acids and other substances in trace amounts, without zeorin. Western. Thallus mostly delimited, usually forming small rounded patches up to 1.5(-2) cm diam., typically areolate, occasionally partly \pm continuous. Prothallus usually indistinct, whitish. Areoles mostly distinct, endo- to epi-substratal, whitish to greenish gray, grayish green, sometimes pale yellow or yellowish gray, discrete or becoming contiguous or rarely fused, sparse to numerous, \pm rounded to elongate, flat to convex, to 0.2(-0.4) mm across; continuous parts weakly tuberculate, cracked. Soralia central or marginal on areoles or tubercles, pale yellow to greenish yellow, at first delimited, \pm punctiform and discrete, flat to convex, to 0.2(-0.3) mm diam., later often somewhat diffuse; soredia fine, 10-20(-25) μ m diam.; wall distinct. Photobiont 9-12(-18) μ m diam. Apothecia sometimes present, emarginate, pale brown to flesh colored, sometimes yellow tinged, slightly convex, adnate, to 0.2(-0.7) mm diam.; spores simple to 1-septate, mostly narrowly ellipsoid, sometimes oblong or somewhat curved, 7.5-10.5 x 2.5-4 μ m. On bark (Alnus, Amelanchier, Oplopanax, Pachystima, Salix, Vaccinium), Pacific coast, 300-1390 m., Alaska to Washington. L. flavopunctata Tonsberg

5. Containing usnic acid, atranorin, and zeorin. Eastern. Thallus thin, with white, fibrous prothallus. Soralia yellow-green, small and inconspicuous to large and confluent, or entire thallus composed of soredia. Apothecia rare, yellow-white, pruinose. On bark, Northeastern.L. "thysanophora" Harris ined.

**II-C CORTICOLOUS/LIGNICOLOUS. Non-sorediate.
Thallus \pm brown.**

1. Spores 10-18 x 4-5 μ m. On conifer bark, western.
Protoparmelia ochrococca

1. Spores under 10 μ m long.2

2. Spores (4.5-)6-7(-8) x (2-)3-3.5(-4.5) μ m. Thallus indeterminate, thinly leprose or evanescent, dark gray or brown. Apothecia rather numerous, dispersed or aggregated, not confluent, 0.15-0.30 mm diam., commonly 0.2 mm diam., round, \pm broadly adnate, persistently plane, brown, epruinose, matt; margin thin or very thin, entire, sometimes elevated, scarcely paler than disc. Amphithecium to 60 μ m thick; cortex well delimited, ca. 13-22 μ m thick, gelatinous, hyaline; cells indistinct, thin-walled, with minute violet granules (not soluble in K); algae rather numerous, 8.5-17 μ m diam. Hymenium 30-40 μ m; epithymenium brown. Paraphyses conglutinate, simple or branched, 1.5-2 μ m, the tips thickened. On wood. Maine.L. fuscidula

2. Spores 7-9 x 5-6 μ m. Thallus brownish, very thin, disappearing. Apothecia to 0.3 mm, discs plane, bay brown, appearing biatorine, but first surrounded by a very thin thalline margin. Spores 7-9 x 5-6 μ m. On conifer bark.L. anoptiza

II-D CORTICOLOUS/LIGNICOLOUS. Non-sorediate.

**Thallus \pm grayish, whitish, or immersed, K-;
apothecial margins \pm grayish or whitish, K-;
Discs brownish, red-brown, or black**

After Brodo (unpublished), and others

This group is a mess.

**II-D-1. Discs becoming very dark, and finally black;
Apothecial margins often thin and finally excluded,
or concolorous with discs**

1. Thallus immersed in wood (mainly coniferous). Apothecia to 0.3 mm, penetrating between the wood fibers; disc rusty-black or rusty, epruinose. Spores 8-12 x 3-4 μ m.L. apochraceoides

1. Thallus (mostly?) superficial. 2

2. Apothecial margins distinct, often well-developed, gray or yellowish, \pm persistent, usually paler than disc.
.....3

2. Apothecial margins becoming thin, then excluded, or, if persistent, then the same color as disc (or slightly paler).
.....7

3. Apothecial margins grayish, thick.4

3. Apothecial margins yellowish or thallus-colored, \pm thin; discs dark carneous to olive to black. 6

3. Medulla white. Growing in the arctic. 4

3. Medulla \pm lemon yellow. Growing in Florida. Thallus thin, papilliform-granulose to rugose-warty, greenish gray to ashy, on a blackening hypothallus. Apothecia to 0.8 mm, sessile, flat to convex, reddish brown to black, the margin concolorous with thallus, usually entire and persistent. Spores ellipsoid, 15-26 x 9-15 μ m. On trees.L. granulifera

4. Apothecia black; spores 11-12.5 x 4-5 μ m; cortex expanded at base, distinct; apothecia 0.3-0.6 mm diam.L. surrecta

4. Apothecia red, red-brown or blackening, substipitate. Thallus verruculose or areolate, thin to disappearing, bluish white or ashy. Apothecia to 2 mm, substipitate, the margin thick, pale, entire, with thick cortex of palisade-like hyphae. Epihymenium reddish or brownish to violet reddish. Spores 9-14 x 4-6 μ m.L. behringii

5. Spores 6-10 x 3-4 μ m; apothecia 0.2-0.5 mm diam. Temperate to

arctic.L. piniperda f. nigrescens

5. Spores 14-18 x 4-5 um; margins entire or finely crenulate.(L. mughicola)

6. Spores 10-14 x 6.5-8 um. Discs black, ashy or bluish pruinose.

Thallus of dispersed or contiguous semiglobose to irregular 0.5 mm broad verrucules, ashy, yellowish brown or brownish ashy. Apothecia dense, innate then adnate and elevated, to 0.8 mm, the disc plane, the thalline margin thick, entire, disappearing; proper margin thin, black. On wood, Arctic.L. vegae

6. Spores under 6 um wide. Discs at least partly pale (not from ashy or bluish pruina). 7

7. Apothecial margin cortex indistinct, thin. 8

7. Apothecial margin cortex distinct, 15-40 um thick, gelatinous. 9

8. Spores narrowly ellipsoid, (7-)8-12(-16) x 2.5-4(-6) um. Apothecial margin cortex 10-20 um; epihymenium brownish to olivaceous, granulose; apothecia 0.2-0.7 mm diam., discs yellow-brown to dark red-brown (L. piniperda: infrequent marginless form) (L. sarcopisioides may also key out here)

8. Spores subglobose to broadly ellipsoid (L:W = 1-1.4:1), 6-10 x 4-7 um. Apothecial margin brown to black, concolorous with disc or slightly paler, soon disappearing. Apothecia to 0.8 mm. On wood, conifer bark, twigs. Widespread.L. fuscescens

9. Epihymenium granulose at surface; amphithecium with few algae (mostly at base), margin almost biatorine; disc generally pale livid to fuscous, rarely darker, usually lightly pruinose, quite adnate; margin concolorous with disc, not raised; spores (6.5-)7-11(-12) x 3-4.5(-6) um.10

9. Epihymenium not interspersed or granular; amphithecium with abundant or moderately abundant algae; apothecial disc dark brown to black, epruinose.12

10. Discs yellow, brown, olive or grey. Spores 6-10(-12) x 2.5-4.5 um. Thallus finely granulose, pale yellow to dull grey, or immersed. Apothecia to 0.5 mm diameter. (L. fuscidula Degel. may belong here if epihymenium is granulose; several European species are similar to L. subintricata but have spores mostly 4-6 um wide: L. anopta, L. attigens and L. effusella).L. subintricata (dark morphotypes)

10. Disc pinkish to pale olive-brown to dark red-brown or brown-black, sometimes thinly pruinose; Thallus membranous or granulose or verruculose, sometimes dispersed or scale-like, whitish or grayish to dark gray, sometimes with a creamy tinge; prothallus white, sometimes well

developed and \pm fibrous. Apothecia to 0.6(0.8) mm, adnate to sessile; disc plane becoming moderately to strongly convex, margin at first thin and entire, becoming concolorous with disc, often becoming \pm excluded with age. Epihymenium brown, not distinctly granular; hymenium 30-45 μ m; paraphyse 1.5-2 μ m, simple or sparsely branched above; apices to 4 μ m wide, swollen, brown-capitate; asci clavate, *Bacidia*-type. Spores (7-)8-11(-13) x 3.5-4(-5) μ m, oblong-ellipsoid to fusiform. Pycnidia frequent, 60-100 μ m, immersed to somewhat erumpent, black, sometimes gaping; pycnospores (3-)4-5(-6) x 1-1.5 μ m, bacilliform. Thallus and thalline exciple P+ orange, K+ yellow (stictic acid) or orange or red (norstictic acid). On bark and wood, especially of conifers. Ch: norstictic acid. Boreal, S. to California.L. cadubriae

11. Spores very small, (4.5-)6-7(-8) x (2-)3-3.5(-4.5) μ m; apothecia small (0.15-0.3 mm diam.), brown, with thin, scarcely raised margin (like L. fuscescens).L. fuscidula
(assuming epihymenium is not granular)

11. Spores 10.5-13(-15) x 3-4.5(-5.3) μ m; apothecia 0.2-0.5 mm diam., brown to dark brown or red-black, usually convex and deformed, with a thin, brown margin which soon becomes excluded. Thallus usually poorly developed, dirty gray-white, finely granular. On wood.L. hypoptoides

II-D-2. Apothecia remaining pale, not blackening.

1. Apothecial margins yellowish, fuscous, or carneous, often disc-colored, persistent or disappearing. 2

1. Apothecial margins gray to white (not yellow or disc-colored), generally persistent although some margins can become excluded; apothecial cortex well-developed, at least at apothecial base; spores 9-14(-16) x 4-6(-7) μm 5

2. Apothecial disc red-brown, orange-red, or white pruinose. 3

2. Apothecial disc pale brown, yellowish brown, or brown to black. 4

3. Pycnidia abundant; conidia broadly falcate, over 1.5 μm wide. Spores broadly ellipsoid, 7-10(-13) x 4-6(-7) μm ; apothecia to 0.4-0.75 mm diam., often densely aggregated and then becoming angular by compression, sessile, scarcely exceeding the thallus granules; thalline margin thick, prominent, entire, verrucose to crenulate, persistent but becoming inconspicuous with age; disc pale red-brown, flat to slightly convex, sometimes slightly pruinose at first. Epithecium olive green to brown; hymenium 45-65 μm ; paraphyses 1.5-3 μm , sparsely branched, especially above, apices 2.5-4 μm wide, olivaceous brown, capitate. Thallus to 5 cm or more across, of dispersed to \pm contiguous granules, forming poorly delimited but often extensive patches, yellowish gray to gray; prothallus indistinct. Pycnidia frequent, black; pycnosporos 7-8(-9) x 1.5-2.5(-3) μm , broadly fusiform to arc-like, truncated at the base. Thallus P-, K-, KC-, C- (isousnic acid) (atranorin and one unknown pigment according to Hawksworth & Dalby). On wood, more rarely dead bark, generally in exposed situations. Very common on conifer wood, at least in California. L. saligna

3. Pycnidia sparse or absent; conidia filiform or narrowly arc-like, not exceeding 1.5 μm in width. 4

4. Thallus of dispersed granules or inconspicuous. Apothecia to 0.25-0.4(0.8) mm; discs often white or bluish gray pruinose. Apothecia scattered or in small groups, sessile, somewhat constricted at the base; discs yellow-brown to red-brown or pinkish red or blackish brown; thalline margin remaining smooth, packed with algae, usually persistent but thinner with age, finally excluded, entire to slightly crenate, \pm white to brownish gray. Apothecial margins and thallus yellow to yellow-green, K \pm yellow. Spores (7-)8-12(-16) x 2.5-4(-6) μm , narrowly ellipsoid. Epihymenium brownish to olivaceous, interspersed with granules [not, according to ?]; hymenium 45-75 μm ; paraphyses 1.5-2 μm wide, branched and anastomosed, apices 2.5-3.5 μm wide, yellowish brown, slightly swollen, capitate; asci broadly clavate.

Thallus of scattered granules or \pm inconspicuous, not clearly delimited, gray, yellowish or greenish gray. Pycnospores of two types: macroconidia 7-10(-14) x 1-2 μ m, curved; microconidia 3-5 x 1 μ m, bacilliform. Thallus P- or P+ red in parts, K- or weakly yellowish, C-. On coniferous bark or wood. [Spores narrow, 7-12 x 3-4.5 μ m; apothecia 0.2-0.4 mm diam., discs slightly pruinose. = L. piniperda typical morphotype according to Brodo].L. piniperda

4. Thallus of irregular granules often aggregated into mounds.

Apothecia 0.2-0.6(-1.2) mm diam.; discs epruinose. Thallus of irregular granules, sometimes aggregated into convex groups ca. 2 mm wide, poorly delimited or forming extensive patches, creamy to gray; prothallus absent. Apothecia dispersed or aggregated into small groups, constricted at base; margin at first paler than thallus but later concolorous, entire to crenulate, persistent; discs red-brown, flat to slightly convex; epithecium interspersed with granules; hymenium 35-40 μ m tall; paraphyses 1-1.5 μ m wide, sparsely branched, apices not or slightly thickened; spores 7-12 x 3-3.5(-4) μ m. Pycnospores 3-7 x 1-1.5 μ m, \pm bacilliform. Thallus P-, K-, C-, KC-. On bark, especially of coniferous trees, and wood or worked timber. L. sarcopisoides

5 Amphithecium with few algae, making the apothecia almost

biatorine; Apothecial margin cortex distinct, gelatinous; thalline margin thin, disc-colored, entire, becoming excluded. Thallus immersed and inconspicuous or of dispersed fine granules, white, yellowish gray or gray, poorly delimited; prothallus inconspicuous. Apothecia (0.2-)0.4-0.6(-1) mm, dispersed, sessile, usually constricted below; discs flat to convex, yellowish, olive-brown or brownish black, sometimes pruinose, with a bluish bloom when moist; epithecium colorless to olive gray, interspersed with granules; hymenium 40-65 μ m; paraphyses 1-2 μ m, sparsely branched, anastomosed, apices to 3.5 μ m, swollen, capitate, brown; spores (5-)6-10(-12) x 2.5-4(-4.5) μ m, narrowly ellipsoid. Pycnospores 3-7 x 1-1.5 μ m, bacilliform. Thallus P-, K- or weakly yellow, KC-, C-. On bark and wood, coniferous forests.L. subintricata

5. Amphithecium usually packed with algae. Apothecial margin distinct, usually persistent for a long time, the cortex thin, indistinct, not gelatinous or expanded;

..... 6

6. Apothecia heavily gray to blue-gray pruinose; apothecia small, 0.2-0.8 mm.forms of L. hagenii

6. Apothecia epruinose or very lightly pruinose. 7

7. Apothecial margin cortex more or less uniform in thickness; apothecia large, (0.3-)0.5-2 mm diam.L. beringii

7. Apothecial margin cortex thin to absent at upper (lateral) edge, and very thick below. 8

8. Apothecial margin narrow, broken up, almost disappearing; apothecia extremely crowded, 0.2-1.0 mm diam.; spores 9.8-11(-13) x (4-)5-7.2 μ m. Discs brown to red-brown, \pm epruinose. Thallus dark. Spermatia 16-24 long.L. umbrina (including? f. gregaria or gregata? (= ? L. hagenii))

8. Apothecial margin thicker, persistent; apothecia more evenly distributed (not crowded); discs slightly pruinose. 9

9. Apothecia small, 0.2-0.6(-0.8) mm diam. 10

9. Apothecia large (0.6-1.6 mm diam.), red-brown to lead brown or blackish, plane, biatorine, constricted at base; discs slightly pruinose; margin thin, whitish, even, continuous. Spores 9-11 x 4-6 μ m. Epihymenium yellow-brownish. Thallus thin, continuous, smooth, gray to bluish white. On wood or vegetational detritus, coastal, arctic-boreal.L. zosterae

10. Discs waxy red or rosy under pruina. Thallus with \pm zonate edge, whitish or gray, thin, continuous, becoming areolate in the center, forming clearly delimited patches; prothallus fibrous, gray. Apothecia to 1.5 mm diam. (but often smaller?), aggregated in small groups, \pm immersed in thallus; disc light brown to pale yellow-brown, flat, grayish white pruinose when young; thalline margin entire to irregularly contorted, persistent, thin, often pruinose and including numerous crystals, the cortex gelatinous, 50-100 μ m thick. Epihymenium interspersed with numerous fine granules, hyaline to pale yellow-brown; hymenium 45-75 μ m; hypothecium with small granules; paraphyses 1-2 μ m, sparsely branched, apices not swollen. Spores ellipsoid, 10-16 x 6-7.5(-9) μ m. Thallus P-, K-, KC-, C- (2,5-dichlorolichexanthone). On nutrient-enriched bark, especially aspen. Boreal (S. to California).L. populicola

10. Discs brown; apothecia adnate, not constricted at base; discs slightly pruinose; margin often uneven, broken. Thallus pale. Spermatia shorter than in L. umbrina.L. hagenii

ADD:

Thallus whitish, grayish, or immersed. Apothecial margin with abundant algae. Disks yellow-brown to red-brown. Spores 8-12 x 4-7 μ m. Ch: isousnic acid.L. saligna

L. willeyi (see saxicolous spp.)

Spores 3-5 x 2-3 μ m, ovoid. Thallus very thin, smooth, pale green-gray to ashy or whitish, sometimes disappearing. Apothecia to 0.25 mm, sessile, the disc concave or flat to slightly convex, yellowish to reddish brown, the margin thin, concolorous with thallus, sometimes disappearing. Spermatia 5 μ m long. On pine bark, Tennessee.L. minutella

ADD (closely related to each other):

a). Apothecia to 0.6 mm, the margin thin, soon concolorous with disc. Spores 8 per ascus, ellipsoid, 9-10 x 5 μ m. Thallus very thin, blue-grayish, often indistinct. Apothecia biatorine, plane or slightly convex, red-brown. On hardwood bark, especially Populus.L. persimilis

b) Apothecia to 0.4(-0.8) mm, the margin thin, paler than disc, entire or slightly crenulate at first but becoming irregular and finally almost excluded. Spores (8-)16-32 per ascus, 8-12 x (3-)4-6(-7) μ m. Thallus whitish ash-gray, thin, often indistinct, of clusters of minute granules ca. 1 mm diam., more rarely \pm continuous and irregularly cracked, poorly limited; prothallus not conspicuous. Apothecia dispersed or aggregated, sessile, arising amongs the thallus granules, slightly constricted at base; discs flat to slightly convex, pinkish brown to red-brown or dark brown. Epithymenium hyaline to pale reddish brown, not or finely granular; hymenium (40-)55-65(-70) μ m tall; paraphyses 1.5-2 μ m wide, simple to sparsely branched, apices 2.5-3.5 μ m, colorless to brownish, the final 2 cells capitate. Pycnidia 0.05-0.1 mm diam., frequent, black, erumpent; pycnosporos 10-12 x 1 μ m, irregularly arc-like or curved, \pm straight. Thallus P-, K-, KC-, C-. On nutrient-enriched hardwood bark, especially twig axils of Sambucus.L. sambuci

(L. scrupulosa listed by Migula as a synonym of this species)

II-E. CORTICOLOUS/LIGNICOLOUS.

**Thallus whitish, K+ yellow; apothecia discs strongly pruinose
(L. pallida group)**

after Imshaug & Brodo

(needs to be cross-referenced to key to L. subfusca group)

This group has been monographed for N. America.

- 1. Spores 12-16 per ascus; thallus P+ yellow (psoromic acid).2**
- 1. Spores 8 per ascus; thallus P+ or P-, without psoromic acid.3**
 - 2. Apothecia scattered; apothecial margins thin, soon excluded. Boreal.L. cateilea**
 - 2. Apothecia densely clustered; apothecial margins thick, raised, persistent, densely interspersed with granules. Mexico.L. brunneri**
- 3. Discs C+ yellow.4**
- 3. Discs C-.5**
 - 4. Apothecial margins P- (determined by apothecial sections under dissecting microscope). Western America & western Lake Superior Region.L. carpineae**
 - 4. Apothecial margins P+ red. Norstictic acid in stipe & adjacent thallus. Southeastern U.S. & northern coastal plain.L. caesiorubella subsp. lathamii**
- 5. Apothecial margins P- or P+ yellow (determined by apothecial sections under dissecting microscope).6**
- 5. Apothecial margins (at least inner amphithecium) P+ red. ...7**
 - 6. Norstictic acid in apothecial margins, but often in low amount and then not detected by KOH. Lignicolous, especially on Juniperus, Rocky Mountains and Minnesota.L. caesiorubella subsp. saximontana**
 - 6. Norstictic acid absent. Corticolous and lignicolous. Florida & Hawaii.L. caesiorubella subsp. glaucomodes (inactive strain)**
- 7. Norstictic acid present in apothecial section (radial).8**
- 7. Norstictic acid absent.9**
 - 8. Norstictic acid in margin. Spores 10-12(-14(x 6-7(-8) um;**

apothecia (0.3-)0.5-1.5(-3) mm. Thallus thin, more or less membranous. Boreal eastern N. America.L. pallida var. rubescens

8. Norstictic acid in stipe & adjacent thallus. Thallus more or less cartilaginous. Coastal California and Mexico.L. caesiorubella subsp. merrillii

9. Apothecia small, less than 1 mm diameter, thin; disks yellowish; margins thin and soon excluded. On coniferous trees (except in Mexico), especially in bogs & along lake shorelines, Great Lakes Region, Washington, New York and Mexico.L. pallida var. pallida

9. Apothecia large, more than 1 mm diameter, thick; disks usually rose or violet colored; margins thick, often flexuous, regeneration frequent. Thallus becoming thick and rimose-areolate.10

10. Protocetraric acid in apothecial margins. Southeastern U.S. (coastal plain), Arizona, Mexico.L. caesiorubella subsp. glaucomodes

10. Monoacetylprotocetraric acid in apothecial margins. Northeastern U.S. and adjacent Canada.L. caesiorubella subsp. caesiorubella

II-F CORTICOLOUS/LIGNICOLOUS. Sorediate.
Thallus whitish, K+ yellow (atranorin).
(L. subfusca group, p.p.)

after Brodo, 1984

1. Thallus effuse granular sorediate; apothecia cinereofusca-type, always present but poorly developed; epihymenium P+ orange (with crystal formation). Chem.: pannarin, placodialic acid. Maryland.rare morphotype of L. cinereofusca

1. Soredia at least partly in round soralia.2

2. Soralia punctiform, 0.3-0.5 mm diameter, containing white granular soredia; epihymenium P+ orange (pannarin); thallus thin, continuous; apothecia cinereofusca-type; spores 17-20 x 11-15 um, thick walled. On Abies, southern Appalachians.rare morphotype of L. insignis

2. Soralia large, 0.5-1.5 mm diameter, finally coalescing; apothecia and soralia lacking pannarin (P- or pale yellow).
3

3. Thallus dark grayish yellow, areolate, thick, on lignum; apothecia pulicaris-type. Chem.: roccellic acid. Massachusetts. Rare.L. farinaria

3. Thallus white to yellowish white, thin to thick; apothecia allophana-type; lacking roccellic acid; on bark.4

4. Soredia granular, in excavate roundish patches coalescing into larger, continuous patches; apothecia rare, 0.5-1.0 mm diameter; margins becoming sorediate; spores 10-14(-16) x 5.5-8(9.5) um. Chem.: atranorin alone. On neutral-barked trees. Widespread.L. impudens

4. Soredia farinose, in hemispherical mounds, usually discrete; apothecia often larger than 1.0 mm diameter, margins usually not sorediate; spores larger than 10-14 x 5.5-8 um.L. allophana f. sorediata

II-G. CORTICOLOUS/LIGNICOLOUS. Non-sorediate.
Thallus whitish, K+ yellow, discs epruinose or weakly pruinose
(L. subfusca group)

after Brodo, 1984

This group has been monographed for N. America, so the key is reliable, but it's a tremendous pain to use. I had almost completed a nice, field-oriented alternative key when the power went out, and I hadn't saved it, and I don't feel like trying again right now. As a matter of fact I'm sick of working on this document, and I don't feel like even putting things in bold, so tough beans for the present.

(Note: it is necessary to use a polarizing filter on the microscope to distinguish the crystals and granules; the epihymenial characters are difficult to see in thick sections)

1. Epihymenium not granular or inspersed, but pigmented a clear red-brown, olive, or greenish; often with a hyaline gelatinous layer on the hymenial surface. Discs epruinose2
 1. Epihymenium with fine or coarse granules appearing on the hymenial surface or between the paraphyses tips; epihymenial area pigmented or essentially hyaline; amphithecial crystals, when present, are very large, irregular and in clumps. Discs pruinose or not.10
 2. Amphithecium containing clumps of very large, irregular, KOH-insoluble crystals, but the crystals may be abundant, few or rarely even absent in some sections.3
 2. Amphithecium and/or cortex containing very small, angular, KOH-insoluble crystals, usually more or less filling the amphithecium, but rarely few or even absent in some sections of L. aleutica and L. grantii.6
3. Apothecia black to dark brownish black, (0.3-)0.6-1.0(-2.3) mm diameter; epihymenium olive-brown; spores ca. 101-13 x 6-8 um. Chem.: roccellic acid and gangaleoidin.(L. meridionalis)
3. Apothecia red-brown; epihymenium red- or yellow-brown.4
 4. Apothecial margin cortex thin, indistinct, not gelatinous; thallus granulose-verrucose; spores 11-16 x 7-9 um. Chem.: zeorin. Great Lakes Region (and Arkansas?).L. perplexa
 4. Apothecial margin cortex distinct, gelatinous; thallus verrucose to continuous. Chem.: lacking zeorin.5
5. Apothecia becoming large, 0.6-2.0(-2.7) mm diameter; most apothecia

constricted at base; margins thick, crenulate or verrucose; thallus thick, verrucose; spore walls 1.0-1.5 μm thick; spores ca. 11-16 x 7-9 μm . Chem.: roccellic acid (in N. America). On Thuja and some deciduous trees. Hemiboreal: New Brunswick to Yukon and California.L. subrugosa

5. Apothecia 0.4-0.8(-1.0) mm diameter, broadly attached, crowded; margins usually thick, rarely thin, but remaining more or less smooth, sometimes somewhat flexuose; spore walls 0.6-0.8(-1.0) μm thick; thallus continuous, thick or thin; spores ca. 11-15 x 6-9 μm . Chem.: gangaleoidin and californin. On bark of deciduous trees. Infrequent; East Temperate and California.L. argentata

6. Amphithecial cortex indistinct to absent, not gelatinous; apothecia bright reddish brown; margin white, thick, smooth, becoming flexuose; spores (10-)11-14 x (6-)7-9 μm . Chem.: zeorin, and almost always hypoprotocetraric and 4-O-demethylnotatic acids. On bark of deciduous trees. East Temperate.L. imshaugii

6. Amphithecial cortex gelatinous, distinct.7

7. Amphithecial cortex distinctly delimited from medulla, 12-65(-90) μm thick; small crystals confined to medulla, not extending into cortical region.8

7. Boundary between amphithecial cortex and medulla is difficult to discern, but gelatinous area up to 50-90 μm thick, at least at the base of the apothecium; small angular crystals extending from the medullary area through the cortex usually in radiating rows,, or occasionally restricted to the outer gelatinous portion. Corticolous; temperate forest regions. Thallus generally thin and continuous, smooth or rough9

8. Lignicolous, on logs and dead wood on maritime beaches; apothecial margin cortex 18-30 μm laterally, expanded to 30-55(-95) μm at base. Chem.: Lgr-1 and Lgr-2. Bicoastal.L. grantii

8. Corticolous, or if lignicolous, then not maritime. Apothecial margin cortex 18-25 μm laterally, expanded to 35-85(-150) μm at base. Chem.: atranorin alone, or with traces of Lgr-1 and Lgr-2. Bark of deciduous trees, coastal California.L. horiza

9. Apothecia small, soon becoming convex, 0.3-0.6(1.2) mm diameter, closely adnate; apothecial margin smooth, even with disk, thin, and finally excluded; spores ca. 9-13 x 6-8 μm . Chem.: usually atranorin alone. Usually on bark of Fagus or Acer saccharum. Great Lakes region to Nova Scotia.L. glabrata

9. Apothecia large, flat, (0.5-)0.7-2.0(-3.0) mm diameter, very constricted at base in maturity; apothecial margin prominent, thin, smooth, commonly flexuose; spores (12-)13-18(-21) x 7-10(-11) μm . Chem.: usually atranorin alone. On Populus, Fraxinus, or other deciduous trees, rarely lignum.

Eastern U.S. and Canada, Alberta and California.L. allophana

10. Epihymenium interspersed with fine granules, especially between the tips of the paraphyses; granules insoluble in conc. HNO_3 ; epihymenium pigmented in and between tips of paraphyses; large amphithecial crystals usually present, but sometimes sparse or absent. Discs epruinose.11

10. Epihymenium with coarse granules at surface, or sometimes also between tips of paraphyses; granules soluble in conc. HNO_3 (sometimes very slowly, or only partially, especially when apothecia are pruinose); epihymenium pigmented or not. Discs often pruinose.14

11. Apothecial margin sections P+ red; discs dull reddish brown to dark brown, or black especially in lignicolous specimens; apothecia 0.3-0.7(-1.0) mm diameter; margin cortex 18-25 μm laterally, expanded to (25-)30-45(-66) μm at base; spores (9-)11-14(-16) x 7-10 μm . Chem.: fumarprotocetraric acid and usually roccellic acid. Hemiboreal to southern boreal, widespread. On bark of conifers and alders, or on wood.L. pulicaris

11. Apothecial margin sections P-.12

12. Apothecial cortex 22-38 μm laterally, usually expanded to 35-65(-90) μm at base; apothecia medium to dark brown or reddish orange, more rarely reddish brown, very often darkening to reddish black; 0.4-0.8(-1.5) mm diameter; spores (11-)12-17(-18) x (7-)8-11(-12) μm , with walls 1.0-1.2 μm thick. Chem.: roccellic acid in most specimens. Usually on conifers. Boreal forest region, widespread.L. circumborealis

12. Apothecial cortex not strongly expanded, mostly 18-35(-55) μm ; spores mostly 10-13 x 6-8.5 μm , walls less than 1.0 μm thick; usually on deciduous trees.13

13. On conifers, lignum, or Alnus; apothecial margin even, sometimes thick or disappearing in age and "rough" in texture (i.e., not shiny); spores broadly ellipsoid, ca. 10-14 x 7-8.5 μm ; apothecia reddish orange to reddish brown or strong brown. Chem.: roccellic acid. Mostly California to Alaska, scattered elsewhere with L. pulicaris s. str.L. pulicaris (P- strain)

13. On deciduous trees, especially hardwoods; apothecial margin rather thick, becoming verruculose to verrucose, rarely thin and even; apothecia (0.3-)0.5-0.8(-1.3) mm diameter, commonly crowded; spores ca. 10-13 x 6-8 μm , often poorly developed or absent; apothecia orange to brownish orange to reddish brown. Chem.: atranorin alone or with roccellic acid. East Temperate; common.L. hybocarpa

14. Apothecial discs C+ orange; discs light to medium orange or orange-yellow, often lightly pruinose; margins thin or thick, smooth and

- even or verrucose, often with a disk-colored inner ring (excipulum proprium) next to disk; hypothecium often becoming yellowish, K+ yellow to orange. Chem.: LIs-1 and LIs-2. Bark of deciduous trees and lignum. Southeastern coastal plane.L. louisianae
(if discs C+ yellow, see Key to L. pallida group)
14. Apothecial disks C-; hypothecium hyaline, K-.15
15. Apothecial discs heavily pruinose (also see Key to L. pallida group)16
15. Apothecial disks pruinose or only lightly pruinose, UV-.17
16. Apothecial disks UV+ bright orange; disks yellowish pink to purplish blue; apothecial margin often pruinose or "frosted" with a crown of crystals (in old specimens); apothecial cortex not gelatinous, 15-25(-35) um. Chem.: zeorin, lichexanthone. Appalachians and Louisiana.L. miculata
16. Apothecial disks UV-, light orange to light orange-yellow; margins never frosted with crystals nor pruinose; thallus verrucose, sometimes UV+ yellow; apothecial cortex gelatinous, 15-35 um. Chem.: gangaleoidin. Arizona and Mexico.L. viriduloflava
17. Apothecial cortex 8-15 um, very inconspicuous, not gelatinous; epihymenium P+ orange (with formation of tiny orange crystals); some apothecia remaining at least partially immersed in thallus; apothecial margins verrucose, becoming discontinuous and "beaded" in appearance.18
17. Apothecial cortex more than 15 um thick, conspicuous, gelatinous; epihymenium P-.19
18. Spores 14-20 x (8-)10-12(-13) um, walls over 1.0 um thick; amphithecial crystals almost always present. Chem.: pannarin, roccellic acid. On bark of conifers and Sorbus. Southern Appalachians; rare.L. insignis
18. Spores (7.5-)9-14 x (6-)7-8.5(-9.5) um, walls less than 1.0 um thick; amphithecial crystals occasionally few or absent. Chem.: pannarin; placodialic acid almost constant in East and rare in West; roccellic acid is an accessory. On bark of deciduous trees, or rarely conifers. Appalachian-Great Lakes region, and west coast from Washington to Queen Charlotte Islands (B.C.).L. cinereofusca
19. Spores small, mostly 9-13 x 5-7 um. On deciduous trees and lignum in tropical and subtropical southeastern U.S.20
19. Spores larger, 11-18 x (5-)6-12 um. Temperate to boreal regions.21

20. Apothecia bright reddish brown, 0.4-0.7(-1.0) mm diameter, sessile to slightly constricted at base; epihymenium pigmented red-brown, with few granules; spores broadly ellipsoid.L. sp. 2 sensu Brodo, 1984
20. Apothecia light orange to pink-orange, lightly pruinose or epruinose, 0.3-0.8 mm diameter, usually very crowded, immersed when young, then sessile; epihymenium not pigmented, with abundant granules; spores mostly narrowly ellipsoid.L. leprosa
21. Thallus very thin, smooth to slightly verruculose, yellowish white to yellowish gray. On smooth-barked deciduous trees or occasionally lignum.22
21. Thallus generally thick, verruculose to verrucose or dispersed areolate.24
22. Spores broadly ellipsoid, often with truncate ends, ca. 12-17 x 7-10 um; discs often variously colored on the same thallus, light orange-yellow to light orange, brown, greenish or black, often lightly pruinose; apothecia mostly 0.7-1.2(-2.0) mm diameter, sessile. On bark, or sometimes lignum. Pacific coast, San Diego to Alaska.L. pacifica
22. Spores ellipsoid or narrowly ellipsoid.23
23. Disks uniformly pale orange-brown, often lightly pruinose; apothecia less than 1.0 mm diameter, at least some erumpent when young, becoming sessile. Spores ca. 11-16(-18) x (5-)6-7(-8) um. Oregon, Rocky Mountains to N.W.Territories.L. cf. salicicola
23. Discs pale to dark red-brown, 1-1.5(-2) mm wide, erumpent then sessile. Spores 11-18 x 6-10 um.L. intumescens
24. Apothecia 0.3-1.0(-1.5) mm diameter, broadly attached to slightly constricted below, usually round, even; margins rarely crenulate or flexuose; thallus continuous, smooth or rough, becoming verruculose to verrucose; spores 11-13(-14) x 6-7.5(-8.5) um.25
24. Apothecia 0.6-2.0(3.0) mm diameter, constricted at base, flat or raised, often flexuose and irregular in outline, with verrucose margins; thallus verrucose to dispersed, rarely continuous; spores 11-16(-18) x 7-8.5(-11) um.27
25. Apothecia medium to brownish orange or reddish brown. Chem.: usually roccellic acid (in N. America).L. chlarotera
25. Apothecia black to brown-black, rarely lighter brown in part.26

26. On lignum. Apothecia often lightly pruinose; epihymenium with abundant granules; apothecial margin smooth to verrucose, dark gray, becoming blackish adjacent to disk. Chem.: roccellic acid or rarely gangaleoidin (in arctic).L. cenisia

26. On bark of various trees, especially conifers, rarely on wood; apothecia epruinose in all but rare cases; epihymenium often with very sparse granules; apothecial margin smooth, even, white or yellowish white, with no blackening. Chem.: gangaleoidin and roccellic acid (in N. America). Great Lakes region and Arizona.L. meridionalis

27. Apothecia broad, usually flat, more or less appressed, 0.7-2.0(-3.0) mm diameter; disks reddish orange, red-or yellow-brown, or rarely dark brown to almost black, epruinose with rare exception; apothecial margins usually thin, yellowish to yellowish white, shiny, smooth to verruculose, even to flexuose; spores 12-16(-18) x (6-)7-9.5(-12) um; walls ca. 1.0-1.4 um thick. Chem.: roccellic acid. On conifer bark in Appalachian-Great Lakes region.L. wisconsinensis

27. Apothecia usually thick, raised; margins thick, smooth to verrucose, white or gray, rarely with a yellowish tint and rarely shiny.28

28. Apothecia usually dark brown to brown-black; spores 11-15(-17) x 6-8 um, walls under 1.0 um thick; apothecial margins becoming blackish adjacent to disk. On lignum.(see L. cenisia)

28. Apothecia medium orange to yellowish brown, rarely dark reddish orange; spores (10-)12-16(-18) x 7-10 um, walls over 1.2 um thick; apothecial margins remaining unblackened. On Thuja, Picea, Acer, Salix, etc., rarely lignum. Widely distributed, but mostly in southern boreal zone.L. rugosella