

# IDENTIFYING MIXED HARDWOOD FOREST LICHENS

**A REFERENCE NOTEBOOK**



**Prepared by Irwin M. Brodo and Brian Craig**

This reference manual – Version 4.1 - has been prepared by Irwin M. Brodo, Canadian Museum of Nature, Ottawa, Ontario, Canada, and Brian Craig, Ecological Monitoring and Assessment Network Coordinating Office, Environment Canada, Canada Centre for Inland Waters, Burlington, Ontario, Canada.

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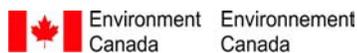
This reference manual is supported by the Ecological Monitoring and Assessment Network (EMAN) Coordinating Office, Environment Canada.

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## ***Candelaria concolor***

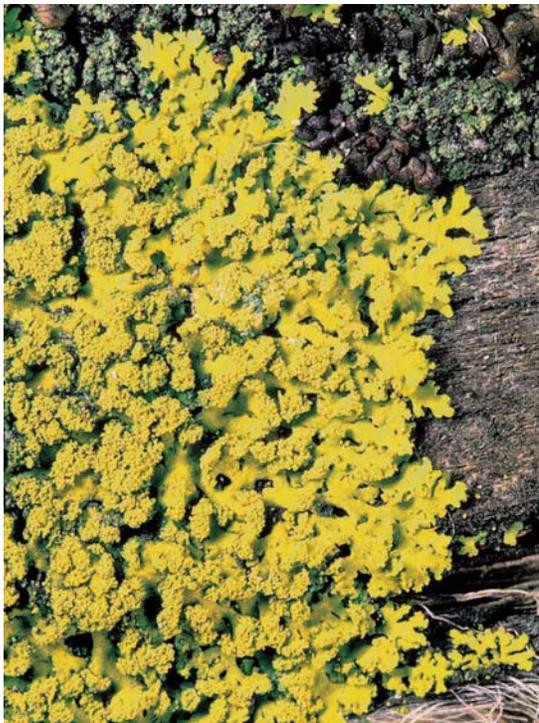
## **Candleflame lichen**

**Description:** Thallus bright yellow, forming small rosettes (less than 1 cm across) of overlapping lobes; lobes only 0.1-0.5 mm across with lacy margins edged with granules and granular soredia, rarely almost entirely dissolving into granular soredia. Apothecia uncommon, 0.2-0.7 mm in diameter, having dark yellow to orange-brown disks surrounded by very thin, thallus-colored margins.

**Chemistry:** Cortex PD-, K+ pink or K-, KC-, and C-. Apothecial disks often K+ pink (yellow pigments are calycin and other compounds related to pulvinic acid). Medulla, no reactions.

**Habitat:** Extremely common and widespread, especially on nutrient-rich substrates, often forms luxuriant colonies along rain tracks on tree trunks or on twigs of trees near farms or towns.

**Comments:** Specimens that consist of only a few small foliose lobes in a sea of granular soredia are almost indistinguishable from some sorediate species of the crustose genus *Candelariella*, such as *C. efflorescens* or *C. reflexa*; the *Candelariella* species, however, almost always have a few round areoles or granules with sorediate margins. Shade forms of small-lobed, sorediate *Xanthoria* species such as *X. fallax* or *X. ulophyllodes* can be similar but are thicker, not so finely divided, and turn dark red-purple with K.



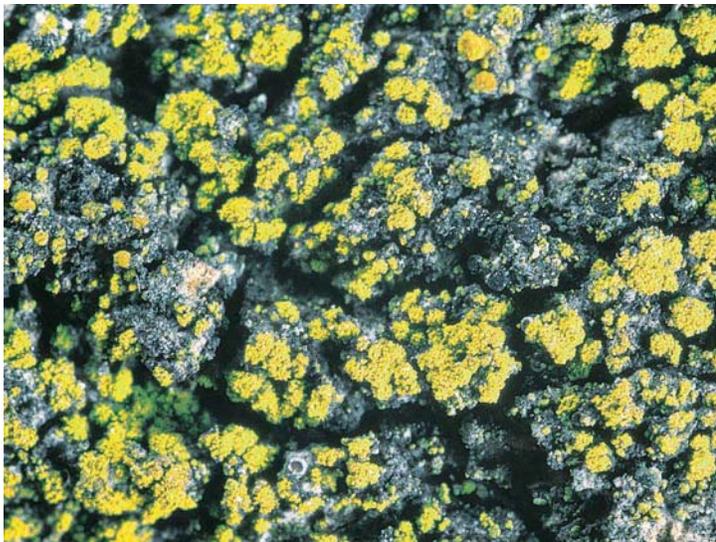
***Candelariella efflorescens*****Powdery goldspeck lichen**

**Description:** Thallus consisting of round, flattened areoles less than 0.2 mm in diameter that break down at the edges into fine soredia, creating tiny clusters of soredia that finally coalesce into a yellow, powdery mass. Apothecia uncommon less than 0.5 mm in diameter; spores 32 per ascus.

**Chemistry:** Cortex PD-, K- or K+ pale rose, KC-, C-, UV+ dull dark orange (calycin, a yellow pigment)

**Habitat:** Very common on bark of all kinds and sometimes wood.

**Comments:** *Candelariella reflexa*, a much less common, mostly western species, is virtually indistinguishable from *C. efflorescens* based on thallus characters alone, but it contains 8 spores per ascus. *Candelariella xanthostigma* has more evenly distributed almost spherical, corticate granules (0.05-0.13 mm in diameter) that do not break down into soredia. It is rarely fertile, but has many spores per ascus. It grows on bark or wood, and has a broad distribution.



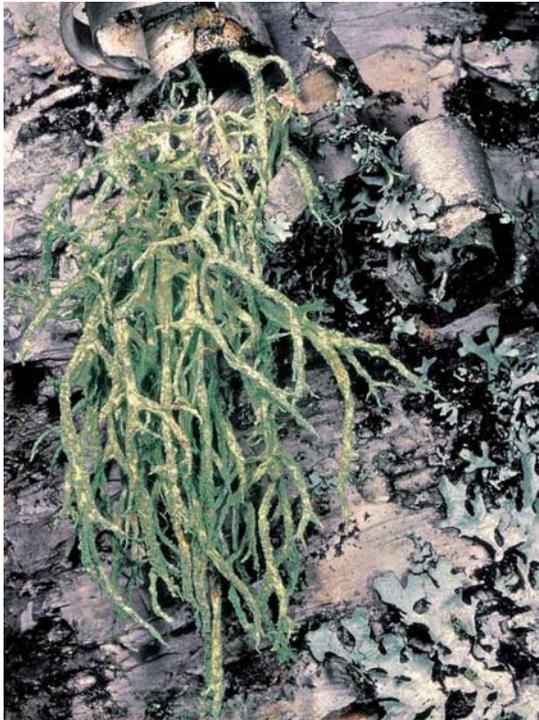
***Evernia mesomorpha***

**Boreal oakmoss lichen**

**Description:** Thallus forming pendent or shrubby tufts (2-) 4-8 cm long composed of wrinkled and ridged branches 0.5-1.5 mm thick, irregularly but abundantly divided, with coarse soredia developing on the ridges. The branches are rather soft and pliable because they contain no special stiff, strengthening strands or cortex found in similar fruticose lichens such as *Usnea*

**Chemistry:** Cortex PD-, K-, KC+ gold, C- (usnic acid)  
Medulla PD-, K-, KC-, C- (evernic or divaricatic acids)

**Habitat:** On branches and trunks of both conifers and hardwoods in sunny sites. It is more pollution-tolerant than *Usnea* and is therefore more frequently found close to urban centers.



***Flavoparmelia caperata***

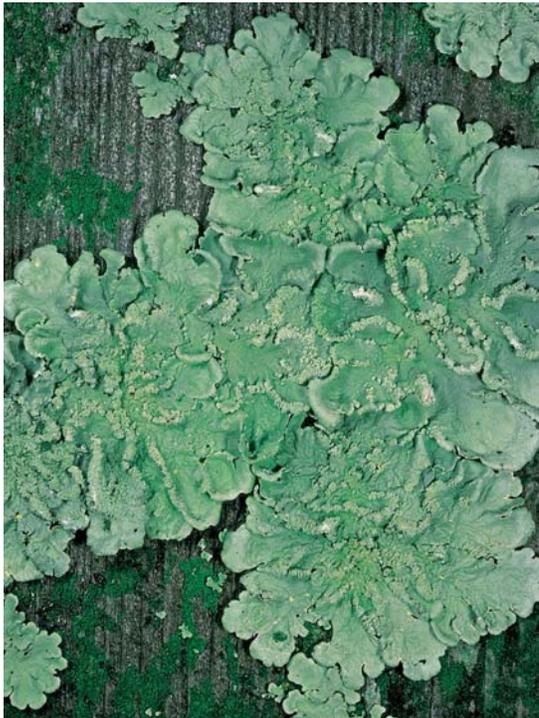
**Common greenshield lichen**

**Description:** Thallus pale yellow-green when dry, greener when wet; lobes rounded, 3-8 mm wide, smooth or wrinkled, with large or small, irregular patches of coarsely granular soredia developing from pustules. Apothecia very rare.

**Chemistry:** Cortex PD-, K-, KC+ gold, C-; medulla PD+ red-orange, K-, KC+ pink, C- (usnic, protocetraric, and caperatic acids and atranorin).

**Habitat:** On bark of all kinds in sun or partial shade, less commonly on rock.

**Comments:** *Flavoparmelia caperata* can be confused with *Flavopunctelia soredica*, which has few pseudocyphellae. That species, however, has mostly marginal soredia, and the medulla reacts C+ red. *Flavopunctelia flaventior* can have some soralia on the lobe surface, but the lobes have conspicuous white dots (pseudocyphellae), and it is also C+ red.



## ***Graphis scripta***

## **Common script lichen**

**Description:** Thallus within bark tissues and barely visible or forming circular, yellowish white to greenish gray patches. Fruiting bodies are elongate “lirellae” that are black, variable in length and breadth, branching and shape. Mostly 1-7 mm long, 0.15-0.3 mm wide, unbranched (especially on birch bark) or branched once or twice (especially on beech), pointed at the ends; walls thin, black, prominent; disk barely visible under a slit like opening or relatively broad and lightly pruinose; spores 6- to 14-celled, 20-70 x 6-10  $\mu$ m, IKI+ violet.

**Chemistry:** All reactions negative (no lichen substances).

**Habitat:** On bark of all types of trees, usually in partial shade.

**Comments:** The script lichen is named for its slender, elongate fruiting bodies that look like scribbles on the bark, especially in the form having lirellae that branch and curve. On bark with a pronounced grain such as birch, the linear apothecia often follow the bark texture, choosing to "go with the flow"



## ***Lobaria pulmonaria***

## **Lungwort, lung lichen**

**Description:** Thallus pale brown to olive-brown when dry and quite green when wet, containing green algae, with a strongly ridged and pitted surface that gives the lichen the appearance of lung tissue; lobes 8-30 mm broad, up to 7 cm long, branching in dichotomies and trichotomies; soredia developing on the lobe margins and along the thallus ridges, often with isidia emerging among the soredia. Tiny, wart like cephalodia, 0.5-1.5 mm in diameter common or sparse on the lower surface: cut one open to see the dark, blue-green cyanobacteria inside, quite different from the grass-green layer in the main part of the thallus. Apothecia infrequent, mostly on or near the lobe margins or along ridges on the upper surface.

**Chemistry:** Medulla PD+ orange, K+ yellow to red, KC-, C- (stictic and norstictic acids), or PD+ yellow, K+ red, KC-, C- (norstictic acid alone).

**Habitat:** On trees, mossy rocks, and wood in mature forests, usually in the shade.

**Comments:** *Lobaria pulmonaria* is the most widely distributed and common *Lobaria* in North America. In the eastern forests, nothing resembles *L. pulmonaria*. The only other lungwort in the northeast is *L. quercizans*, which has smaller lobes (5-20 mm across), a smooth to wrinkled, greenish grey thallus, often with large, red-brown apothecia, and lacks any soredia or isidia. Like *L. pulmonaria*, its lower surface is tan and fuzzy with tomentum, and it also has cephalodia. Its medulla reacts C+ pink (gyrophoric acid). All species of *Lobaria* are good indicators of rich, unpolluted forests.

**Importance:** All species of *Lobaria*, but especially *L. retigera*, are good indicators of rich, unpolluted and often very old forests. Despite its diminishing abundance, *L. pulmonaria* has long been prized as an important source of boiling water dyes. Herbalists have recommended *L. pulmonaria* as a remedy for tuberculosis because of its resemblance to lung tissue, and in India, it has been used to treat lung diseases, asthma, hemorrhages, and even eczema on the head. Lungwort has also been used for brewing in India and Europe. It is apparently a favourite food for moose in the northeast.



***Melanelia subaurifera***

**Abraded camouflage lichen**

**Description:** Thallus olive to chocolate brown, dull, or shiny especially at the edge, not pruinose; lobes rounded, 1-4(-6) mm wide, flat, sorediate or isidiate, usually both, with short, cylindrical, unbranched isidia (mostly less than 0.2 mm long) breaking down into granular soredia on the thallus surface, leaving yellowish patches where they are rubbed off; apothecia uncommon.

**Chemistry:** Medulla PD-, K-, KC+ red, C+ red (lecanoric acid).

**Habitat:** On bark of all kinds, sometimes wood, rarely rock.

**Comments:** *Melanelia subaurifera* is the most common and widespread of the camouflage lichens in eastern North America.



***Parmelia squarrosa***

**Bottlebrush shield lichen**

**Description:** Thallus pale gray, with lobes 1-5 mm wide, often overlapping, with conspicuous reticulate ridges and white markings (pseudocyphellae); isidia mostly cylindrical and shiny, but sometimes becoming almost squamulose or fat and dull, marginal as well as on the lobe surface; rhizines slender, at first unbranched, then branched like a bottle-brush (squamrose). Apothecia rather common.

**Chemistry:** Cortex PD-, K+ yellow (atranorin), KC-, C-.  
Medulla PD+ yellow, K+ yellow turning blood red (salazinic and consalazinic acids), KC-, C-.

**Habitat:** On bark or mossy rock, mostly in shaded, humid habitats.

**Comments:** Although the rhizines on young lobes of *P. squarrosa* can be unbranched, they are never thick and forked as in *P. saxatilis*, a similar lichen with isidia on the upper surface. *Parmelia saxatilis* can also grow on bark, but it is more commonly found on rock.



***Parmelia sulcata***

**Hammered shield lichen**

**Description:** Thallus blue-gray and often browned at the edges, or entirely brownish when in exposed habitats; lobes 2-5 mm wide, with a network of sharp ridges and depressions and irregular whitish markings (pseudocyphellae); powdery soredia along the ridges and lobe margins where the cortex develops cracks; rhizines densely branched like a bottle brush (squarrose) when fully developed, but on young lobes slender and unbranched. Apothecia rare.

**Chemistry:** Cortex PD-, K+ yellow (atranorin), KC-, C-.  
Medulla PD+ yellow, K+ yellow turning blood red (salazinic and consalazinic acids), KC-, C-.

**Habitat:** Mostly on bark, but also on mossy rocks, wood, and even soil in both shade and sun.

**Comments:** This is an extremely widespread, even weedy species in the north and west. As it is one of the first lichens to invade trees and picnic benches in suburban areas, *P. sulcata* is the lichen most familiar to casual observers in many parts of the continent. It is, unfortunately, also quite variable. For example, soredia can be abundant or hardly produced at all. If soredia are lacking, it can be confused with *P. fertilis*, a rather rare, small, more abundantly fertile species with less conspicuous ridges and white markings. It is known in North America only from Nova Scotia, New Brunswick, Maine, and adjacent Quebec, although common in Asia.



***Phaeophyscia adiastrata***

***Powder-tipped shadow lichen***

**Description:** Thallus dark greenish gray, gray-brown, or brown, lobes 0.5-1(-2) mm wide, with very coarse, almost isidia-like soredia along the margins and at the tips of the lobes, rarely also on the upper surface; lobules occasionally produced at the lobe tips as well; lower surface black with abundant and conspicuous black rhizines with white tips. Apothecia rare.

**Chemistry:** No lichen substances.

**Habitat:** Quite common on shaded, mossy granitic rocks as well as on bark of different kinds, especially hardwoods.

**Comments:** *Phaeophyscia rubropulchra* can also have coarse soredia but has a red medulla. In *Ph. orbicularis*, the soredia are mainly on the lobe surface, and the species is less common in the east. Small specimens of *Ph. hispidula* can be similar but lack lobules, and the soredia are mostly on the lobe surface rather than along the margins. Species of *Physciella* can be distinguished by their white lower surface.



***Phaeophysica rubropulchra***

**Orange-cored shadow lichen**

**Description:** Thallus extremely variable, pale to dark green or greenish gray to dark brown; medulla red-orange, at least in older parts of the thallus, noticeable in the field where insects have eaten away the cortex, as in the center of the picture below; lobes 0.5 – 1.2 mm across, slightly turned up at the tips; soredia usually rather coarse, mostly marginal, but also on the lobe surface (laminal) in part; rhizines short, black with white tips. Apothecia common, mostly under 1 mm in diameter.

**Chemistry:** Reactions negative except for medulla, which is K+ purple (anthraquinone)

**Habitat:** On bark of deciduous trees, typically in shaded, forest habitats. Rarely on conifers, mosses or rock.

**Comments:** The bright orange medulla and presence of soredia distinguish this species from any other lichen. Specimens having only scattered patches of red medulla are sometimes encountered, however, and these can be mistaken for *Ph. Orbicularis*, a mainly western species with flat to convex lobes and fine soredia on the upper surface of the lobes, or *Ph. adiastrata*, which has soredia only on the lobe tips and along the margins.



***Physcia adscendens***

**Hooded rosette lichen**

**Description:** Thallus pale gray to pale greenish gray, spotted with white maculae and sometimes slightly pruinose, forming small clusters of ascending lobes, many of which expand at the tip to produce inflated and hollow, helmet-shaped soralia, which are formed from a separation of the upper and lower cortices and contain greenish, granular soredia; lobes mostly under 1 mm broad except for the helmets, which can be up to 2 mm across; long, white, mostly unbranched cilia (some with darkened tips) grow from lobe margins and tips; lower surface white. Apothecia not common.

**Chemistry:** Cortex PD-, K+ yellow (atranorin), KC-, C-,  
Medulla PD-, K-, KC-, C-.

**Habitat:** On bark, twigs, and wood of a variety of trees, less frequently on rock, in well-lit or slightly shaded sites.

**Comments:** This is the only clearly "hooded" *Physcia*. *Physcia tenella*, a common bark-dwelling, ciliate lichen along the east and west coasts, has lip-shaped soralia on the lobe tips but does not form hollow hoods or helmets.



***Physcia aipolia***

**Hoary rosette lichen**

**Description:** Thallus pale to dark gray, conspicuously spotted with white maculae; lobes narrow and radiating, flat to slightly concave or upturned at the tips, sometimes overlapping, 1-2(-3) mm across, without any soredia or isidia; lower surface white to pale brown with many pale rhizines. Apothecia very common, 1-2(-3) mm in diameter, very dark brown but typically with a heavily white “frosting” of pruina, (pruinose) giving the lichen its English name; spores (16-)18-25 x 7-12  $\mu\text{m}$ , with angular cells.

**Chemistry:** Cortex PD-, K+ yellow (atranorin), KC-, C-.  
Medulla PD- or + pale yellow, K+ yellow, KC-, C-.

**Habitat:** On bark and wood of different kinds of trees in open habitats.

**Comments:** *Physcia stellaris* is a very similar species with about the same range as *Ph. aipolia*, but it usually lacks conspicuous white spots (maculae), has flat or somewhat convex lobes, and has a K- reaction in the medulla.



***Phycia millegrana***

**Mealy rosette lichen**

**Description:** Thallus pale gray, spotted with white maculae; lobes thin, appressed to somewhat ascending, 0.3-1(-2) mm broad, margins (especially the tips) finely divided and finally dissolving into granular soredia; lower surface white, with pale rhizines. Apothecia very common, under 1 mm in diameter, dark brown, often lightly pruinose.

**Chemistry:** Cortex PD-, K+ yellow (atranorin), KC-, C-.  
Medulla, PD, K-, KC-, C-.

**Habitat:** On bark, especially deciduous trees, as well as wood and occasionally granitic rock.

**Comments:** This is among the most common bark-dwelling lichens in eastern North America, even occurring close to urban areas on cultivated as well as wild deciduous trees. *Phycia dubia* has its soredia in lip-shaped soralia at the lobe tips, and the margins are never finely divided.



***Physcia stellaris***

**Star rosette lichen**

**Description:** Thallus pale gray, darker gray in the center, more or less smooth and uniform although sometimes with some white spotting, especially on older parts of the thallus; lacking pruina, soredia, isidia, or lobules; lobes radiating out (like a star) but sometimes crowded, flat to convex, 0.5-1.5(-3) mm broad; lower surface white to light brown, with fairly abundant pale to dark rhizines. Apothecia common, 0.7-3 mm in diameter, dark brown, often frosted with a white pruina; spores 16-22 x 7-10  $\mu\text{m}$ , with angular locules.

**Chemistry:** Cortex PD-, K+ yellow (atranorin), KC-, C-.  
Medulla K-.

**Habitat:** On bark of many kinds, but especially poplars, alders, and elms; rarely on wood or rock.

**Comments:** The negative K reaction of the medulla is the most reliable way to distinguish *Ph. stellaris* from *Ph. aipolia*, although the convex lobes and lack of conspicuous white spots (maculae) can also be helpful.



***Physciella chloantha***  
**(Syn. *Phaeophyscia chloantha*)**

**Cryptic rosette lichen**

**Description:** Thallus pale to dark greenish or brownish gray, uniform in color, lacking a frost-like pruina and usually lacking white blotches; lobes 0.3-1(-2) mm across often ascending; small, lip-shaped soralia on the lobe margins and tips, containing greenish, granular soredia; lower surface pale white to pale tan, smooth, with thick, pale, unbranched rhizines, often developing into marginal cilia. Apothecia infrequent, disks very dark brown, not pruinose.

**Chemistry:** All reactions negative (no lichen substances).

**Habitat:** Usually on hardwoods, but occasionally on rock, especially limestone.

**Comments:** The sister species of *Physciella chloantha* is *Ph. melanchra* (syn. *Phaeophyscia melanchra*), which has soralia bursting through the top surface of the lobes as well as on the lobe margins. Marginal cilia (or marginal rhizines that resemble cilia) are less frequent on *Ph. melanchra*. *Physciella chloantha* also resembles *Physcia dubia*, with its dark gray color and pale lower surface, but the *Physciella* has a K- upper cortex. *Physciella melanchra*, on the other hand, is almost identical to *Phaeophyscia orbicularis* except for the pale rather than black lower surface.



## ***Physconia detersa***

## **Bottlebrush frost lichen**

**Description:** Thallus pale gray-brown to dark red-brown, uniform and often shiny except for the white pruina on the lobes (sometimes confined to the tips); lobes flat to slightly up-turned and partly overlapping, (0.6-)1-2(-3) mm broad, bordered with marginal soralia containing brown to gray-green soredia (except for the growing tips); medulla white; lower surface black producing a thick mat of black, densely branched (like a bottle-brush) rhizines. Apothecia rare.

**Chemistry:** Cortex, medulla and soredia PD-, K-, KC-, C- (no lichen substances).

**Habitat:** On bark of various kinds, occasionally on wood or rock. Often on roadside trees, even close to urban areas.

**Comments:** *Physconia detersa* is very common in eastern North America where its distribution overlaps that of two other, equally common, marginally sorediate frost lichens: *Ph. enteroxantha* and *Ph. leucoleiptes*. *Physconia enteroxantha* is almost identical, but its medulla is distinctly yellowish (at least in spots) and turns K+ yellow, KC+ orange (secalonic acid). In *Ph. leucoleiptes*, some of the marginal soralia can become crisped and broken up into individual, more or less lip-shaped soralia, and the soredia (not the medulla) are K+ yellow, KC+ yellow-orange (also due to secalonic acid).



***Punctelia rudecta***

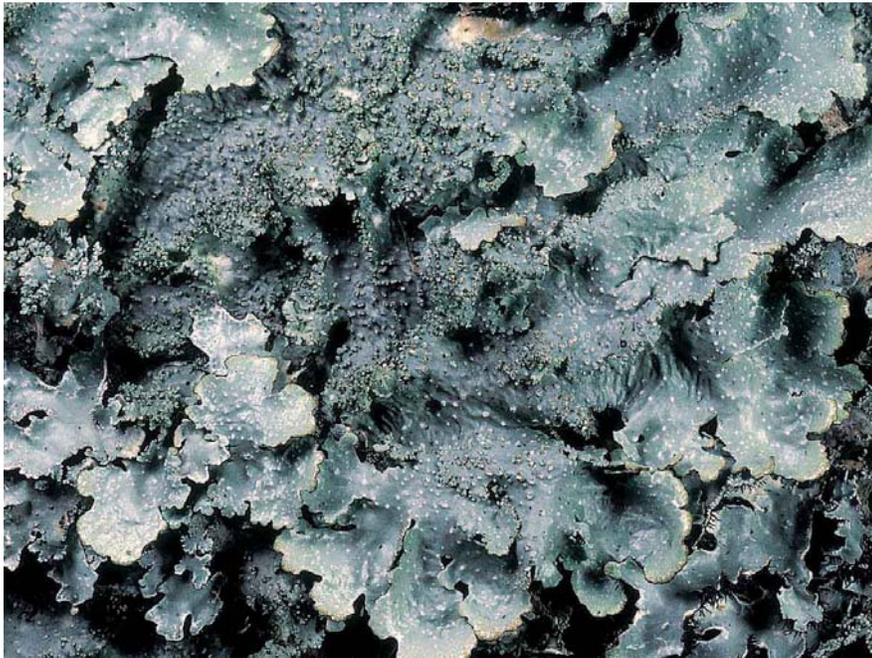
**Rough speckled shield lichen**

**Description:** Thallus dark greenish gray to almost blue-gray, lobes mostly 3-8 mm broad, more or less covered with cylindrical to branched isidia; white spots (pseudocyphellae) usually prominent on lobe tips; lower surface pale tan, with pale rhizines. Apothecia infrequent.

**Chemistry:** Cortex K+ yellow (atranorin); medulla PD-, K-, KC+ red, C+ red (lecanoric acid).

**Habitat:** On bark of all kinds or shaded rocks.

**Comments:** This is one of the most common eastern isidiate foliose lichens; it is fairly tolerant of pollution, making it familiar to city dwellers. Specimens with very few isidia can be mistaken for *P. bolliana*, medulla C-, usually with abundant lobules on the thallus surface and edges and conspicuous black dots (pycnidia) on the surface..



## **Usnea**

## **Beard lichens**

**Note:** Usnea species are intolerant of even slight levels of sulphur dioxide. Finding any species of the Usnea genus indicates good air quality with respect to sulphur dioxide. A general description of the Usnea genus is followed by a description of a fairly common species and other Usnea species

**Description:** Fruticose lichens with slender to tapered, hair-like branches, shrubby to pendent; yellowish green to green, never brown or grey; cortex thin or thick, sometimes interrupted by cracks around the branch, medulla thin to thick, dense to cottony; branches always with an elastic cartilaginous central cord that can be revealed by gently pulling the branch apart; many species with isidia and some with soredia or mixtures of isidia and soredia, produced in small spots or scattered over the surface of the branches. Apothecia common on a few species, usually on or close to the branch tips, but rarely produced in most species.

### ***Usnea diplotypus***

### **Ragged beard lichen**

**Description:** Thallus shrubby to almost pendent, yellowish green, with or without a blackened base; main branches 1-1.5 mm wide, branching in unequal dichotomies, with branch tips often twisted and irregular; branches have a central cartilaginous strand; perpendicular side branches and fibrils fairly abundant; short or cylindrical papillae, and sometimes warts, prominent and abundant, especially on the main branches, often forming low ridges that twist around the branches; isidiate soralia common; cortex fairly thin, 9-11%; medulla white, loose or dense, 15-25%; axis broad, 33-45%. Apothecia rare.

**Chemistry:** Medulla PD+ yellow, K+ red, KC-, C- (salazinic acid).

**Habitat:** On trees, mostly conifers.

**Comments:** This species appears to be widespread in the coniferous forest region from coast to coast, perhaps extending southward in the eastern mountains. *Usnea diplotypus* resembles *U. filipendula* but is shrubbier, usually has a thicker medulla, and has thicker main branches (1-1.5 mm). Both are (or can be) abundantly isidiate, and both contain salazinic acid. *Usnea diplotypus* is most easily mistaken for *Usnea subfloridana*, a very common boreal species always having a black base, branching in equal dichotomies, and differing in chemistry. Most North



American specimens contain squamatic acid (PD-, K-, KC-, C-, UV+ blue-white). *Usnea subfloridana* is shrubby to almost pendent, and has a thick cortex and rather cottony medulla. Another common shrubby beard lichen in the northeast is *Usnea hirta*. Its thallus forms short, densely branched, compact tufts rarely over 5 cm long, pale yellowish green, not blackened at the base. Its branches are strongly ridged and angular in cross section, without papillae or soredia, but producing abundant isidia all along the branches. *Usnea hirta* has a thin cortex and loose, cottony medulla, and it contains nothing but usnic acid (medulla PD-, K-).

### ***Xanthoria fallax***

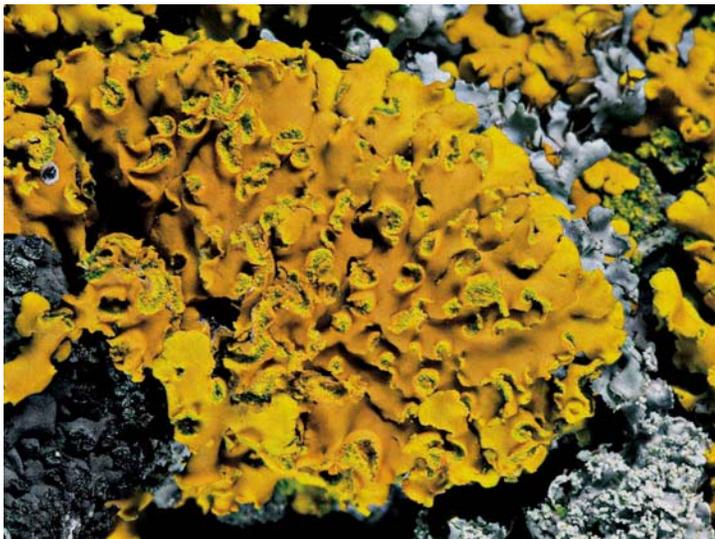
### **Hooded sunburst lichen**

**Description:** Thallus yellow-orange to dark orange, with rather short, narrow to broad lobes with rounded, somewhat divided tips, 0.8-2 mm broad, appressed or raised; soralia lip- or crescent-shaped on the lobe tips, with greenish yellow, powdery soredia that develop within a split between the upper and lower cortices, forming a kind of rounded hood; lower surface white, with white rhizines. Apothecia occasionally seen, mostly 0.7-1 mm in diameter.

**Chemistry:** Cortex K+ dark red-purple (various anthraquinone pigments, especially parietin)

**Habitat:** On the bark of a variety of trees, especially oaks, elms and poplars, less commonly on wood, and rarely on rock. It is commonly seen on roadside trees or trees close to farms.

**Comments:** Among the sorediate species of *Xanthoria* in the northeast, *X. fulva* and *X. ulophyllodes* are most similar to *X. fallax*. *Xanthoria fulva* has narrower, more ascending lobes, lacks rhizines, and the granular soredia are mostly on the lower surface. *Xanthoria ulophyllodes*, also very common, has rhizines like *X. fallax*, but the thallus is more ascending and the coarsely granular soredia develop on the margins or on the upper surface, not between the cortices of the lobe tips.



**KEY TO COMMON URBAN LICHENS OF EASTERN  
ONTARIO AND WESTERN QUEBEC**

Irwin M. Brodo, 26 March 2004

1. Thallus fruticose, pendent or shrubby, attached at a single point .....2
  1. Thallus foliose or crustose, not pendent or shrubby ..... 3
  2. Branches round in cross section, with a somewhat elastic central cord  
surrounded by a thin or loose medulla; soralia, if present, in small round  
patches..... *Usnea species*
  2. Branches irregular or angular in cross section, with a uniformly cottony  
medulla; soredia granular, produced along ridges..... *Evernia mesomorpha*
  3. Thallus bright yellow, orange, yellowish green or grass green when dry ..... 4
  3. Thallus grey or brownish when dry, without yellowish tint, and not grass-  
green .....7
  4. Thallus yellowish green or grass-green, with broad, rounded lobes; coarse  
granular soredia produced in patches on upper surface of lobes  
.....*Flavoparmelia caperata*
- [Note: Species of *Flavopunctelia* can resemble *Flavoparmelia*, but they have tiny white dots on the upper surface of the lobe tips, and the medulla turns C+ red; *Flavoparmelia caperata* is C-.]
4. Thallus bright yellow or orange ..... 5
  5. Thallus orange or orange-yellow, turning deep purple with KOH; thallus with  
small upturned lobes having granular soredia in crescent-shaped “hoods”  
..... *Xanthoria fallax*
  5. Thallus yolk-yellow, unchanged with KOH ..... 6

6. Thallus with minute foliose lobes, finely divided, with granular soredia along the margins..... *Candelaria concolor*
6. Thallus crustose (i.e., without any trace of foliose lobes even when examined closely with a hand lens), with tiny granular areoles less than 0.5 mm in diameter breaking down into powdery soredia ..... *Candelariella efflorescens*
7. Thallus crustose, thin, forming a whitish stain on the bark, with script-like, elongate and often branched, black fruiting bodies..... *Graphis scripta*
7. Thallus foliose (sometimes with minute, scale-like lobes); fruiting bodies, if present, disk- or cup-shaped, not elongate ..... 8
8. Thallus very large; lobes 8-30 mm across with conspicuous ridges and depressions; soredia and/or isidia along lobe margins and ridges  
..... *Lobaria pulmonaria*
- [Note: This is not really a “common urban lichen,” but it is included here to represent the most pollution sensitive part of the sensitivity spectrum.]
8. Thallus smaller, with lobes 0.5-5 mm across ..... 9
9. Thallus without soredia, isidia or granules; lower surface white with white rhizines; upper surface turning KOH+ yellow ..... 10
9. Thallus with soredia, isidia or granules on lobe margins or surface; lower surface white, brown or black; upper surface KOH+ yellow or KOH- .....11
10. Thallus lobes covered with vague white spots or blotches giving it a mottled appearance; lobe tips flat or slightly concave; medulla (as well as the upper cortex) turning yellow with KOH ..... *Physcia aipolia*
10. Thallus uniform in colour, without white spots; lobe tips tend to be convex; medulla negative with KOH, although the upper cortex is KOH+ yellow  
..... *Physcia stellaris*

11. Thallus with isidia on upper surface and/or lobe margins ..... 12
11. Thallus with soredia or granules on the lobe margins or tips, or upper surface  
..... 13
12. Lower surface of thallus, and rhizines, pale tan; lobes spotted with white dots  
(pseudocyphellae); medulla C+ red, KOH- ..... *Punctelia rudecta*
12. Lower surface of thallus, and rhizines, black; lobes with a network of irregular  
white spots and ridges, appearing like hammered metal; medulla C-, KOH+  
yellow changing to blood red ..... *Parmelia squarrosa*
13. Thallus dark olive to brown or greyish brown ..... 14
13. Thallus pale grey to dark grey or greenish grey, sometimes slightly browned at  
the lobe tips ..... 16
14. Medulla bright red-orange lobes less than 2 mm across  
..... *Phaeophyscia rubropulchra*
14. Medulla white or very pale yellowish; lobes usually more than 2 mm  
across..... 15
15. Thallus brown to grey-brown, sometimes green when wet; lobe tips, and  
sometimes the surface, conspicuously “frosted” with a fine to coarse white  
pruina; soredia along the margins of the lobes; rhizines branched like a bottle-  
brush; medulla C- ..... *Physconia detersa* (in the broad sense)
15. Thallus olive to brown, never greyish; surface not at all “frosted” with a white  
pruina; granular soredia and/or slender, cylindrical isidia in irregular patches  
on upper surface (not lobe margins); rhizines unbranched; medulla C+ red  
..... *Melanelia subaurifera*
16. Lobe tips, and sometimes the surface, conspicuously “frosted” with a fine to  
coarse white pruina (see couplet 15)..... *Physconia detersa* (in the broad sense)

16. Lobe tips not at all “frosted” with white pruina ..... 17
- 17 Lobes 2-5 mm across, squarish, the surface covered with a network of ridges and depressions and appearing like hammered metal; powdery soredia forming on many of the ridges and on the lobe margins; lower surface of lobes black except for the margins; medulla KOH+ yellow changing to blood red  
..... ***Parmelia sulcata***
17. Lobes mostly under 2 mm across, without ridges or depressions; medulla KOH- ..... 18
18. Lower surface black, with black rhizines (sometimes with white tips) ..... 19
18. Lower surface white, with white rhizines ..... 20
19. Medulla bright orange or red-orange; soredia on the lobe margins and upper surface ..... ***Phaeophyscia rubropulchra***
19. Medulla white; soredia mostly on the lobe tips ..... ***Phaeophyscia adiastrata***
20. Thallus ascending, with lobe tips inflated and hood-like, the hoods containing granular soredia; long hair-like “cilia” growing from the lobe tips; upper surface KOH+ yellow. .... ***Physcia adscendens***
20. Thallus more or less flat, although sometimes with crowded lobes; soredia not produced in inflated, hood-shaped structures at the lobe tips; cilia absent or, if present, short..... 21
21. Lobes very finely divided and lacy, with coarse granules or granular soredia forming along the margins; cilia absent; upper surface KOH+ yellow  
..... ***Physcia millegrana***
21. Lobes not finely divided; short cilia sometimes present; upper surface KOH-  
..... 22

22. Granular soredia only along the margins of the lobes and on the lobe tips  
..... *Physciella chloantha*
22. Granular soredia produced on the thallus surface, and often on the lobe  
margins and lobe tips as well..... *Physciella melanchra*.

