

**CATAPYRENIUM**

**Catapyrenium Flotow**

**The Stipplescale Lichens**

**Minute** to occasionally small **stratified squamulose lichens**, corticate above, corticate or not below, lacking isidia and soredia, squamules attached to substrate by entire lower surface, or by central portions only, closely appressed to loosely appressed, subrotund to rotund, thin to thick, averaging to 0.4–3 mm wide. Upper surface **greyish to reddish brown**. Lower surface becoming blackish, **lacking rhizines**, though usually bearing hairlike rhizohyphae. Medulla white. Photobiont green.

Ascocarp a **perithecium**, immersed in upper surface, appearing blackish from above; spores simple (but occasionally appearing 2-celled, owing to oil droplets), ellipsoid, colourless, 8 per ascus.

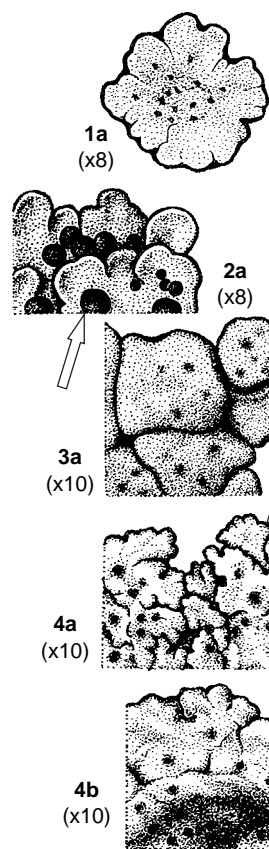
**Over moss and soil.**

References: Thomson (1987, 1989); Goward and Thor (1992); Breuss (1993); Goward et al. (1994a).

Common Name: Suggested by the general scale-like appearance and by the presence of dot-like perithecia over the upper surface.

Notes: Of the 16 species of *Catapyrenium* reported for North America, only three are known to occur in B.C. The species listed here have until recently been included in *Dermatocarpon*. Chemistry is of no diagnostic value in this genus and has been omitted in the following species accounts.

**Key to *Catapyrenium* and Similar Lichens**



- 1a Lobes pale or occasionally dark, but never reddish brown; restricted to lowland intermontane localities; spores multi-celled/muriform, brownish, intermixed with algal cells ..... ***Endocarpon pusillum***
- 1b Lobes pale or reddish brown; widespread; spores 1-celled/simple, colourless, never intermixed with algal cells ..... 2
- 2a Fruiting bodies (apothecia) more or less hemispherical(←), located on upper surface; lobes attached mostly along one edge, opposite margin often somewhat raised; tending to form overlapping/imbricate colonies ..... ***Psora globifera*** (and others)
- 2b Fruiting bodies (perithecia) appearing dot-like from above, immersed in upper surface; lobes attached over central portion of lower surface, appressed throughout or margins somewhat raised all around; thalli rarely overlapping ..... 3
- 3a Lobes strong reddish brown (rarely pale), attached to substrate by predominantly pale woolly hairs/rhizohyphae; spores 11–18 μ long, aligned in the ascus in single row (i.e., uniseriate); over soil in inland localities at all elevations ..... ***Catapyrenium squamulosum***
- 3b Lobes pale greyish brown, attached by uniformly dark woolly hairs/rhizohyphae; spores 16–23 μ long, aligned in the ascus in two rows (i.e., biseriate); restricted to subalpine and alpine localities ..... 4
- 4a Lobe margins finely lobulate(←); lower surface dark, corticate, rhizohyphae growing out of distinct lower cortex ..... ***Catapyrenium cinereum***
- 4b Lobe margins at most coarsely lobulate; lower surface lacking a lower cortex, medullary hyphae grading downward into minute, rhizine-like hairs/rhizohyphae ..... ***Catapyrenium daedaleum***

***Catapyrenium cinereum* (Pers.) Körber**

Map 8

Ashen stipplescale

Habitat/Range: Rare over moss and humus in open inland subalpine and alpine sites; circumpolar, N to YU, S to CA.

***Catapyrenium daedaleum* (Krempelh.) B. Stein**

Map 9

Ashen stipplescale

Habitat/Range: Rare over moss and humus in open inland subalpine and alpine sites; circumpolar, N to BC, S to CO.

**Catapyrenium squamulosum (Ach.) O. Breuss**

Brown stippled scale

Habitat/Range: Common over base-rich soil in open inland sites, especially in BG zone, but also occasionally in exposed alpine sites; circumpolar, N to AK, S to MX.

Notes: The B.C. material was previously identified as *C. lachneum* (Ach.) R. Sant. That species, however, is characterized by conspicuous black pycnidia that appear as knoblike projections along the margins of the lobes and contain cylindrical pycnospores 5–7 μ long. In *C. squamulosum*, by contrast, the pycnidia are dot-like and immersed in the upper surface (thus resembling the perithecia) and the pycnospores are oblong and 2.5–4.5 μ long. *Catapyrenium lachneum* is not yet reliably documented in B.C., but is expected to occur in alpine localities (O. Breuss, Wien, pers. comm., 1993).

**CAVERNULARIA**

**Cavernularia Degel.**

**The Saguaro Lichens**

**Small stratified foliose lichens**, corticate above and below, sorediate or not, lobes closely appressed, elongate, averaging to 1 mm wide, thin. Upper surface **whitish**. Lower surface black, shiny, **lacking rhizines, dimpled with numerous minute pits**. Medulla white. Photobiont green.

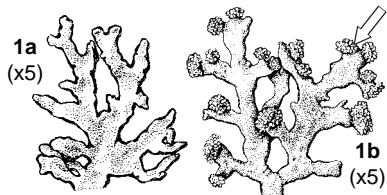
Apothecia located over upper surface, disc brownish; spores simple, globose, colourless, 8 per ascus.

Over conifer branches and lignum.

References: Degelius (1937); Ahti and Henssen (1965).

Common Name: Emphasizes the numerous tiny pits/cavernulae present over the lower surface (i.e., resembling a dead saguaro).

Notes: The genus *Cavernularia* contains only two species, both of which occur in B.C.



- 1a Thallus without soredia; apothecia generally present ..... ***Cavernularia lophyrea***
- 1b Thallus sorediate(←); apothecia rare ..... ***Cavernularia hultenii***

**Cavernularia hultenii Degel.**

Powdered saguaro

Habitat/Range: Frequent over conifers at lower elevations in open coast forests, also rare in ICH zone; western N Am–eastern N Am–western Eurasia, N to AK, S to CA.

Reactions: Cortex K+ yellow; medulla KC+ reddish.

Contents: Atranorin and physodic acid.

**Cavernularia lophyrea (Ach.) Degel.**

Eyed saguaro

Habitat/Range: Infrequent over conifers at lower elevations in open coast forests, especially in hypermaritime localities; western N Am, N to AK, S to CA.

Reactions: Cortex K+ yellow; medulla KC+ reddish.

Contents: Atranorin and physodic acid.

**CETRARIA**

**Cetraria Ach.**

**The Icelandmoss Lichens (and others)**

Small to large **stratified foliose lichens**, corticate above and below, sorediate or not, lobes rather closely appressed to **semi-erect or erect**, short to more often **elongate**, averaging to 0.5–10 (–12) mm wide, thin to somewhat thick, occasionally bearing **protruberant marginal pycnidia or cilia**. Upper surface **brownish, blackish, or brightly coloured; lower surface coloured alike with upper surface**, often lacking rhizines. Medulla white (rarely yellow). Photobiont green.

**Apothecia located along lobe margins**, disc brown or black; spores simple, spherical or ellipsoid, colourless, 8 per ascus.

References: Esslinger (1971, 1973); Kärnefelt (1979); Mattsson (1993); Mattsson and Lai (1993).

Common Names: Several are assigned to this genus, reflecting its very heterogeneous circumscription:

“Brown” is applied to two species (*C. commixta* and *C. hepatizon*), stressing their surface colour and, more importantly, their generic similarity with other lichens of that name (i.e., members of *Melanelia* and *Neofuscellia*).

“Icelandmoss” is the traditional name given to *Cetraria islandica* and its allies.

“Paperdoll” is a fanciful name applied to two species (*C. cucullata* and *C. nivalis*), referring to their pale, upright, “cut-out” lobes.

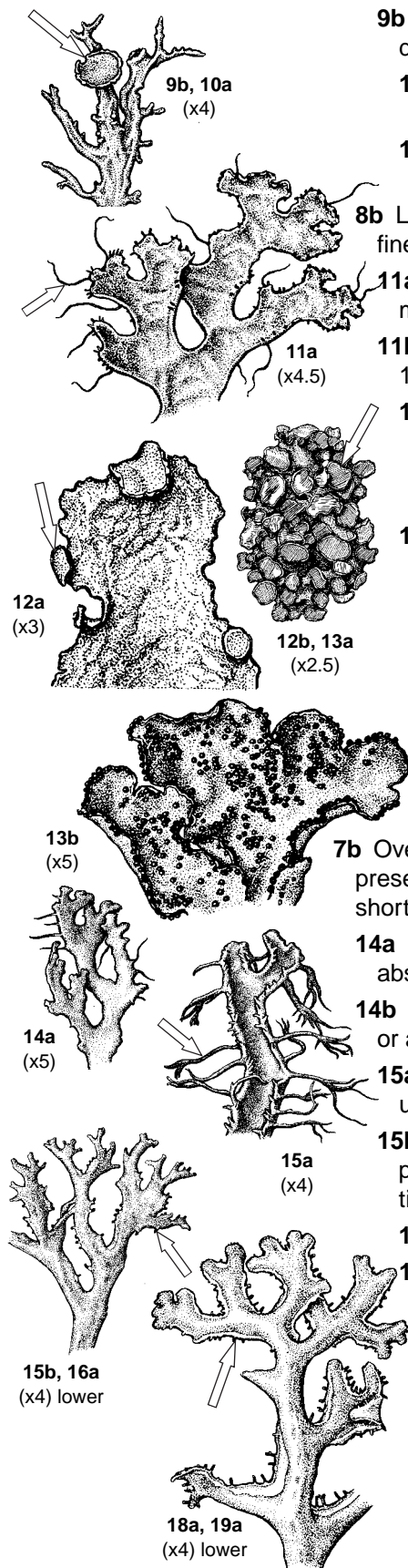
“Ruffle” is applied to several species, describing their typically wrinkled upper surface.

“Thornbush” is applied to two species (*C. californica* and *C. merrillii*), conveying their spiny, shrub-like habit.

Notes: Thirty-eight species of *Cetraria* are reported for North America. Nineteen of these occur in B.C. As presently delimited, *Cetraria* is a heterogeneous genus. Although several species groups are segregated from it as distinct genera (e.g., *Asahinea*, *Cetrelia*, *Esslingeriana*, *Masonhalea*, *Platismatia* and *Vulpicida*), a number of other species and species groups also deserve generic rank. Recently Hale (1987) transferred some of these to *Tuckermannopsis*. This disposition, however, seems more nomenclatural than taxonomic and is not followed here. Also not accepted here (pending further study) is the separate genus *Allocetraria* (Randlane and Saag 1992).

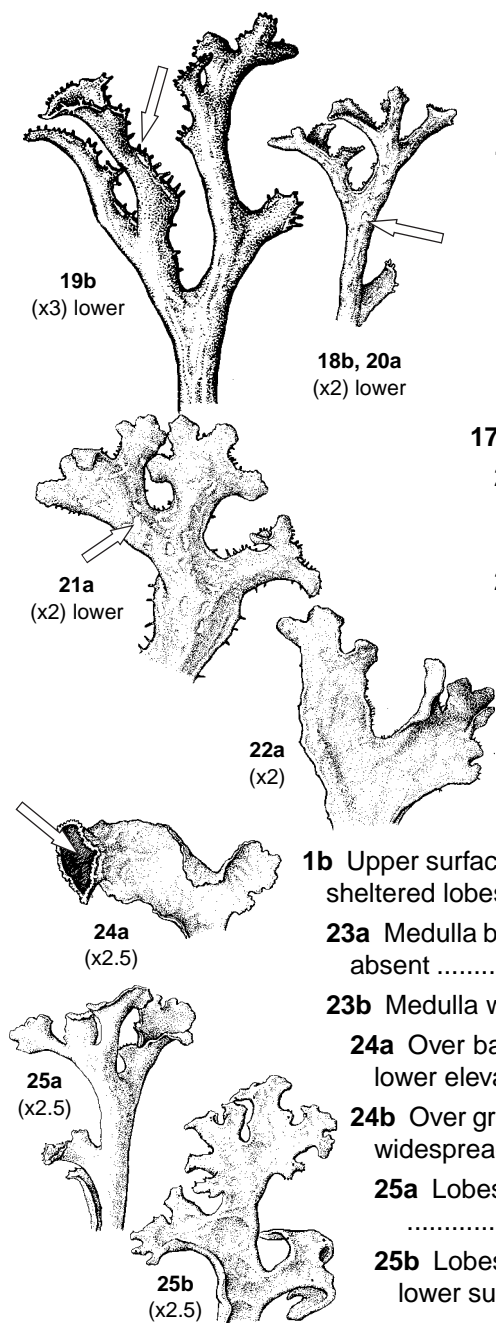
**Key to *Cetraria* and Similar Lichens**

<p>2a (x3)</p>	<p>1a Upper surface essentially dark: olive-green, brown or blackish ..... 2</p>
<p>5a (x8)</p>	<p>2a Soredia present(←), located along margins of lobes, occasionally intermixed with isidia ..... <b><i>Cetraria chlorophylla</i></b></p>
<p>5b, 6a (x8)</p>	<p>2b Soredia absent; true isidia also absent ..... 3</p>
<p>6b (x8)</p>	<p>3a Growing directly over rock ..... 4</p>
<p>9a (x6)</p>	<p>4a Thallus tough, wiry, difficult to cut; lobes raised to semi-erect, attached to substrate only at base; rhizines absent; alpine ..... (<b><i>Cornicularia normoerica</i></b>)</p>
	<p>4b Thallus more delicate, usually readily cut; lobes more broadly attached to substrate; rhizines present; distribution various ..... 5</p>
	<p>5a Pseudocyphellae scattered over upper surface(←) (check lobe tips); pycnidia absent or, if present, then immersed, never erect-cylindrical; medulla thickish; rhizines marginal or scattered over lower surface ..... ..... <b><i>“Cetraria” agnata</i></b> (and others) (see key to <b><i>Melanelia</i></b>)</p>
	<p>5b Pseudocyphellae and pycnidia usually restricted to lobe margins(←), pycnidia erect and cylindrical; medulla thin; rhizines located only along lobe margins ..... 6</p>
	<p>6a Lobes usually elongate-linear; lobe margins somewhat rimmed; lower surface blackening; pseudocyphellae located strictly along lobe margins or submarginal over upper surface; medulla KC- ..... <b><i>Cetraria hepatizon</i></b></p>
	<p>6b Lobes usually rather short; lobe margins not distinctly rimmed; lower surface pale; pseudocyphellae strictly marginal (i.e., positioned at right angles to upper surface); medulla KC+ reddish or KC- ..... <b><i>Cetraria commixta</i></b></p>
	<p>3b Growing over bark, wood, earth or humus ..... 7</p>
	<p>7a Over trees and shrubs; pseudocyphellae absent over lower surface; lobes short to occasionally elongate, margins usually even (i.e., lacking short projections, though marginal cilia may be present) ..... 8</p>
	<p>8a Lobes dark olive-green to blackish or, if distinctly greyish or brownish, then finely dissected and shrub-like at maturity ..... 9</p>
	<p>9a Lobes dark olive-green to blackish, usually averaging to more than 1 mm wide; apothecial disc blackish(←); primarily intermontane (but rare also in CDF zone) ..... <b><i>Cetraria merrillii</i></b></p>



- 9b** Lobes greyish or reddish brown, averaging to less than 1 mm wide; apothecial disc blackish or brownish(←); distribution various ..... 10
- 10a** Lobes grey or greyish brown, averaging to 1.5 cm long; apothecial disc blackish; hypermaritime; rare ..... *Cetraria californica*
- 10b** Lobes brown or reddish brown, averaging to more than 2 cm long; apothecial disc reddish brown; intermontane; common ..... (*Bryoria abbreviata*)
- 8b** Lobes pale olive-green to dark brown, sparsely to moderately branched, but never finely dissected or shrub-like ..... 11
- 11a** Lobe margins bearing long, slender cilia(←), these averaging to 3–6 mm long; medulla KC+ reddish ..... *Cetraria ciliaris* var. *halei*
- 11b** Lobe margins naked or at most bearing very short cilia, these averaging to 1 mm long; medulla KC- ..... 12
- 12a** Lobes averaging to 4–12 mm wide at maturity; lower surface generally same colour as upper surface; apothecia often present(←), but rarely dominating lobes; medulla often pale yellow (and then K+ yellowish) near apothecia ..... *Cetraria platyphylla*
- 12b** Lobes generally averaging to 1–5 mm wide at maturity; lower surface generally distinctly paler than upper surface; apothecia frequently dominating lobes(←); medulla white (and K-) throughout ..... 13
- 13a** Thallus distinctly cushion-forming, generally less than 1 cm across when mature; upper surface usually smooth; pycnidia sparse; over deciduous trees and shrubs, especially birch and soopalallie ..... *Cetraria sepincola*
- 13b** Thallus mat-forming to rarely cushion-forming, averaging to 3–7 cm across at maturity (Note: some forms can be smaller); upper surface wrinkled at maturity; pycnidia generally numerous; over deciduous and coniferous trees ..... *Cetraria orbata*
- 7b** Over earth, humus or occasionally on branches at bases of shrubs; pseudocyphellae present or absent over lower surface; lobes generally elongate, margins often bearing short projections and/or cilia ..... 14
- 14a** Lobes averaging to less than 1 mm wide, more or less flat; pseudocyphellae absent ..... *Phaeophyscia constipata*
- 14b** Lobes averaging to more than 2 mm wide, often concave; pseudocyphellae present or absent ..... 15
- 15a** Lobe margins ciliate(←), cilia averaging to 0.5–2 mm long; lobes blackening; usually alpine; northernmost regions ..... *Cetraria nigricans*
- 15b** Lobe margins lacking cilia (Note: marginal projections(←) may, however, be present, these averaging to 0.1–1 mm long); lobes at most dark brown; distribution various ..... 16
- 16a** Medulla KC+ reddish; alpine; northernmost regions ..... *Cetraria delisei*
- 16b** Medulla KC-; ecology and distribution various ..... 17
- 17a** Lobes strongly concave to conspicuously inrolled along margins, with or without distinct central axis that runs length of lobes ..... 18
- 18a** Pseudocyphellae more or less submarginal over lower surface (i.e., restricted to near lobe margins)(←) ..... 19
- 19a** Thallus lobes with a distinct central axis running length of lobes; pseudocyphellae frequently forming almost continuous line averaging 0.3–1 mm wide(←); alpine; northernmost regions; medulla PD+ orange ..... *Cetraria laevigata*





- 19b Thallus lobes usually dichotomously branched, central axis usually not running length of lobes; pseudocyphellae distributed in discontinuous patches or forming a narrow line averaging 0.1–0.2 mm wide(←); widespread; medulla PD- ..... ***Cetraria ericetorum* ssp. *reticulata***
- 18b Pseudocyphellae scattered over entire lower surface(←) (check broader lobes), usually including near the lobe margins ..... 20
- 20a Submarginal pseudocyphellae generally poorly developed, inconspicuous; widespread in subalpine and alpine habitats; medulla PD+ orange or rarely PD- ..... ***Cetraria islandica* ssp. *crispiformis***
- 20b Submarginal pseudocyphellae generally well developed and distinct, often forming an almost continuous line; hypermaritime; medulla PD- ..... [ ***Cetraria islandica* ssp. *orientalis*** ]
- 17b Lobes flat or weakly concave, without distinct central axis ..... 21
- 21a Pseudocyphellae scattered over entire lower surface(←) (check broader lobes); medulla PD+ orange or rarely PD- ..... ***Cetraria islandica* ssp. *islandica***
- 21b Pseudocyphellae mostly located along margins of lower surface (i.e., restricted to near lobe margins); medulla PD- ..... 22
- 22a Upper surface smooth; lobe margins bearing projections to 0.1–0.5 mm long; apothecia, if present, located along lobe margins; alpine and subalpine ..... ***Cetraria subalpina***
- 22b Upper surface generally wrinkled at maturity; lobe margins bearing projections to 0.3–1.0 mm long; apothecia, if present, restricted to lobe tips; widespread .... ***Cetraria ericetorum* ssp. *reticulata*** (see lead 19b)
- 1b Upper surface sometimes partly brownish in exposed localities, but otherwise pale (check sheltered lobes) yellowish or pale greenish ..... 23
- 23a Medulla bright yellow; upper surface yellow to occasionally greenish; soredia present or absent ..... ***Vulpicida***
- 23b Medulla white; upper surface yellowish green; soredia absent ..... 24
- 24a Over bark; lobes proportionately short and broad; apothecia generally present (←); lower elevations; intermontane ..... ***Cetraria pallidula***
- 24b Over ground; lobes more or less elongate; apothecia rare; mainly subalpine to alpine; widespread ..... 25
- 25a Lobes more or less curling inward along margins; upper and lower surface smooth ..... ***Cetraria cucullata***
- 25b Lobes flat to weakly concave (i.e., lobe margins never strongly infolded); upper and lower surfaces wrinkled when mature. .... ***Cetraria nivalis***

***Cetraria californica* Tuck.**

Map 10

(Syn. *Cornicularia californica* (Tuck.) Du Rietz)

Seaside thornbush

Habitat/Range: Rare over shore pine, in open coast forests at lower elevations, especially hypermaritime localities; western N Am, N to BC, S to CA.

Reactions: All spot tests negative.

Contents: No lichen substances reported.

***Cetraria chlorophylla* (Willd. in Humb.) Vainio**(Syn. *Tuckermannopsis chlorophylla* (Willd. in Humb.) Hale)

Shadow ruffle

Habitat/Range: Common over coniferous and deciduous trees and shrubs in open to shaded forests throughout, except probably absent from boreal regions; incompletely circumpolar, N to AK, S to CA.

Reactions: All spot tests negative.

Contents: Protocetraric and rangiformic acids.

***Cetraria ciliaris* Ach. var. *halei* (Culb. & C. Culb.) Ahti**(Syn. *Tuckermannopsis americana* (Sprengel) Hale)

Fringed ruffle

Habitat/Range: Frequent over trees, especially conifers, in open lowland forests throughout; N Am, N to AK and YU, S to OR.

Reactions: Medulla KC+ reddish, UV+ white.

Contents: Alectoronic and alpha-collatolic acids.

Notes: Only var. *halei* has been reported for B.C.***Cetraria commixta* (Nyl.) Th. Fr.**

Map 11

(Syn. *Cetraria fahlunensis* (L.) Schreber)

Rock brown

Habitat/Range: Infrequent over acid rock in open inland localities, also rare in coast localities; circumpolar, S to CO.

Reactions: Medulla KC+ reddish.

Contents: Alectoronic acid or alpha-collatolic acid and one unknown (or occasionally no substances present).

Notes: For points of distinction with similar species, see the key under *Melanelia*. *Cetraria commixta* is said to have a pale lower surface, whereas in the related *C. hepatizon* the lower surface is black. In the B.C. material, however, these characters are variable.***Cetraria cucullata* (Bellardi) Ach.**(Syn. *Allocetraria cucullata* (Bellardi) Randl. & Saag)

Curled snow (Furled paperdoll, Curled Cetraria)

Habitat/Range: Common over ground in open inland alpine and subalpine sites, also rare at lower elevations in dry localities on leeward side of ridges; circumpolar, S to NM.

Reactions: Cortex KC+ yellowish.

Contents: Protolichesterinic and usnic acids.

***Cetraria delisei* (Bory ex Schaerer) Nyl.**

Map 12

(Syn. *Cetraria hiascens* (Fr.) Th. Fr.)

Icelandmoss

Habitat/Range: Infrequent over sheltered ground in open northern alpine localities; circumpolar, S to northern BC.

Reactions: Medulla C+ reddish, KC+ reddish.

Contents: Gyrophoric and hiassic acids.

***Cetraria ericetorum* Opiz ssp. *reticulata* (Räsänen) Kärnef.**

Icelandmoss

Habitat/Range: Frequent over ground in open inland forests and alpine sites; N Am, N to AK, S to OR.

Reactions: All spot tests negative.

Contents: Lichesterinic acid and two unidentified substances.

Notes: The type locality of ssp. *reticulata* is given as "Kamloops."***Cetraria hepatizon* (Ach.) Vainio**

Rock brown

Habitat/Range: Frequent over acid rock in open sites throughout; circumpolar, S to AZ.

Reactions: Medulla K+ yellowish or becoming orangish, PD+ orangish.

Contents: Norstictic and stictic acids (occasionally in trace amounts, rarely absent).

Notes: For points of distinction with similar species, see the key under *Melanelia*. Also see notes under *C. commixta*.

***Cetraria islandica* (L.) Ach.**

Icelandmoss

Notes: Two subspecies of *C. islandica* occur in B.C., distinguished by the characters outlined in the above keys. A third subspecies, ssp. *orientalis* (Asah.) Kärnef., has also been reported, but no specimens have been examined by us.

**- ssp. *crispiformis* (Räsänen) Kärnef.**

Habitat/Range: Infrequent over ground in open subalpine and alpine sites throughout, except probably rare in boreal regions; incompletely circumpolar, S to WA.

Reactions: Medulla K- or K+ yellowish, PD+ yellowish or reddish or PD-.

Contents: Lichesterinic and protolichesterinic acids (and fumarprotocetraric acid).

**- ssp. *islandica***

Habitat/Range: Frequent over ground in open inland forests and alpine localities; circumpolar, S to MX.

Reactions: Medulla K- or K+ yellowish, PD+ yellowish or reddish or PD-.

Contents: (Fumarprotocetraric, lichesterinic and protolichesterinic acids, and rarely two unknown substances.)

***Cetraria laevigata* Rass.**

Map 13

Icelandmoss

Habitat/Range: Infrequent over ground in open inland alpine and subalpine localities in northern regions; incompletely circumpolar, S to northern BC.

Reactions: Medulla K+ yellowish or rarely K-, PD+ reddish or rarely PD-.

Contents: Fumarprotocetraric, lichesterinic and protolichesterinic acids.

***Cetraria merrillii* Du Rietz**(Syn. *Tuckermannopsis merrillii* (Du Rietz) Hale)

Blackened thornbush

Habitat/Range: Common over conifers, especially lodgepole pine, in open intermontane and maritime forests; western N Am, N to YU, S to CA, though also known from one locality in Spain.

Reactions: All spot tests negative.

Contents: Two unknown fatty acids.

***Cetraria nigricans* Nyl.**

Map 14

Blackened icelandmoss

Habitat/Range: Rare over ground in open dry alpine localities in northern regions; circumpolar, S to northern BC.

Reactions: All spot tests negative.

Contents: Lichesterinic and protolichesterinic acids.

***Cetraria nivalis* (L.) Ach.**(Syn. *Allocetraria nivalis* (L.) Randl. & Saag)

Ragged snow (Ragged paperdoll)

Habitat/Range: Common over ground in open inland alpine and subalpine localities, also infrequent on leeward sides of ridges at lower elevations in dry regions; circumpolar, S to NM.

Reactions: Cortex KC+ yellow.

Contents: Protolichesterinic and usnic acids.

***Cetraria orbata* (Nyl.) Fink**(Syn. *Tuckermannopsis orbata* (Nyl.) Lai)

Variable ruffle

Habitat/Range: Common over conifers and deciduous trees and shrubs, especially Douglas-fir, in open intermontane and maritime forests; western N Am – eastern N Am, N to BC, S to CA.

Reactions: All spot tests negative.

Contents: Protolichesterinic acid.

**Cetraria pallidula Tuck. ex Riddle**

(Syn. *Tuckermannopsis pallidula* (Tuck. ex Riddle) Hale)

Pallid ruffle

Habitat/Range: Infrequent over conifers, especially Douglas-fir, in open, but somewhat humid, intermontane forests at lower elevations, also rare in maritime forests; western N Am, N to BC, S to CA.

Reactions: Cortex KC+ yellow or apparently KC-.

Contents: Caperatic and usnic acids and an unknown fatty acid.

Notes: Abnormally pale specimens of *C. platyphylla* and especially *C. orbata* might be mistaken for *C. pallidula*. Neither of the former species, however, are distinctly yellowish green.

**Cetraria platyphylla Tuck.**

(Syn. *Tuckermannopsis platyphylla* (Tuck.) Hale)

Weathered ruffle

Habitat/Range: Frequent over conifers in open inland forests, usually at lower elevations, also rare in dry maritime localities; western N Am, N to YU, S to CA.

Reactions: Medulla K- or in part K+ yellow and KC+ yellowish or orangish.

Contents: (Atranorin and an unidentified fatty acid.)

**Cetraria sepincola (Ehrh.) Ach.**

(Syn. *Tuckermannopsis sepincola* (Ehrh.) Hale)

Eyed ruffle (chocolate shield)

Habitat/Range: Frequent over deciduous shrubs, especially scrub birch, in open inland thickets and open forests, essentially boreal; circumpolar, S to WA.

Reactions: All spot tests negative.

Contents: Protolichesterinic acid.

**Cetraria subalpina Imsh.**

Icelandmoss

Habitat/Range: Frequent over lower branches of shrubs, also infrequent over ground, in snowy subalpine forests throughout, rare in alpine; western N Am, N to AK, S to OR.

Reactions: All spot tests negative.

Contents: Lichesterinic acid and two unknown substances.

**CETRELIA**

**Cetrelia Culb. & C. Culb.**

**The Rag Lichens**

**Medium to large stratified foliose lichens**, corticate above and below, **sorediate**, lobes loosely appressed to loosely attached, short, thin, averaging to 1–1.5 cm wide. Upper surface whitish or pale tan, **pseudocyphellate**. Lower surface mostly black, shiny, bearing sparse, short simple rhizines. Medulla white. Photobiont green.

Apothecia unknown in B.C. material.

Reference: Culberson and Culberson (1968).

Common Name: Describes the broad, pale, somewhat uneven lobes of the species.

Notes: *Cetrelia* is essentially a temperate genus consisting of about 14 species worldwide. Five of these are reported for North America, though only one is known to occur in B.C. For points of distinction with similar species in other genera, see the key under *Platismatia*.

**Cetrelia cetrarioides (Delise ex Duby) Culb. & C. Culb.**

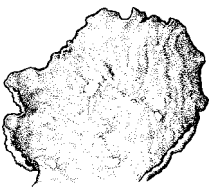
Speckled rag

Habitat/Range: Infrequent over deciduous trees and shrubs, also rare over mossy rock, in open coastal forests at lower elevations, also rare in old-growth intermontane forests; incompletely circumpolar, N to AK, S to OR.

Reactions: Cortex K+ yellow; medulla KC- or KC+ reddish.

Contents: Atranorin and (perlatolic and imbricatic acids).

Notes: *Cetrelia cetrarioides* is very similar to *C. olivetorum* (Nyl.) Culb. & C. Culb. and is often treated as a chemotype of that species.



(x2)



COLLEMA

**Collema Wigg.**

**The Tarpaper Lichens**

Minute to occasionally large **nonstratified foliose lichens (gelatinous when wet), lacking true cortex**, (except cortex present on apothecial margin: see below) isidiate or not, lobes closely appressed to semi-erect, 0.5–10 (–15) mm wide, **thin to thick**. Upper surface **dark olive brownish or blackish** (ours), **dull**. Lower surface dark, rhizines absent or rarely present. Medulla absent. **Photobiont blue-green**.

Apothecia located over upper surface or marginal, with thalline margin, disc reddish brown; spores 2- to multi-celled, ellipsoid to needle-shaped/acicular, (4–) 8 per ascus.

Over bark, earth and rock, usually base-rich.

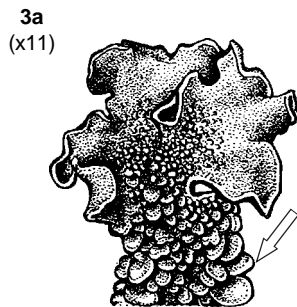
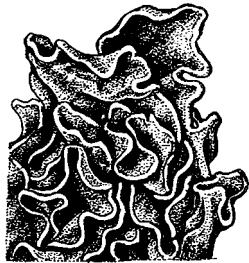
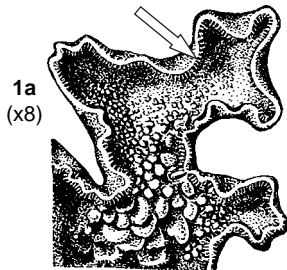
References: Degelius (1954, 1974, 1979).

Common Name: Stresses the blackish nonstratified medulla that becomes somewhat swollen, translucent and jellylike when moistened.

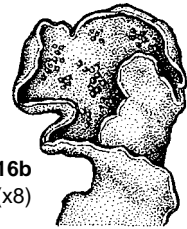
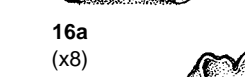
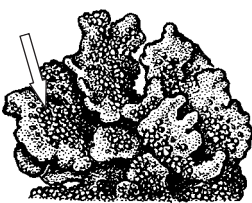
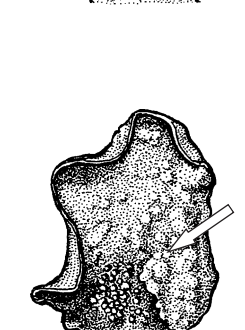
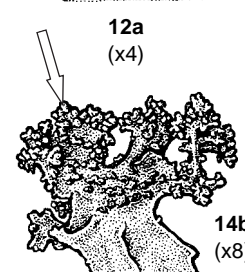
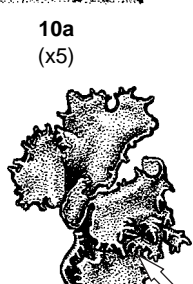
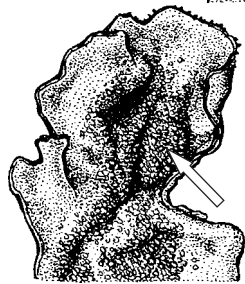
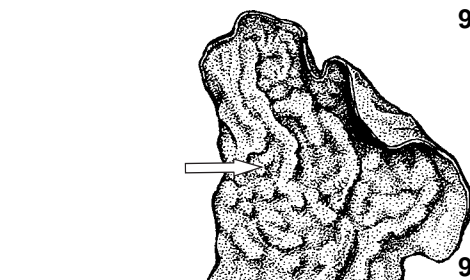
Notes: *Collema* is a taxonomically difficult genus comprising about 80 species, of which 35 are known to occur in North America and 20 in B.C. Chemistry is of no diagnostic value in this genus.

Two keys are provided. The first key emphasizes macroscopic vegetative characters, though spore characters have been incorporated in some places. The second key, to nonisidiate species, stresses spore characters and is more technical.

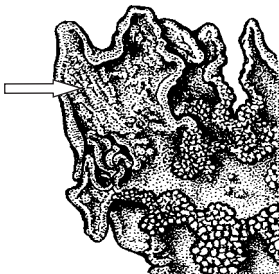
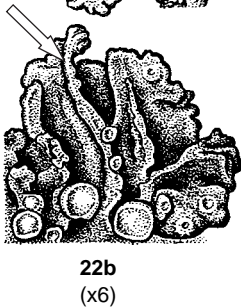
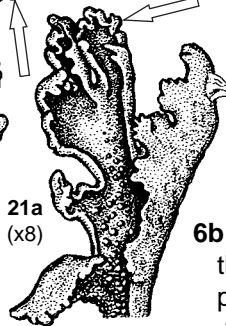
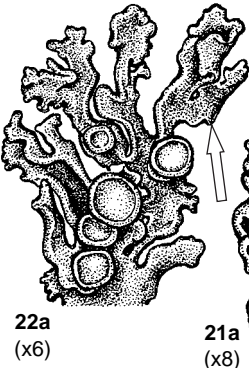
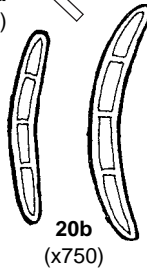
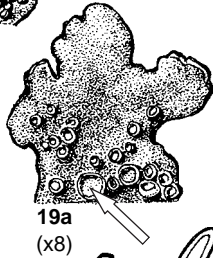
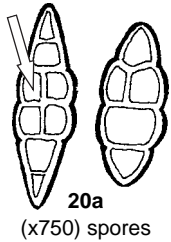
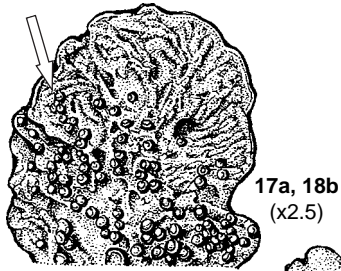
**Key to *Collema* and Similar Lichens Emphasizing Vegetative Characters**



- 1a Lobe margins and/or isidia bearing minute, erect white hairs(←) ..... ***Leptochidium albociliatum***
- 1b Lobe margins hairless; isidia, if present, also lacking hairs ..... 2
- 2a Thallus somewhat appressed to more often erect and essentially fruticose; lobes averaging to 3–5 (–10) mm long x 0.5 (–0.8) mm wide; over soil or rock in humid coastal localities; rare ..... (***Lempholemma radiatum***)
- 2b Thallus foliose or, if somewhat fruticose, then lobes proportionally much shorter and broader; habitat and distribution various ..... 3
- 3a Lobes jet black above and below, except sometimes covered in whitish pruina; thallus cushion-forming, central lobes more or less erect; over rock; inland, restricted to arid climates ..... ***Gonohymenia nigritella***
- 3b Lobes brownish to olive-brownish or blackish, but never jet black above and below; rarely pruinose; habit, substrate and distribution various ..... 4
- 4a Isidia present, these mostly flattened and scalelike(←) at maturity; scalelike lobules therefore rather common over upper surface ..... 5
- 5a Lobes averaging to more than 6 mm wide; lobe margins plane ..... ***Collema flaccidum***
- 5b Lobes averaging to less than 4 (–5) mm wide; lobe margins often undulate ..... ***Collema crispum***
- 4b Isidia absent or, if present, then either essentially globular throughout or becoming cylindrical or branched/coralloid at maturity; scalelike lobules absent (or sparse in some specimens of *C. furfuraceum*) over upper surface ..... 6
- 6a Lobe thickness uniform throughout, lobe tips scarcely (if at all) more swollen than central portions of thallus; upper surface sharply and finely wrinkled or not; central portions of thallus dull (except occasionally shiny in *C. nigrescens*) ..... 7
- 7a Upper surface distinctly isidiate, isidia globular or cylindrical, usually basally constricted ..... 8
- 8a Lower surface more or less evenly covered in dense, white woolly hairs ..... ***Leptogium saturninum***
- 8b Lower surface naked or, if partly hairy, then hairs/hapters occurring in scattered tufts ..... 9

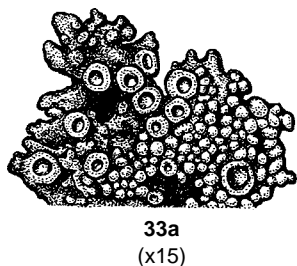
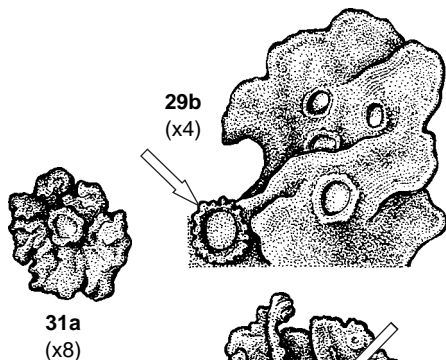
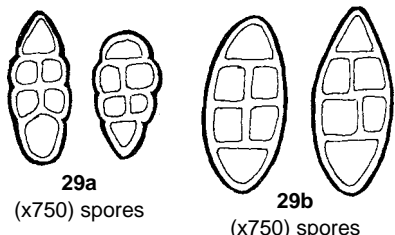


- 9a Lobes averaging to more than 5 mm wide; isidia less than 0.15 mm wide; upper surface often more or less blistered/pustulate ..... 10
- 10a Upper surface strongly pustulate/ridged(←), pustules extending more or less throughout; isidia confined mostly to pustules, usually cylindrical ..... ***Collema furfuraceum***
- 10b Upper surface weakly pustulate or lacking pustules; isidia more or less uniformly distributed(←), globular ..... ***Collema subflaccidum***
- 9b Lobes averaging to less than 5 mm wide; isidia often (but not always) more than 0.2 mm wide; upper surface not pustulate (except usually weakly pustulate in *C. fuscovirens*) ..... 11
- 11a Upper surface bearing distinctly elongate and/or branched isidia(←); over acid or base-rich rock (occasionally also among mosses over rock) along seasonally submerged shores of lakes and streams ..... ***Collema glebulentum***
- 11b Upper surface bearing only more or less globular isidia (Note: elongate isidia-like lobules may be present along lobe margins); habitat various ..... 12
- 12a Central portions of thallus strongly swollen, averaging to 0.2–0.5 mm thick when moist; isidia often arranged in irregular lines(←) over wrinkled upper surface; coastal ..... ***Leptogium brebissonii***
- 12b Central portions of thallus not strongly swollen, averaging to less than 0.2 mm thick when moist; isidia more randomly scattered, not in lines; distribution various ..... 13
- 13a Lobe margins and lobe tips more or less densely crowned with isidia or isidia-like lobules; lobes occasionally distinctly erect ..... 14
- 14a Main lobes usually somewhat thickened, concave; marginal and apical lobules unbranched or weakly branching ..... ***Collema cristatum* var. *marginale***
- 14b Main lobes thin, often translucent, plane; marginal and apical lobules strongly branched and coralloid in mature specimens(←) ..... ***Collema* sp. 1**
- 13b Lobe margins and lobe tips weakly or not isidiate or lobulate; lobes appressed to weakly ascending, but never distinctly erect ..... 15
- 15a Lobes averaging to less than 1 mm wide; upper surface never pustulate; isidia usually dense, often partly obscuring lobes(←) ..... ***Collema subparvum***
- 15b Lobes averaging to more than 1.5 mm wide; upper surface pustulate or not; isidia usually rather sparse or at least not obscuring lobes ..... 16
- 16a Upper surface usually weakly blistered/ pustulate(←); isidia often averaging to more than 0.2 mm wide; over (mossy) rock; spores submuriform (i.e., with both transverse and longitudinal septa) ..... ***Collema fuscovirens***
- 16b Upper surface never pustulate; isidia usually averaging to less than 0.2 mm wide; over (mossy) rock or soil; spores 4-celled, septa transverse ..... ***Collema undulatum* var. *granulosum***
- 7b Upper surface lacking isidia (Note: nonconstricted, isidia-like lobules may occur along margins in some species) ..... 17



- 17a Over trees; upper surface usually somewhat blistered/pustulate(←) ..... 18
- 18a Spores normally 4-celled; less than 40 μ long .....  
..... [*Collema curtisporum*] (see *Collema nigrescens*)
- 18b Spores more than 4-celled, usually more than 40 μ long .....  
..... *Collema nigrescens*
- 17b Over rock; upper surface not blistered/pustulate ..... 19
- 19a Over maritime rocks above intertidal zone; apothecia usually numerous(←)  
..... *Collema fecundum*
- 19b Not associated with intertidal zone; apothecia present or absent ..... 20
- 20a Thallus crust-like, minute, usually less than 0.5 cm across; lobes averaging  
to less than 0.3 mm; spores submuriform(←) (i.e., with both transverse and  
longitudinal septa), (20-) 26-38 (-45) x (9-) 12-15 μ; rare .....  
..... *Collema callopismum*
- 20b Thallus distinctly foliose, larger, more than 1.5 cm across; lobes more than  
0.8 mm wide; spores 4-celled, (i.e., septa strictly transverse) except  
submuriform in *C. cristatum* ..... 21
- 21a Lobe margins bearing irregular, isidia-like lobules; main lobes usually  
concave; spores 8-13 μ wide, submuriform .....  
..... *Collema cristatum* var. *marginale*
- 21b Lobe margins even or at least not bearing isidia-like lobules; main lobes  
usually plane to convex; spores less than 8.5 μ, 4-celled ..... 22
- 22a Well-developed lobes distinctly elongate(←), averaging to less than  
1.5 mm wide, not at all swollen at tips; spores (20-) 26-43 (-60) x 4.5-6.5  
(8) μ ..... *Collema multipartitum*
- 22b Well-developed lobes usually rather broad and platelike(←), more than  
1.5 mm wide, more or less swollen at tips; spores (13-) 18-28 (-30) x  
(5-) 6.5-8.5 μ ..... *Collema polycarpon*
- 6b Lobe thickness uneven: lobe tips either distinctly thicker than central portions of  
thallus or (rarely) vice versa; upper surface never sharply and finely wrinkled; central  
portions sometimes shiny (Note: all specimens growing directly over soil key here)  
23
- 23a Over (mossy) trees in humid sites ..... 24
- 24a Upper surface in part weakly ridged/pustulate(←) ..... *Collema auriforme*
- 24b Upper surface not at all pustulate .....  
..... *Collema undulatum* var. *granulosum* (see lead 16b)
- 23b Over rock or soil or among mosses over rock or soil ..... 25
- 25a Over rock or among mosses over rock ..... 26
- 26a Isidia present; apothecia usually absent ..... 27
- 26b Isidia absent; apothecia usually numerous ..... (see lead 22)
- 27a Lobe margins bearing numerous erect isidia-like lobules .....  
..... *Collema cristatum* var. *marginale* (see lead 21a)
- 27b Lobe margins even or at least not bearing isidia-like lobules .....  
..... *Collema undulatum* var. *granulosum* (see lead 16b)
- 25b Over soil or among mosses over soil (Note: The remaining species, with the  
exception of *Collema ceraniscum* and *Leciophysma finmarkicum*, belong to the  
*Collema tenax* group, and represent some of the most variable and taxonomically  
perplexing of lichens. Specimens lacking mature apothecia are usually best  
referred to the "*Collema tenax* aggregate.") ..... 28

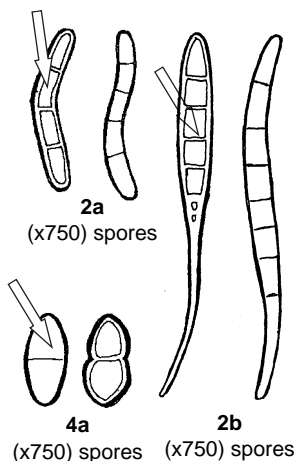




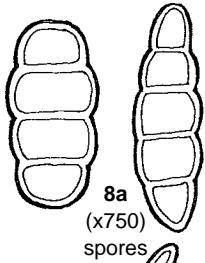
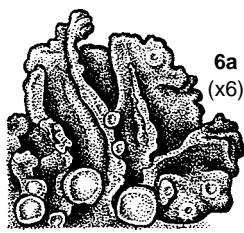
- 28a** Lobes averaging to more than 1.5 mm wide; lobe tips appressed or at least not distinctly erect..... 29
- 29a** Reddish dot-like pycnidia often present (check lobe margins); apothecial disc plane; apothecial rim smooth; spores colourless (15–) 17–26 (–30) x (5–) 6.5–10.5 (–13) μ ..... ***Collema tenax* var. *tenax***
- 29b** Pycnidia absent; apothecial disc concave; apothecial rim usually warty at maturity(←); spores pale yellowish brown at maturity, (20–) 26–32 (–36) x (8.5) 13 (–15) μ ..... ***Collema bachmanianum***
- 28b** Lobes averaging to less than 1.5 mm wide or, if wider, then lobe tips in part distinctly erect ..... 30
- 30a** Uprturned lobe tips mostly platelike, (somewhat resembling mushroom gills), or lobes appressed ..... 31
- 31a** Thallus less than 1 cm across, apparently attached by more or less (broad) central holdfast, rather closely appressed; apothecia, if present, restricted to the upper surface(←) ..... ***Collema tenax* var. *crustaceum***
- 31b** Thallus more than 1 cm across, lobes attached at one margin, erect; apothecia situated on ends or margins of short, broad, vertical lobes(←) ..... ***Collema polycarpon*** (rare over soil)
- 30b** Uprturned lobe tips mostly cylindrical ..... 32
- 32a** Spores 1-celled; restricted to northern localities ..... ***(Leciophysma finmarkicum)***
- 32b** Spores 2-celled, 4-celled or muriform (i.e., with longitudinal and transverse septa); widespread ..... 33
- 33a** Alpine; thallus distinctly and tightly cushion-forming; apothecia usually averaging to less than 1 mm wide; spores broad, 13–22 μ wide, muriform (i.e., with longitudinal and transverse septa), 4 per ascus ..... ***Collema ceranicum***
- 33b** Distribution various; thallus at most weakly and loosely cushion-forming; apothecia usually averaging to more than 1 mm wide; spores narrower, 6.5–8.5 (–13) μ wide, 2-celled to submuriform (see below), 8 per ascus ..... 34
- 34a** Lobe tips both cylindrical and platelike; spores mostly 2-celled (i.e., with single transverse septum) ..... ***Collema coccophorum***
- 34b** Lobe tips more or less cylindrical; spores mostly 4-celled to submuriform (i.e., with transverse septa or with transverse septa and single longitudinal septum) ..... ***Collema tenax* var. *corallinum***

**Key to Nonisidiate Species of *Collema* Emphasizing Apothecial Characters**

(Key adapted from Degelius 1974; drawings of spores adapted from Degelius 1954)



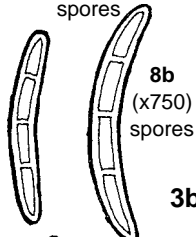
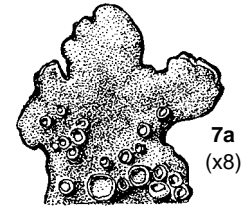
- 1a** Lobes averaging to more than 5 mm across ..... 2
- 2a** Spores normally 4-celled(←), less than 40 μ long ..... ***[Collema curtisporum]*** (see ***C. nigrescens***)
- 2b** Spores more than 4-celled(←), usually more than 40 μ long ..... ***Collema nigrescens***
- 1b** Lobes averaging to less than 5 mm across ..... 3
- 3a** Spores not muriform (i.e., lacking longitudinal septa) ..... 4
- 4a** Spores normally 2-celled(←); over soil ..... ***Collema coccophorum***
- 4b** Spores 4-celled (or more) ..... 5



**5a** Lobe tips distinctly swollen and sometimes longitudinally wrinkled/plicate (resembling gills of mushrooms) ..... 6

**6a** Lobes more or less erect; over rock ..... *Collema polycarpon*

**6b** Lobes appressed; usually over (mossy) soil ..... *Collema tenax* var. *tenax*



**5b** Lobe tips not at all distinctly swollen, never wrinkled/plicate ..... 7

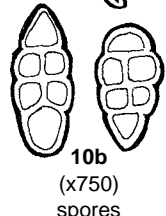
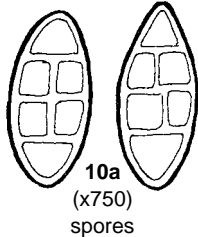
**7a** Growing over maritime rocks above intertidal zone ..... *Collema fecundum*

**7b** Restricted to inland localities east of coast ranges ..... 8

**8a** Spores usually 13–15 μ wide ..... *Collema crispum*

**8b** Spores usually less than 9 μ wide ..... *Collema multipartitum*

**3b** Spores muriform or submuriform (i.e., with transverse and longitudinal septa) ..... 9



**9a** Lobe tips distinctly swollen and sometimes longitudinally wrinkled/plicate ..... 10

**10a** Margin of apothecium warty; spores approximately 13 μ wide, usually pale yellowish brown ..... *Collema bachmanianum* (see lead **29b** of previous key)

**10b** Margin of apothecium more or less smooth; spores 8.5–10.5 μ wide, colourless ..... *Collema tenax* var. *tenax*

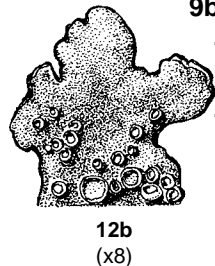
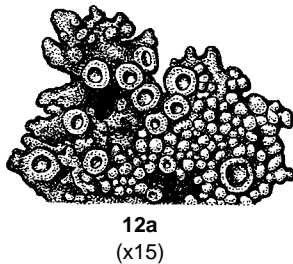
**9b** Lobe tips not at all distinctly swollen, never wrinkled ..... 11

**11a** Thallus crustose to weakly foliose; over rock ..... *Collema callopismum*

**11b** Thallus foliose to almost fruticose ..... 12

**12a** Thallus more or less fruticose; over soil or among moss over soil in alpine localities ..... *Collema ceraniscum*

**12b** Thallus distinctly foliose; over maritime rocks above intertidal zone ..... *Collema fecundum*



***Collema auriforme* (With.) Coppins & Laundon**  
(Syn. *Collema auriculatum* Hoffm.)

Map 15

Jelly tarpaper

Habitat/Range: Rare over deciduous trees in humid forests at lower elevations; western N Am–western Eurasia–eastern Eurasia, N to AK.

Notes: The report is tentative (Goward et al. 1994a). If correct, this species can be expected to occur also over base-rich soil and rock.

***Collema bachmanianum* (Fink) Degel.**

Map 16

Tar tarpaper

Habitat/Range: Rare over mossy base-rich soil in open, but humid, inland localities; circumpolar, S to CO and WY.

Notes: Only var. *bachmanianum* is reported from B.C.

***Collema callopismum* Massal.**

Tripe tarpaper

Habitat/Range: Rare over base-rich rock (limestone) in open intermontane sites; incompletely circumpolar.

Notes: Only var. *rhyarodes* (Nyl.) Degel. is reported from B.C. The record comes from Yoho National Park and represents the only report of this variety for North America.

***Collema ceraniscum* Nyl.**

Map 17

Cushion tarpaper

Habitat/Range: Rare over mossy base-rich soil in open alpine localities, probably northern; circumpolar, S to BC.



***Collema coccophorum* Tuck.**

Map 18

Tar tarpaper

Habitat/Range: Rare over bare base-rich soil in open, arid intermontane localities (BG zone); circumpolar, S to MX.

Notes: Some (reduced) forms of *Heppia lutosa* are superficially similar, but in that species the spores are non-septate, versus once-septate in *C. coccophorum*.***Collema crispum* (Hudson) Weber ex Wigg.**

Papoose tarpaper (crinkled pulp)

Habitat/Range: Frequent over base-rich rock and soil in open intermontane localities, especially in dry climates; probably circumpolar, S to CA, NM.

Notes: Only var. *crispum* is reported from B.C. The material seems to be heterogeneous and includes a soil-dwelling taxon in which the lobe tips are distinctly swollen and the "isidia" soon become erect. This material should perhaps be referred to the *C. tenax* group.***Collema cristatum* (L.) Weber ex Wigg.**

Map 19

Fingered tarpaper

Habitat/Range: Infrequent over (mossy) base-rich rock (rarely also over soil) in open intermontane localities; circumpolar, S to CO.

Notes: Only var. *marginale* (Hudson) Degel. is reported from B.C. Together with *Collema* sp. 1, *C. cristatum* could be confused with *Leciophysma finmarkicum*, a much smaller species (lobes less than 1 mm long) with single-celled spores and a strictly northern distribution.***Collema fecundum* Degel.**

Map 20

Seaside tarpaper

Habitat/Range: Frequent in coast localities over acid rock in somewhat sheltered sites near intertidal zone; western N Am, S to WA.

Notes: The type locality of this species is Narvaez Bay on Saturna Island, B.C.

***Collema flaccidum* (Ach.) Ach.**

Map 21

Butterfly tarpaper

Habitat/Range: Rare over (mossy) rocks and trees in open coastal localities; circumpolar, S to CA.

Note: Tentatively included on the basis of a single collection from the Agassiz area by Macoun in 1889.

***Collema furfuraceum* (Arnold) Du Rietz**

Blister tarpaper

Habitat/Range: Frequent over trees and (mossy) rock in somewhat sheltered sites at lower elevations throughout; circumpolar, S to MX.

Notes: Two varieties occur in B.C.; sterile material, however, cannot be distinguished with certainty at the varietal level. Specimens in which the ridges and pustules are rather indistinct may also be difficult to separate from *Collema subflaccidum*.

**1a** Apothecial disc usually white-pruinose, inner apothecial rim composed of inflated isodiametric cells (excipulum proprium paraplectenchymatous); coastal localities .....  
 ..... var. ***luzonense* (Räsänen) Degel.**

**1b** Apothecial disc usually lacking pruina, inner apothecial rim composed of elongate, rectilinear cells (excipulum proprium euthyplectenchymatous); widespread ..... var. ***furfuraceum***

***Collema fuscovirens* (With.) Laundon**(Syn. *Collema furvum* (Ach.) Ach.; *Collema tuniforme* (Ach.) Ach.)

Bleb tarpaper

Habitat/Range: Frequent over base-rich rock at lower elevations throughout; circumpolar, S to CO.

***Collema glebulentum* (Nyl. ex Crombie) Degel.**

Map 22

Amphibious tarpaper

Habitat/Range: Rare in intermontane localities over seasonally inundated acid and base-rich rock at edges of lakes and streams; circumpolar, S to CO.

Notes: Included on the basis of collections from the wet intermontane (ICH zone), but expected to be more widespread.

**Collema multipartitum Sm.** Map 23

Protracted tarpaper

Habitat/Range: Infrequent over base-rich rock in open boreal and intermontane regions, especially in subalpine and alpine; western N Am–western Eurasia.

**Collema nigrescens (Hudson) DC.** Map 24

Broadleaf tarpaper

Habitat/Range: Infrequent over trees, especially deciduous, in sheltered coast forests, also rare in boreal localities; circumpolar, S to CA.

Notes: The B.C. material may not be taxonomically homogeneous; the inland specimen is characterized by rather small spores and may represent a separate species. *Collema curtisporum* Degel. has been reported for Washington (Degelius 1974) and may be found in British Columbia. It has short, 4-celled spores (averaging to less than 40  $\mu$  long), differing from the spores of *C. nigrescens*, which are 6- to 13-celled and more than 40  $\mu$  long.**Collema polycarpon Hoffm.**

Shaly tarpaper

Habitat/Range: Infrequent over base-rich rock in open inland sites; probably circumpolar, S to MX.

Notes: Only var. *polycarpon* is reported from B.C.**Collema subflaccidum Degel.** Map 25(Syn *Collema subfurvum* sensu Degel.)

Moth tarpaper

Habitat/Range: Infrequent over trees, especially deciduous, in sheltered, humid coastal and intermontane forests, also rare over rock; circumpolar, S to WY.

**Collema subparvum Degel.** Map 26

Western tarpaper

Habitat/Range: Rare over base-rich rock (limestone) in open intermontane localities; western N Am, N to AK.

Notes: *Collema subparvum* is reported from only three localities worldwide (Degelius 1974); the type locality is at Marble Canyon, northwest of Cache Creek, B.C.**Collema tenax (Swartz) Ach.**

Tar tarpaper (sticky lichen)

Habitat/Range: Frequent over (recently disturbed) base-rich soil in open inland localities, especially in arid climates; circumpolar, S to CA, NM.

Notes: Some (reduced) forms of *Heppia lutosa* are superficially similar, but have single-celled spores, differing from the usually 4-celled spores in *C. tenax*. Three varieties of *C. tenax* are reported to occur in B.C.

**1a** Thallus often more than 2 cm across; broadest lobes averaging to more than 2 mm wide; lobes mostly appressed ..... ***C. tenax* var. *tenax***

**1b** Thallus usually less than 1.5 cm across (never more than 2 cm across); broadest lobes averaging to less than 2 mm wide; lobes appressed or erect ..... **2**

**2a** Thallus dark olive-green or brownish; lobe margins more or less even, lobes smooth or at least not forming erect clusters ..... ***C. tenax* var. *crustaceum* (Krempelh.) Degel.**

**2b** Thallus usually blackish; lobes more or less incised and bumpy, forming erect clusters at maturity ..... ***C. tenax* var. *corallinum* (Massal.) Degel.**

**Collema undulatum Laurer ex Flotow**

Protean tarpaper

Habitat/Range: Infrequent over base-rich rock or soil at lower elevations throughout; circumpolar.

Notes: Only var. *granulosum* Degel. is reported from B.C. A few unusually swollen specimens collected from trees are tentatively included here, but are possibly better referred to the *C. tenax* group.**Collema sp. 1** Map 27

Crown-of-thorns tarpaper

Habitat/Range: Rare among moss over base-rich rock in open, semi-arid intermontane outcrops; distribution unknown.

Notes: The material appears to be similar to *Collema thamnodes* Riddle, though G. Degelius (Göteborg, pers. comm., 1992) suggests that it is not conspecific with that species. See notes under *C. cristatum*.

DERMATOCARPON

**Dermatocarpion** Eschw.

**The Stippleback Lichens**

Small to medium **stratified foliose lichens**, corticate above and below, lacking isidia and soredia, lobes **attached to substrate by more or less central holdfast** (except occasionally unattached in some species), loosely attached, subrotund to rotund, entire thallus averaging to 1–3 (–6) cm across, usually somewhat thick. Upper surface **greyish to dark olive brownish**. Lower surface pale brown or blackening, rhizinate or more often **lacking rhizines**. Medulla white. Photobiont green.

Ascocarp a **perithecium** immersed in upper surface, appearing as blackish dot from above; spores simple, ellipsoid, colourless, 8 per ascus.

**Over rock**, rarely over exposed soil.

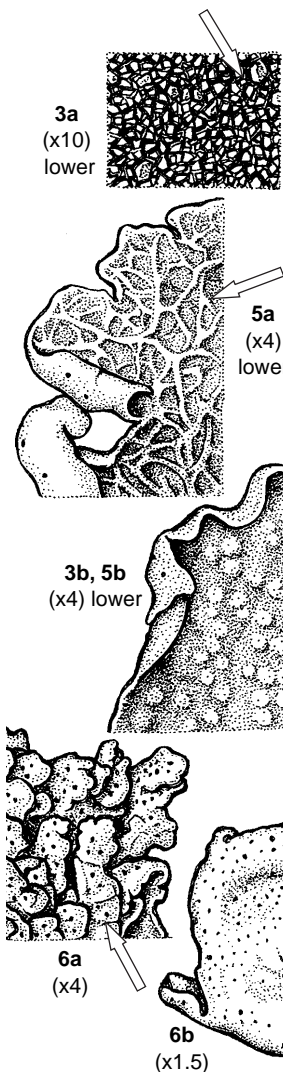
As adopted here, *Dermatocarpion* includes all foliose or squamulose peritheciate lichens having simple spores and attached to substrate by one or more thickened holdfasts, whether central or marginal. Squamulose specimens attached by rhizoidal threads are treated under *Catapyrenium*.

References: Imshaug (1957); Rosentreter and McCune (1992).

Common Name: Emphasizes the presence of numerous dot-like perithecia over the upper surface.

Notes: *Dermatocarpion* is a cosmopolitan genus of approximately 60 species. Only seven species are reported for North America and five occur in B.C. This is a taxonomically difficult group in which many species appear to intergrade. The keys should be considered preliminary, pending a thorough taxonomic revision of the genus. Chemistry is of no diagnostic value in *Dermatocarpion* and has therefore been omitted in the following species accounts.

**Key to *Dermatocarpion* and Similar Lichens**



- 1a Thallus small and scalelike (scales averaging to less than 5 mm across), upper surface pale tan to medium brown, at most only weakly white-pruinose; upper surface KC+ pink or apparently KC-; spores more than 100 per ascus ..... (***Acarospora thamnina***)
- 1b Thallus lobes averaging to more than 6 mm across, or if smaller, then upper surface greyish and strongly white-pruinose; upper surface KC-; spores at most 8 per ascus ..... 2
  - 2a Rhizines present over lower surface ..... [***Dermatocarpion moulinii***]
  - 2b Rhizines absent ..... 3
    - 3a Upper surface white-pruinose; lower surface minutely textured/papillose, individual papillae cylindrical to more often pyramid-shaped, less than 0.1 mm across(←) ..... ***Dermatocarpion reticulatum***
    - 3b Upper surface white-pruinose or not; lower surface varying from smooth to wrinkled or irregularly granular; granules, if present, roughly spheroidal and averaging to more than 0.2 mm across(←) ..... 4
      - 4a Upper surface at most only weakly white-pruinose, in part turning bright green when wetted; confined to sites subject to at least periodic flooding ..... 5
        - 5a Lower surface more or less wrinkled throughout(←); confined to sites subject to periodic flooding ..... ***Dermatocarpion rivulorum***
        - 5b Lower surface smooth, pimpled/papillate(←) or, if wrinkled, then wrinkles weak and seldom covering entire surface; confined to more or less continuously inundated sites ..... ***Dermatocarpion luridum***
      - 4b Upper surface in part heavily white-pruinose; never turning bright green when wetted; confined to dry/xeric sites ..... 6
        - 6a Thallus many-lobed/polyphyllous; central lobes crowded, convex, often appearing chinky-cracked/areolate from above(←), margins usually strongly downturned ..... ***Dermatocarpion intestiniforme***
        - 6b Thallus single-lobed/monophyllous to rarely many-lobed/polyphyllous; central lobes absent or, if present and dense, then concave to more often plane, never appearing chinky-cracked/areolate from above, margins usually upturned or at least not strongly downturned ..... ***Dermatocarpion minutum***

***Dermatocarpon intestiniforme* (Körber) Hasse**

Fissured stippleback

Habitat/Range: Infrequent over base-rich rock in open, usually rather exposed sites throughout; circumpolar.

Notes: An unusually variable species.

***Dermatocarpon luridum* (With.) Laundon**(Syn. *Dermatocarpon aquaticum* (Weis) Zahlbr.; *Dermatocarpon fluviatile* (Weber) Th. Fr.; *Dermatocarpon weberi* (Ach.) Mann)

Streamside stippleback (brook lichen)

Habitat/Range: Frequent over seasonally inundated rock in open waterways throughout, except absent in alpine localities; circumpolar.

***Dermatocarpon miniatum* (L.) Mann**

Limy stippleback (cliff wafer)

Habitat/Range: Frequent over base-rich rock in open sites throughout; circumpolar.

Notes: Like *D. reticulatum*, with which it appears to intergrade, *D. miniatum* may adopt an unattached/vagant habit in highly exposed inland sites. The material is apparently heterogeneous and may include two species:

**1a** Over base-rich rock; lower surface tan, brown or orangish brown, more or less smooth  
 ..... ***Dermatocarpon miniatum***

**1b** Over base-poor rock (e.g., basalt); lower surface dark brown to black, strongly and broadly wrinkled  
 ..... ***Dermatocarpon* sp. 1**

**[*Dermatocarpon moulinsii* (Mont.) Zahlbr.]**

Shag stippleback

Habitat/Range: Not yet confirmed for B.C., but expected to occur in southern inland regions, especially over dry, base-rich rock; incompletely circumpolar.

Notes: *Dermatocarpon moulinsii* may be mistaken for *Umbilicaria vellea* which, however, has a black lower surface and ball-tipped rhizines.***Dermatocarpon reticulatum* Magnusson**

Northwest stippleback

Habitat/Range: Frequent over rock in open or somewhat sheltered maritime and intermontane sites; western N Am, N to AK, S to NM.

Notes: In exposed inland sites, this species may adopt an unattached/vagant habit and is then sometimes treated as a separate species, *D. vagans* Imsh. See the note under "Excluded Species."***Dermatocarpon rivulorum* (Arnold) Dalla Torre & Sarnth.**

Map 28

Streamside stippleback

Habitat/Range: Rare over periodically inundated rock in open inland sites; probably circumpolar.

**ENDOCARPON**

**Endocarpon Hedwig**

**The Stipplescale Lichens**

**Minute** to small **stratified squamulose or occasionally fruticose lichens**, corticate above, corticate or not below, lacking soredia and isidia, squamules/lobes tightly appressed to erect, brownish, rotund to elongate, averaging to 0.5–7 mm wide. Lower surface (when visible) brown or black, lacking rhizines, attached to substrate by non-corticate rhizoids. Medulla white. Photobiont green.

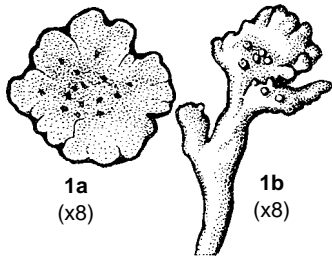
Ascocarp a **perithecium** immersed in upper surface, appearing blackish or brownish from above; spores multicelled (muriform), ellipsoid, brown, 2 per ascus. **Algal cells included with spores in perithecium.**

**Over base-rich soil or rock.**

Reference: Thomson (1984).

Common Name: Suggested by the typical scalelike appearance and by the presence of dot-like perithecia over upper surface.

Notes: *Endocarpon* is mainly a temperate genus of approximately 30 species. Eight of these are reported for North America, though only two are known to occur in B.C. Chemistry is of no diagnostic value in this genus and is omitted in the following species accounts. For points of distinction with similar species in other genera, see the key under *Catapyrenium*.



- 1a Over soil; thallus almost crustose, consisting of appressed squamules ..... **Endocarpon pusillum**
- 1b Over rock; thallus squamulose or fruticose, consisting of upright squamules or cylindrical lobes ..... **Endocarpon pulvinatum**

**Endocarpon pulvinatum Th. Fr.**

Map 29

Rock stippleback

Habitat/Range: Infrequent over (seasonally inundated) outcrops in open inland sites; probably incompletely circumpolar, S to NV.

Notes: Western North America material of *E. pulvinatum* is sometimes referred to the taxonomically rather dubious *E. tortuosum* Herre.

**Endocarpon pusillum Hedwig**

Soil stippleback

Habitat/Range: Frequent over base-rich soil (rarely moss) in open intermontane sites, especially BG zone; probably circumpolar, S to CA, NM.

Notes: Much of the B.C. material has a dark lower surface and therefore belongs in var. *pusillum*, though var. *pallidum* (Ach.) Körber, with a pale lower surface, is also reported to occur (Henssen 1963d). The latter taxon is also sometimes treated as a distinct species, *E. pallidum* Ach.

**ERIODERMA**

**Erioderma Fee**

**The Treepelt Lichens**

Small **stratified foliose lichens**, corticate above, **noncorticate below, sorediate**, lobes loosely attached, rotund (ours), averaging to 5 mm wide, somewhat thick. Upper surface greyish brown, **bearing short erect hairs**. Lower surface whitish, **lacking veins**, bearing short to long rhizines, restricted to vicinity of margins. Medulla white.

**Photobiont blue-green.**

Apothecia unknown in B.C. material.

**Over branches of acid-barked trees and shrubs.**

References: Galloway and Jørgensen (1975); Galloway (1985).

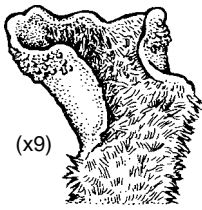
Common Name: Reflects strict occurrence of species over bark and superficial resemblance to certain pelt lichens (*Peltigera*).

Notes: *Erioderma* is an essentially tropical genus of approximately 22 species. Of these, only three are known to occur in North America and one in B.C. For points of distinction with similar species, see the keys under *Pannaria* and *Peltigera*.



***Erioderma solediatum* D. Galloway & P.M. Jørg.**

Map 30



Treepelt

Habitat/Range: Rare over trees and shrubs in somewhat sheltered open hypermaritime forests; western N Am, N to BC, S to OR.

Reactions: Medulla PD+ orange.

Contents: Eriodermin.

**ESSLINGERIANA*****Esslingeriana* Hale & Lai****The Rag Lichen**

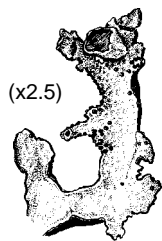
Small to medium **stratified foliose lichen**, corticate above and below, lacking soredia and isidia, lobes **loosely attached, elongate**, averaging to 1.5–5 (–7) mm wide, thin. Upper surface **pale yellowish grey**, usually wrinkled. **Lower surface mostly black**, bearing sparse, short, simple rhizines. Medulla white. Photobiont green.

Apothecia usually located along margins, especially near lobe tips, disc brown; spores simple, ovoid to subspherical, colourless, 8 per ascus. Pycnidia black, conspicuous.

**Over conifers.**

Reference: Esslinger (1971).

Common Name: Descriptive of the pale, often somewhat tattered lobes of the species.

Notes: *Esslingeriana* is a monotypic genus restricted to western North America at temperate latitudes. For points of distinction with similar species in other genera, see the key under *Platismatia*.***Esslingeriana idahoensis* (Essl.) Hale & Lai**(Syn. *Cetraria idahoensis* Essl.)

Yellow rag

Habitat/Range: Infrequent over conifers in open intermontane forests, mostly at lower elevations, also rare in dry maritime forests; western N Am, N to BC, S to CA.

Reactions: Cortex K+ yellow, PD+ pale yellow; medulla K- or K+ pale violet.

Contents: Atranorin, endocrocin, and two unknown substances.

**FLAVOPUNCTELIA*****Flavopunctelia* Hale****The Speckleback Lichens**

Medium to large **stratified foliose lichens**, corticate above and below, sorediate, lobes loosely appressed, short, averaging to 3–7 mm wide, thin. Upper surface **greenish yellow, pseudocyphellate. Lower surface blackening toward thallus centre**, shiny, bearing short, simple rhizines. Medulla white. Photobiont green.

Apothecia unknown in B.C. material.

Over trees, shrubs and rock.

References: Hale (1984); Goward (1985).

Common Name: Suggested by the presence of pale, speckle-like pseudocyphellae over the upper surface.

Notes: *Flavopunctelia* is essentially a temperate genus consisting of four species, all of which occur in North America, though only one is reported for B.C. *Flavopunctelia* was formerly treated within *Parmelia*. For points of distinction with similar species in other genera, see the key under *Platismatia*.***Flavopunctelia flaventior* (Stirton) Hale**

Map 31

(Syn. *Parmelia flaventior* Stirton; *Punctelia flaventior* (Stirton) Krog)

Green speckleback

Habitat/Range: Infrequent over trees and mossy rock in open coastal forests (CDF zone), also rare over shrubs in semi-arid intermontane (BG zone); incompletely circumpolar, N to southern BC, S to CA.

Reactions: Cortex K+ yellow; medulla C+ reddish, KC+ reddish.

Contents: Atranorin, lecanoric acid and usnic acid.

## GONOHYMENIA

**Gonohymenia Steiner****The Tarpaper Lichens**

Small **nonstratified squamulose, foliose or subfruticose lichens**, (**gelatinous when wet**), corticate above and below, lacking isidia, lobes loosely appressed to **semi-erect**, averaging to 0.5–0.8 (–1) mm wide. Upper and lower surfaces **black**, except often **strongly pruinose**, lacking rhizines. Medulla absent. **Photobiont blue-green**.

Apothecia unknown in B.C. material.

**Over base-rich rock.**

Common Name: Stresses the nonstratified medulla, which becomes somewhat swollen, translucent and jellylike when moistened.

Notes: *Gonohymenia* is a genus primarily of arid temperate regions. Approximately a dozen species are described; at least three of these occur in North America, with one species reported for B.C. For points of distinction with similar genera, see the key under *Collema*.

**Gonohymenia nigritella (Lettau) Henssen**

Map 32

(Syn. *Thyrea nigritella* Lettau)



(x11)

Coal tarpaper

Habitat/Range: Infrequent over base-rich rock in exposed semi-arid to dry intermontane localities; probably incompletely circumpolar, S to CA.

Reactions: All spot tests negative.

Contents: No lichen substances reported.

## HEPPIA

**Heppia Naeg. in Massal.****The Ruby Lichens**

**Minute stratified squamulose lichens**, corticate above and below, lacking soredia and isidia, scales **attached to substrate by wefts of hyphae**, rather loosely appressed, rotund, entire thallus averaging to 1–5 mm wide, somewhat thick. Upper surface dark olive-brown, rough. Lower surface lacking rhizines. Medulla white, uneven, cellular. **Photobiont blue-green**, arranged in vertical columns.

**Apothecia somewhat immersed in upper surface**, disc reddish brown; spores simple, spindle-shaped, colourless, 8 per ascus.

**Over base-rich soil.**

Reference: Wetmore (1971).

Common Name: Reflects the colour of the apothecia.

Notes: *Heppia* is primarily a genus of dry, desert regions. Only one species is reported for North America.

**Heppia lutosa (Ach.) Nyl.**

Map 33



(x9)

Soil ruby

Habitat/Range: Rare over base-rich soil in open semi-arid intermontane localities (BG zone); probably circumpolar, S to MX.

Reactions: All spot tests negative, except hymenium I+ wine-red.

Contents: No lichen substances reported.

Notes: Some (reduced) forms of *H. lutosa* are superficially similar to members of the *Collema tenax* group (e.g., *C. coccophorum*, *C. tenax* var. *corallinum*), but in those species the spores are septate, not nonseptate as in *H. lutosa*.

**HETERODERMIA**

**Heterodermia Trevisan**

**The Centipede Lichens**

Small to medium **stratified foliose lichens**, corticate above, **corticate or not below**, sorediate or not, lobes **loosely attached or semi-erect**, elongate-linear to **elongate**, averaging to 0.5–2 mm wide, thin. Upper surface **whitish**, sometimes maculate, **weakly longitudinally striate**, **lobe margins ciliate**. Lower surface white, partly noncorticate (and then **appressed-cottony**), lacking rhizines or bearing sparse rhizines. Medulla white. Photobiont green.

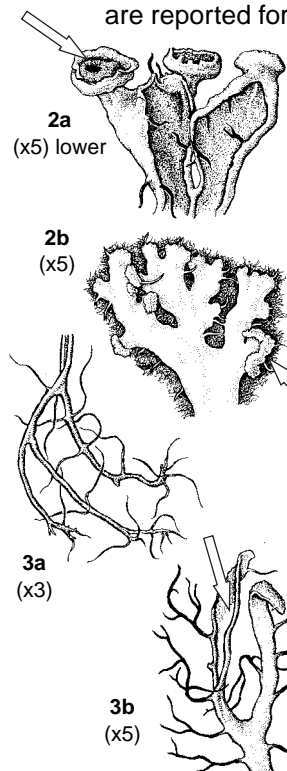
Apothecia located over upper surface, often near lobe tips, disc brown; spores 2-celled, ellipsoid, brown, 8 per ascus.

**Over trees.**

References: Kurokawa (1962, 1973); Culberson (1966); Goward (1984); Trass (1992).

Common Name: Descriptive of the elongate lobes and cilia that line the lobe margins in most species.

Notes: *Heterodermia* is primarily a genus of temperate latitudes. Of the approximately 80 species worldwide, 21 are reported for North America and three for B.C.



**Key to Heterodermia and Similar Lichens**

- 1a Lobes short or only slightly elongate; marginal cilia at most averaging to 0.5–2 mm long; soredia restricted to urn-shaped structures over upper surface or if located over lower surface, then positioned near lobe tips ..... 2
- 2a Upper surface strongly convex; soredia lacking on lower surface, restricted to urn-shaped structures over upper surface(←) ..... **Heterodermia sitchensis**
- 2b Upper surface plane to at most weakly convex; soredia located partly over lower surface near lobe tips(←) ..... **Heterodermia speciosa**
- 1b Lobes distinctly elongate; marginal cilia averaging to 2–5 mm long; soredia mostly broadcast over lower surface, or soredia absent ..... 3
- 3a Soredia absent; apothecia usually present; over base-enriched trees in inland localities **Anaptychia setifera**
- 3b Soredia present(←); apothecia unknown in B.C. material; over trees in hypermaritime localities ..... **Heterodermia leucomelos**

**Heterodermia leucomelos (L.) Poelt**

Map 34

(Syn. *Heterodermia "leucomelaena"* (L.) Poelt)

Elegant centipede

Habitat/Range: Infrequent over conifers in open hypermaritime localities; incompletely circumpolar, N to BC, S to CA.

Reactions: Cortex K+ yellow; medulla K+ yellow becoming reddish, PD+ yellowish.

Contents: Atranorin, salazinic acid, zeorin (and various unknown substances).

**Heterodermia sitchensis Goward & Noble**

Map 35

Seaside centipede

Habitat/Range: Rare over spruce in open, but somewhat sheltered seaside sites in hypermaritime localities; western N Am, known only from BC.

Reactions: Cortex K+ yellow; medulla K+ yellow, PD+ orange.

Contents: Atranorin, zeorin and various unknown substances.

Notes: The type locality is in Pacific Rim National Park, Vancouver Island, B.C.

**Heterodermia speciosa (Wulfen) Trevisan**  
(Syn. *Anaptychia speciosa* (Wulfen) Massal.)

Map 36

Powdered centipede

Habitat/Range: Rare over deciduous trees and conifers in open boreal and hypermaritime localities; western N Am – eastern N Am – western Eurasia, N to BC, S to WA.

Reactions: Cortex K+ yellow; medulla K+ yellow, PD+ yellow.

Contents: Atranorin, leucotylin, zeorin and various unknown substances.

Notes: The anomalous distribution reported above raises the possibility that the material included here may actually be heterogeneous.

**HYDROTHYRIA**

**Hydrothyria J. Russell**

**The Waterfan Lichen**

Small to occasionally medium **nonstratified foliose lichens (gelatinous when wet)**, **corticate above and below**, lacking soredia and isidia, lobes loosely attached, 0.3–1 cm wide, thin (except thicker when moist). Upper surface bluish black. Lower surface dark, **veined**. Medulla absent. **Photobiont blue-green**.

Apothecia located over upper surface, disc reddish brown; spores simple, ellipsoid, 8 per ascus.

**Over rock in mountain streams.**

References: Fink (1935); McCune (1984); Feige et al. (1989).

Common Name: Conveys the fan-shaped appearance of the lobes and the aquatic habitat.

Notes: *Hydrothyria* is a monotypic genus known only from the middle latitudes of North America. For points of distinction with similar lichens, see the key under *Collema*.

**Hydrothyria venosa J. Russell**

Map 37



(x2.5) lower

Waterfan (North American lichen, underwater lichen)

Habitat/Range: Rare over permanently submerged rock in open subalpine streams; western N Am – eastern N Am, N to BC, S to CA.

Reactions: All spot tests negative.

Contents: (Methyl gyrophorate, methyl lecanorate).

Notes: *Leptogium rivale* Tuck., another rock-dwelling lichen of streams and waterways, is reported in the Cascade Range of Washington and may eventually be found in British Columbia. It is much smaller than *Hydrothyria venosa* (lobes averaging to 1 mm wide), is tightly appressed, and lacks the veined lower surface characteristic of that species.

**HYPOCENOMYCE**

**Hypocenomyce M. Choisy**

**The Turtle Lichens**

**Minute stratified squamulose lichens**, corticate above, corticate or not below, **sorediate or not**, squamules closely appressed or more often **attached to substrate at one margin**, the opposite margin weakly raised, short to subrotund, averaging to 0.8–1.5 (–2) mm wide, thin. Upper surface **pale greyish, greenish or dark brown**, shiny or not. Lower surface pale or darkening, **lacking rhizines**. Medulla white. Photobiont green.

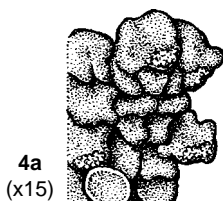
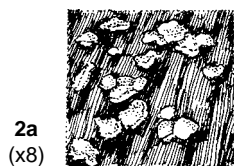
Apothecia usually located along lobe margins, **disc plane or occasionally convex**, brown or black; spores simple, ellipsoid to spindle-shaped, colourless, 8 per ascus.

**Over (fire-blackened) trees.**

Reference: Timdal (1984).

Common Name: Describes the shell-like habit of the species.

Notes: *Hypocenomyce* is primarily a temperate and boreal genus consisting of ten species worldwide. Of the eight species reported for North America, four are known to occur in B.C. *Hypocenomyce* was formerly treated within *Psora*. The taxonomy of the western North American species has not been entirely elucidated; the following treatment is preliminary, pending further study.

Key to *Hypocenomyce* and Similar Lichens

- 1a Soredia absent ..... 2
- 2a Lobes weakly lobulate, lobules never distinctly longer than broad; upper surface sometimes strong brown; apothecia rare, disc brownish ... *Hypocenomyce castaneocinerea*
- 2b Lobes strongly lobulate, lobules in part distinctly longer than broad; upper surface never strong brown; apothecia abundant or absent, disc black ..... 3
- 3a Upper surface whitish, minute; lobes averaging to 0.3 (–0.4) mm long; over oak in maritime localities ..... (*Bacidia rubella*)
- 3b Upper surface pale greenish, larger; lobes averaging to more than 0.5 mm long; over old conifers in humid climates throughout ..... *Hypocenomyce friesii*
- 1b Soredia present on lobe margins ..... 4
- 4a Lobes hemispherical/helmet-shaped (resembling *Physcia adscendens*); spores 15–21  $\mu$  long, at maturity 3-septate; over oak in CDF zone ..... *Waynea californica*
- 4b Lobes concave to convex or, if helmet-shaped, then apparently never over oak; spores less than 14  $\mu$  long, usually 1-septate ..... 5
- 5a Lobes erect, averaging to slightly longer than wide; soredia C- ..... (*Cladonia parasitica*)
- 5b Lobes appressed to ascending, but rarely erect, averaging to slightly wider than long; soredia C+ red or C- ..... 6
- 6a Upper surface sometimes strong brown; apothecia, if present, brown; soredia C- .... 7
- 7a Lobes white-edged, more or less concave when young; medulla PD+ orange or PD- ..... [*Hypocenomyce anthracophila*] (see *H. castaneocinerea*)
- 7b Lobes brown-edged, more or less convex when young; medulla PD- ..... *Hypocenomyce castaneocinerea* (see lead 2a)
- 6b Upper surface never strong brown; apothecia, if present, black; soredia C+ red ..... 8
- 8a Lobes small, whitish, appressed (crustose), averaging to less than 0.8 (–1.0) mm across; over deciduous trees and shrubs; soredia K+ yellow ..... *Hypocenomyce leucococca*
- 8b Lobes larger, usually greenish, somewhat loosely attached (squamulose), averaging to more than 0.8 mm across; over deciduous trees and conifers; soredia K- ..... *Hypocenomyce scalaris*

*Hypocenomyce castaneocinerea* (Räsänen) Tindal

Charcoal turtle

Habitat/Range: Common over fire-blackened conifer bark and wood in coastal and intermontane (ICH zone) forests; tentatively western N Am – western Eurasia, S to AZ.

Reactions: All spot tests negative, but medulla UV+ white.

Contents: Various unknown lichen substances.

Notes: The local material was previously assigned to *H. anthracophila*, though that species should have a PD+ red medulla. Much of the B.C. material lacks soredia.*Hypocenomyce friesii* (Ach.) P. James & G. Schneider

Map 38

(Syn. *Lecidea friesii* Ach.; *Psora friesii* (Ach.) Hellbom)

Old-growth turtle

Habitat/Range: Infrequent over conifers, especially redcedar, in humid coastal and intermontane forests; western N Am – eastern N Am – eastern Eurasia, S to CA and AZ.

Reactions: All spot tests negative, but medulla UV+ white.

Contents: A single unknown UV+ compound.



**Hypocenomyce leucococca R. Sant. in Moberg**

Map 39

Alder turtle

Habitat/Range: Rare (overlooked?) over deciduous trees and shrubs in humid, intermontane forests; western N Am – western Eurasia, N to AK.

Reactions: Cortex and soredia K+ yellow, KC+ pink, PD+ yellow, UV+ white.

Contents: Alectorialic acid.

Notes: This is a crustose species.

**Hypocenomyce scalaris (Ach.) M. Choisy**

(Syn. *Lecidea scalaris* (Ach.) Ach.; *Psora scalaris* (Ach.) Hooker

Common shingle

Habitat/Range: Frequent over charred or uncharred bark or wood throughout; circumpolar, S to CA.

Reactions: Cortex and soredia C+ red, KC+ red.

Contents: Lecanoric acid.

**HYPOGYMNIAS**

**Hypogymnia (Nyl.) Nyl.**

**The Bone Lichens**

Small to medium **stratified foliose lichens**, corticate above and below, sorediate or rarely isidiate or not, lobes rather loosely appressed to semi-erect or pendulous, **hollow**, occasionally perforate, 0.5–5 mm wide. Upper surface usually **pale greyish**, occasionally brownish. Lower surface blackish, shiny, wrinkled, **lacking rhizines**. Medulla white. Photobiont green.

Apothecia located over upper surface, often stalked/stipitate, disc usually concave, brown; spores simple, spherical to ellipsoid, colourless, 8 per ascus.

References: Krog (1968); Ohlsson (1973); Pike and Hale (1982); Goward (1988); Goward and McCune (1993).

Common Name: Stresses the hollow lobes of the species and the pale, often whitish, upper cortex.

Notes: *Hypogymnia* is essentially a temperate genus of about 50 species worldwide. Twenty species occur in North America and 17 in B.C. The western Hypogymniae display a highly varied chemistry and spot tests are helpful in distinguishing between species. Note that what is usually referred to as a PD- medullary reaction in *Hypogymnia* may sometimes actually be discerned as PD+ pale yellow. In this case, however, the coloration is usually restricted to the upper portion of the medulla, while the lower portion remains white. By contrast, a “true” PD+ pale yellow reaction (e.g., as for *H. rugosa*) registers across the entire medulla, from top to bottom. Applying as little reagent as possible will help avoid ambiguity.

*Brodoa oroarctica* was formerly treated within *Hypogymnia*.

2a, 3a (x2.5)

3b (x2.5)

4a (x2.5)

5a (x2.5)

2b (x2.5)

1a Soredia present (check lobe tips) ..... 2

2a Soredia located on inner surface of burst lobe tips(←) ..... 3

3a Upper surface usually partly brownish; medullary ceiling darkening toward thallus centre; medulla PD-; humid localities ..... **Hypogymnia vittata**

3b Upper surface not at all brownish; medullary ceiling white throughout (rarely darkening); medulla PD+ orange; widespread ..... **Hypogymnia physodes**

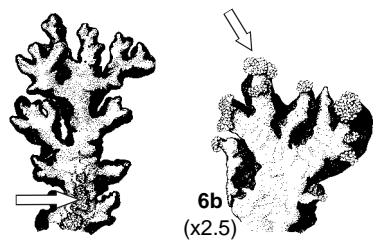
2b Soredia located on upper surface (including upper surface of lobe tips) ..... 4

4a Lobes distinctly swollen, bearing (basally constricted) marginal lobules(←); lobe tips often perforate; medulla PD+ yellow becoming bright orange; essentially coastal ..... **Hypogymnia oceanica**

4b Lobes not distinctly swollen, lacking basally constricted marginal lobules (lobules may, however, sometimes be present over upper surface); lobe tips generally not perforate; medulla PD-; variously distributed ..... 5

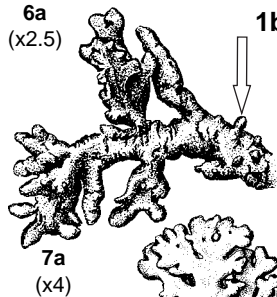
5a Lobes stiffly suberect, elongate, divergent; upper surface convex; soralia located on or very near lobe tips(←); widespread ..... **Hypogymnia tubulosa**

5b Lobes appressed to substrate, elongate to more often rather short, usually crowded; upper surface plane; soralia variously positioned; inland ..... 6



**6a** Outermost soralia generally small and loosely packed with coarsely granular soredia(←); soredia also usually well developed over upper surface, often arising from coarse, pustular “isidia”; over bark, wood and rock; common ..... *Hypogymnia austerodes*

**6b** Outermost soralia larger, densely packed with finely granular/farinose soredia(←); soredia rare toward thallus centre, arising through disintegration of upper cortex; over bark; infrequent ..... *Hypogymnia bitteri*



**1b** Soredia absent ..... 7

**7a** Upper surface dark brownish, usually bearing lobules and/or isidia(←); over soil and mossy rock; alpine, mostly northern ..... *Hypogymnia subobscura*

**7b** Upper surface pale brownish or more often whitish grey; lobules, if present, along margins; isidia absent; over bark and wood; variously distributed ..... 8

**8a** Medullary ceiling distinctly dark almost throughout ..... 9

**9a** Upper surface more or less plane or at least not strongly convex, never swollen, often weakly concave near lobe tips; lobe tips rarely perforate; (basally constricted) marginal lobules absent; medulla PD-; essentially inland ..... *Hypogymnia metaphysodes*

**9b** Upper surface distinctly and strongly convex throughout (including near lobe tips), also often swollen; basally constricted marginal lobules present or absent ..... 10

**10a** Lobes usually ascending; lobe tips mostly tapered and broadly pointed; perforations absent or restricted to lower surface; strictly coastal ..... 11

**11a** Lobes evenly fork-branching/dichotomous(←) or at least not strongly and irregularly side-branched; medulla PD-; common ..... *Hypogymnia inactiva*

**11b** Lobes strongly and irregularly side-branched(←); medulla PD+ yellow becoming bright orange; rare ..... *Hypogymnia heterophylla*

**10b** Lobes appressed or pendulous; lobe tips mostly hemispherical, perforate or not; variously distributed ..... 12

**12a** Basally constricted marginal lobules sparse or more often absent; medulla PD- or PD+ pale yellow ..... 13

**13a** Upper surface smooth or weakly wrinkled toward thallus centre; lobes short or long, longest usually somewhat “knobby”(←) (i.e., swollen at regular intervals); medulla PD-; mostly coastal ..... *Hypogymnia apinnata*

**13b** Upper surface strongly wrinkled toward thallus centre(←); lobes generally short, never knobby; medulla PD+ pale yellow throughout; inland ..... *Hypogymnia rugosa*

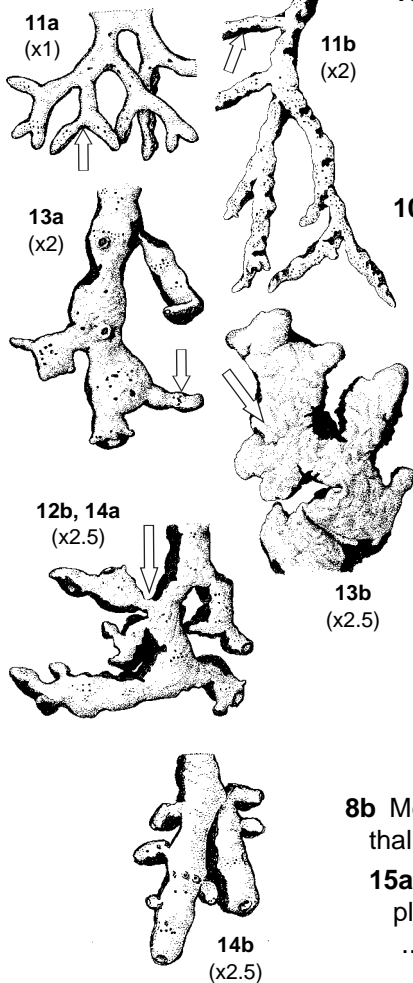
**12b** Basally constricted marginal lobules more or less abundant(←); medulla PD- or PD+ yellow becoming bright orange ..... 14

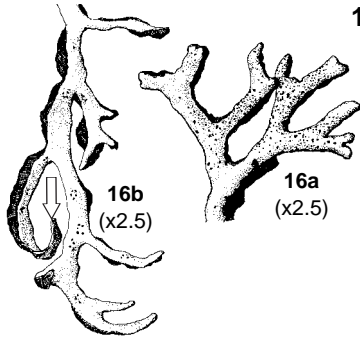
**14a** Lobes averaging to 1.5–2.5 (–3.5) mm across, never knobby; medulla PD-; mostly inland ..... *Hypogymnia occidentalis*

**14b** Lobes averaging to 3–4 mm across, longest ones often weakly knobby; medulla PD+ bright yellow becoming orange, or occasionally PD-; essentially coastal ..... *Hypogymnia enteromorpha*

**8b** Medullary ceiling predominantly white (or at least not distinctly dark: check toward thallus centre) ..... 15

**15a** Lobes closely appressed to substrate, usually short and crowded; upper surface plane or concave at lobe tips, never strongly convex; medulla PD-; inland ..... *Hypogymnia metaphysodes* (see lead 9a)





- 15b** Lobes raised or at least not closely appressed, elongate; upper surface sometimes strongly convex at lobe tips; medulla PD+ yellow becoming bright orange; distribution various ..... 16
- 16a** Lobes typically raised and rather stiff; upper surface often brownish; lower surface not much expanded, scarcely visible from above; widespread ..... *Hypogymnia imshaugii*
- 16b** Lobes distinctly pendent (except turned up at tips(←)); upper surface whitish; lower surface often much expanded and clearly visible from above; essentially coastal ..... *Hypogymnia duplicata*

***Hypogymnia apinnata* Goward & McCune**

Beaded bone

Habitat/Range: Common over trees, especially conifers, in coastal forests at lower elevations; western N Am, N to AK, S to CA.

Reactions: Cortex K+ yellow.

Contents: Atranorin.

***Hypogymnia austerodes* (Nyl.) Räsänen**

Powdered bone

Habitat/Range: Common over trees, especially conifers, in open inland forests, also infrequent over mossy rock in alpine localities; circumpolar, S to MX.

Reactions: Cortex K+ yellow; medulla KC+ red.

Contents: Atranorin, oxyphysodic acid (and physodic acid).

***Hypogymnia bitteri* (Lyngé) Ahti**

Powdered bone

Habitat/Range: Frequent over conifers in open forests in boreal regions, infrequent in intermontane; circumpolar, S to MX.

Reactions: Cortex K+ yellow; medulla KC+ red.

Contents: Atranorin and physodic acid.

***Hypogymnia duplicata* (Sm. ex Ach.) Rass.**

Tickertape bone

Habitat/Range: Common over trees, especially conifers, in open coastal forests at lower elevations; western N Am, N to AK, S to OR.

Reactions: Cortex K+ yellow; medulla PD+ orange.

Contents: Atranorin, diffractaic, physodalic and protocetraric acids.

***Hypogymnia enteromorpha* (Ach.) Nyl.**

Beaded bone

Habitat/Range: Frequent over trees, especially conifers, in coastal forests at lower elevations, also rare in humid intermontane (ICH zone); western N Am – probably eastern Eurasia, N to AK, S to CA.

Reactions: Cortex K+ yellow; medulla PD+ orange.

Contents: Atranorin, physodalic, physodic and protocetraric acids (and diffractaic acid).

***Hypogymnia heterophylla* Pike**

Map 40

Seaside bone

Habitat/Range: Infrequent over conifers, especially shore pine (*Pinus contorta*), in open coastal localities, western N Am, N to BC, S to CA.

Reactions: Cortex K+ yellow; medulla KC+ red, PD+ yellow becoming red.

Contents: Atranorin, physodalic acid, physodic acid and protocetraric acid.

***Hypogymnia imshaugii* Krog**

Forking bone (forking tube)

Habitat/Range: Common over trees, especially conifers, in open forests throughout, except rare (absent?) in hypermaritime localities and in boreal regions; western N Am, N to AK, S to CA.

Reactions: Cortex K+ yellow; medulla KC+ red, PD+ red.

Contents: Atranorin, physodalic and protocetraric acids (and physodic and diffractaic acids).

Notes: A PD- form of *H. "imshaugii"* has been detected in Montana and may occur also in adjacent parts of British Columbia. This may represent a distinct taxon. The type locality of *H. imshaugii* is Mt. Rabbit, near Tulameen, B.C.***Hypogymnia inactiva* (Krog) Ohlsson**

Forking bone

Habitat/Range: Frequent over trees, especially conifers, in open coastal forests; western N Am, N to AK, S to CA.

Reactions: Cortex K+ yellow; medulla KC+ red.

Contents: Atranorin and physodic acid.

***Hypogymnia metaphysodes* (Asah.) Rass.**

Deflated bone

Habitat/Range: Frequent over trees, especially conifers, in inland forests, rare in open maritime forests; western N Am – eastern Eurasia, N to AK, S to WA.

Reactions: Cortex K+ yellow; medulla KC+ red, PD- (occasionally PD+ yellow).

Contents: Atranorin, physodic acid and (physodalic and protocetraric acids).

Notes: The material here assigned to *H. metaphysodes* is apparently heterogeneous and probably represents two distinct species. Further work is in progress.***Hypogymnia occidentalis* Pike**

Lattice bone

Habitat/Range: Frequent over trees in open to shady intermontane (ICH zone) forests; western N Am, N to AK, S to CA.

Reactions: Cortex K+ yellow; medulla KC+ red.

Contents: Atranorin and physodic acid.

***Hypogymnia oceanica* Goward**

Lattice bone

Habitat/Range: Infrequent over conifers in open to shady coastal forests at lower elevations, rare in humid intermontane forests (ICH zone); western N Am, N to AK, S to WA.

Reactions: Cortex K+ yellow; medulla KC+ red, PD+ orange.

Contents: Atranorin, physodic, physodalic and protocetraric acids.

Notes: The type locality is near Sutton Pass on southern Vancouver Island, B.C.

***Hypogymnia physodes* (L.) Nyl.**

Monk's-hood (dark crottle, heather rags, hooded tube, puffed shield)

Habitat/Range: Common over trees and rare over acid rock throughout; circumpolar, S (at least) to CA.

Reactions: Cortex K+ yellow; medulla KC+ rose, PD+ orange.

Contents: Atranorin, physodalic, physodic and protocetraric acids.

***Hypogymnia rugosa* (Merr.) Pike ex Hale**

Puckered bone

Habitat/Range: Infrequent over conifers in open coastal and especially intermontane forests, usually at upper elevations (ESSF zone); western N Am, N to BC, S to WA.

Reactions: Cortex K+ yellow; medulla KC+ red, PD+ slowly pale yellow.

Contents: Atranorin, hypoprotocetraric acid (and physodic acid).

Notes: The type locality is MacLeod Lake, north of Prince George, B.C.

**Hypogymnia subobscura (Vainio) Poelt**

Map 41

Heath bone

Habitat/Range: Infrequent over mossy soil in windblown northern alpine localities, especially in north; circumpolar, S to CO.

Reactions: Cortex K+ yellow (check pale areas); medulla KC+ red.

Contents: Atranorin, physodic and vittatolic acids (and paraphysodic acid).

**Hypogymnia tubulosa (Schaerer) Hav.**

Dog bone

Habitat/Range: Frequent over trees in open forests throughout; incompletely circumpolar, S (at least) to CA.

Reactions: Cortex K+ yellow; medulla KC+ red, PD- (except soralia PD+ slowly yellow).

Contents: Atranorin, oxyphysodic, paraphysodic and physodic acids.

**Hypogymnia vittata (Ach.) Gas.**

Monk's-hood

Habitat/Range: Infrequent over conifers and mossy rock in humid coastal and intermontane forests; incompletely circumpolar, S to OR.

Reactions: Cortex K+ yellow; medulla KC+ red.

Contents: Atranorin, oxyphysodic and physodic acids (and vittatolic acid).

**HYPOTRACHYNA****Hypotrachyna (Vainio) Hale****The Loop Lichens**

Small to medium **stratified foliose lichens**, corticate above and below, **sorediate** (ours), lobes loosely appressed to **loosely attached**, short to elongate, averaging to (0.7–) 1–5 mm wide, thin. Upper surface **greenish or greyish**, somewhat shiny. **Lower surface black**, shiny, bearing **forked rhizines**. Medulla white. Photobiont green.

Apothecia unknown in B.C. material.

Over bark and rock.

Reference: Hale (1975).

Common Name: Describes the conspicuously rounded axils of the lobes.

Notes: *Hypotrachyna* is primarily a tropical genus consisting of about 80 species worldwide. Twenty-three of these occur in North America, though only two species are known in B.C.

**Key to *Hypotrachyna* and Similar Lichens**

**2a** Upper surface distinctly yellowish green; lobes mostly elongate-linear; cilia absent over margins ..... 2

**2a** Lobes loosely appressed to semi-erect; rhizines strongly fork-branching(←); coastal; medulla K+ yellow becoming reddish ..... ***Hypotrachyna sinuosa***

**2b** Lobes strongly appressed; rhizines rarely or not at all fork-branching; distribution various; medulla K+ yellow or K- ..... 3

**3a** Over rock; upper surface generally somewhat shiny throughout; coastal; medulla K+ yellow ..... ***Xanthoparmelia mougeotii***

**3b** Over bark (very rare over rock); upper surface generally dull towards thallus centre; widespread; medulla K- ..... ***Parmeliopsis ambigua***

**1b** Upper surface greyish, bluish or if somewhat greenish, then not yellowish green; lobes proportionately rather short and broad; cilia sometimes present at margins ..... 4

**4a** Soralia broad, diffuse, loosely packed with soredia(←); cilia absent or very sparse, less than 1 mm long; rhizines progressively better developed toward thallus centre; medulla C+ reddish ..... ***Hypotrachyna revoluta***

**4b** Soralia narrow or head-shaped, sharply delimited, densely packed with soredia(←); most cilia more than 2 mm long; rhizines often abruptly longer toward thallus centre; medulla C- ..... ***Parmotrema***



***Hypotrachyna revoluta* (Flörke) Hale**

(Syn. *Parmelia revoluta* Flörke)

Grey loop

Habitat/Range: Frequent over trees and acid rock in open to somewhat sheltered hypermaritime sites; incompletely circumpolar, N to BC, S to WA.

Reactions: Cortex K+ yellow; medulla C+ reddish, KC+ reddish.

Contents: Atranorin and gyrophoric acid.

***Hypotrachyna sinuosa* (Sm.) Hale**

(Syn. *Parmelia sinuosa* (Sm.) Ach.)

Green loop

Habitat/Range: Frequent over trees and shrubs in open coastal forests at lower elevations, especially in hypermaritime localities; tentatively circumpolar, N to AK, S to MX.

Reactions: Medulla K+ yellow becoming reddish, PD+ orange.

Contents: Salazinic and usnic acids (and norstictic and stictic acids).

**IMSHAUGIA**

***Imshaugia* S. F. Meyer**

**The Starburst Lichens**

**Small** to medium **stratified foliose lichens**, corticate above and below, **isidiate** (ours), lobes **closely appressed**, elongate, averaging to 1–2 mm wide, thin. Upper surface **whitish, shiny**. Lower surface whitish to pale brown, bearing short, simple rhizines. Medulla white. Photobiont green.

Apothecia located over upper surface, disc brownish; spores simple, **ellipsoid**, colourless, 8 per ascus.

Over conifer bark.

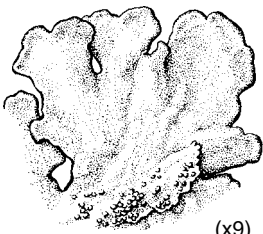
References: Meyer (1982, 1985).

Common Name: Describes the centrifugal growth pattern characteristic of the species.

Notes: *Imshaugia* is a temperate-boreal genus with two species worldwide. Both occur in North America, though only one occurs in B.C. *Imshaugia* was formerly treated within *Parmeliopsis*. For points of distinction with similar species in other genera, see the key under that genus.

***Imshaugia aleurites* (Ach.) S. F. Meyer**

(Syn. *Parmeliopsis aleurites* (Ach.) Nyl.)



(x9)

Salted starburst (grizzly shield)

Habitat/Range: Infrequent over trees, especially pines, in open inland localities at lower elevations, also rare over pines in coastal bogs; circumpolar, N to AK, S to NM.

Reactions: Cortex K+ yellow; medulla PD+ yellow becoming reddish.

Contents: Atranorin and thamnolic acid.

**KOERBERIA**

***Koerberia* Massal.**

**The Brownette Lichens**

**Minute stratified foliose lichens**, corticate above and below, isidiate or not, lobes **closely appressed** or occasionally in part loosely appressed, **elongate**, averaging to **0.1–0.2 mm wide**, thin. Upper surface **dark olive-brown**, somewhat shiny, smooth to longitudinally striate. Lower surface pale, bearing scattered, short, simple rhizines. Medulla white. **Photobiont blue-green**.

Apothecia unknown in B.C. material.

**Over rock** (ours).

Reference: Henssen (1963b).

Common Name: Stresses both the miniature size and the superficial resemblance to certain species of “brown” lichens (i.e., *Melanelia* and *Neofuscelia*).

Notes: *Koerberia* consists of two species worldwide, both occur in North America, though only one is known from B.C. For points of distinction with similar species, see the key under *Placynthium*. Chemistry is of no diagnostic value in this genus.

**Koerberia sonomensis (Tuck.) Henssen**

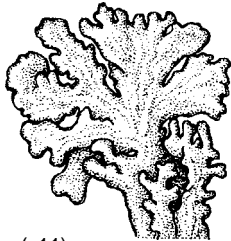
Map 42

(Syn. *Pannaria sonomensis* Tuck.)

Brownette

Habitat/Range: Infrequent over acid rock in open coastal sites, especially near ocean, probably restricted in BC to CDF zone; western N Am – western Eurasia, N to BC, S to CA.

Notes: *Koerberia sonomensis* is known to occur as far east as Montana; it may yet be found in the intermontane area of southern British Columbia.



(x11)

**LASALLIA**

**Lasallia Mérat**

**The Rocktripe Lichens**

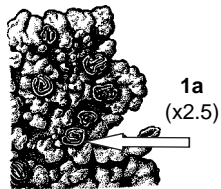
**Medium to large stratified foliose lichens**, corticate above and below, lacking isidia (ours), lobes **attached to substrate by a more or less central holdfast**, usually **rotund**, rather thin, thallus averaging to 6–15 (–25) cm across. Upper surface **dark brown, blistered/pustulate**. **Lower surface black** (ours), papillate, lacking rhizines. Photobiont green.

Apothecia located over upper surface, disc black; spores multi-celled, ellipsoid, brownish, 1 (rarely 2) per ascus.

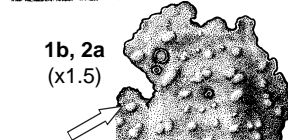
References: Llano (1950); Posner et al. (1991).

Common Name: Traditional, reflecting the strict occurrence of the species over rock and the apparent use of a species of the related genus *Umbilicaria* as food during famine.

Notes: *Lasallia* is primarily a temperate genus; of the eight species described worldwide, three occur in North America and one in B.C.



1a  
(x2.5)



1b, 2a  
(x1.5)

**Key to Lasallia and Similar Lichens**

- 1a Upper surface densely packed with blisters/pustules and ridges; apothecial disc concentrically fissured(←) ..... ***Umbilicaria hyperborea***
- 1b Upper surface bearing well-spaced, discrete blisters/pustules(←), ridges absent; apothecial disc plane ..... 2
- 2a Lower surface black, distinctly textured ..... ***Lasallia pensylvanica***
- 2b Lower surface pale brown, not at all textured ..... [***Lasallia papulosa***] (see ***Lasallia pensylvanica***)

**Lasallia pensylvanica (Hoffm.) Llano**

Map 43

(Syn. *Umbilicaria pensylvanica* Hoffm.)

Blistered rocktripe (Pennsylvania rocktripe)

Habitat/Range: Rare (but locally abundant) over vertical acid rock in open intermontane boulderbeds; western N Am – eastern N Am – eastern Eurasia, S to MX.

Reactions: Medulla C+ reddish, KC+ reddish.

Contents: Gyrophoric and ovoidic acids, with traces of lecanoric and hiascic acids (umbilicinic acid).

Notes: *Lasallia papulosa* is also reported for B.C., though the record is questionable. See the remarks under "Excluded Species."

## LEIODERMA

**Leioderma Nyl.****The Treepelt Lichens**

**Small stratified foliose lichens**, corticate above, **noncorticate below**, **sorediate** (ours), lobes loosely attached, rotund (ours), averaging to 3 mm wide, somewhat thick. Upper surface greyish, **bearing minute, appressed woolly hairs**. Lower surface whitish, **lacking veins**, bearing short to rather long rhizines restricted to vicinity of margins or scattered throughout. Medulla white. **Photobiont blue-green**.

Apothecia unknown in B.C. material.

**Over conifer branches.**

Reference: Galloway and Jørgensen (1987).

Common Name: Reflects the strict occurrence over bark and the superficial resemblance to certain pelt lichens (*Peltigera*).

Notes: *Leioderma* is primarily a subtropical to temperate genus of the southern hemisphere. It consists of five species, only one of which occurs in North America. For points of distinction with similar genera, see the keys under *Pannaria* and *Peltigera*.

**Leioderma sorediatum D. Galloway & P.M. Jørg.**

Map 44



(x6)

Treepelt

Habitat/Range: Rare over mossy conifer branches in open hypermaritime forests; western N Am – eastern Eurasia.

Reactions: All spot tests negative.

Contents: (Ursolic acid.)

Notes: This essentially South Pacific lichen is known in only two localities in North America — Vancouver Island and coastal Oregon.

## LEPTOCHIDIUM

**Leptochidium Choisy****The Tarpaper Lichen**

A small to medium **nonstratified foliose lichen (gelatinous when wet)**, **corticate above and below**, **isidiate**, lobes loosely attached, 3–5 mm wide, thick. Upper surface **blackish brown**, dull, bearing **minute white hairs on margins**. Lower surface dark, **white-tomentose**, rhizines absent. Medulla absent. **Photobiont blue-green**.

Apothecia located over upper surface, disc orangish brown; spores 2-celled, ellipsoid to pointed-ellipsoid, colourless, 8 per ascus.

Over mossy soil.

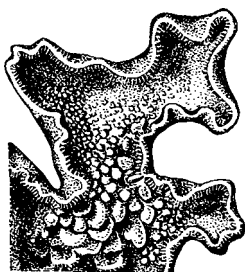
Reference: Thomson (1984).

Common Name: Emphasizes the typically dark upper surface, as well as the unstratified thallus, in which a pale medulla is lacking.

Notes: *Leptochidium* is a monotypic genus. For points of distinction with similar lichens, see the key under *Collema*.

**Leptochidium albociliatum (Desmaz.) M. Choisy**

(Syn. *Polychidium albociliatum* (Desmaz.) Zahlbr.)



(x8)

Whiskered tarpaper

Habitat/Range: Frequent over (mossy) rock or occasionally over soil in open or somewhat sheltered sites at lower elevations throughout, except absent from boreal regions; western N Am – eastern N Am – western Eurasia, N to AK, S to CA.

Reactions: All spot tests negative.

Contents: No lichen substances reported.

LEPTOGIUM

**Leptogium (Ach.) Gray**

**The Vinyl Lichens**

Minute to medium **nonstratified foliose or occasionally fruticose lichens (gelatinous when wet), corticate above**, usually corticate below, isidiate or not, lobes closely appressed to semi-erect or erect, averaging to 0.2–5 (–10) mm wide, usually thin. Upper surface **bluish grey, greyish brown or dark brown**, often **somewhat shiny**. Lower surface dark, lacking rhizines, though sometimes white-tomentose. Medulla absent. **Photobiont blue-green**. Apothecia located over upper surface or at margins, with a thalline margin, disc reddish brown to black; spores multi-celled, ellipsoid to spindle-shaped or acicular, colourless, (4–) 8 per ascus.

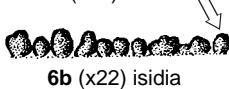
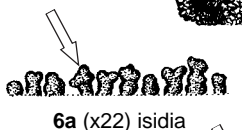
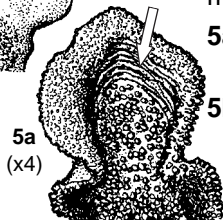
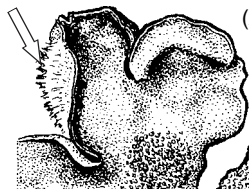
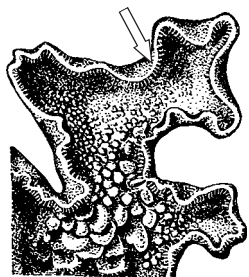
Over bark, earth and rock.

References: Sierk (1964); Jørgensen (1975); Jørgensen and James (1983); Jørgensen and Goward (1994).

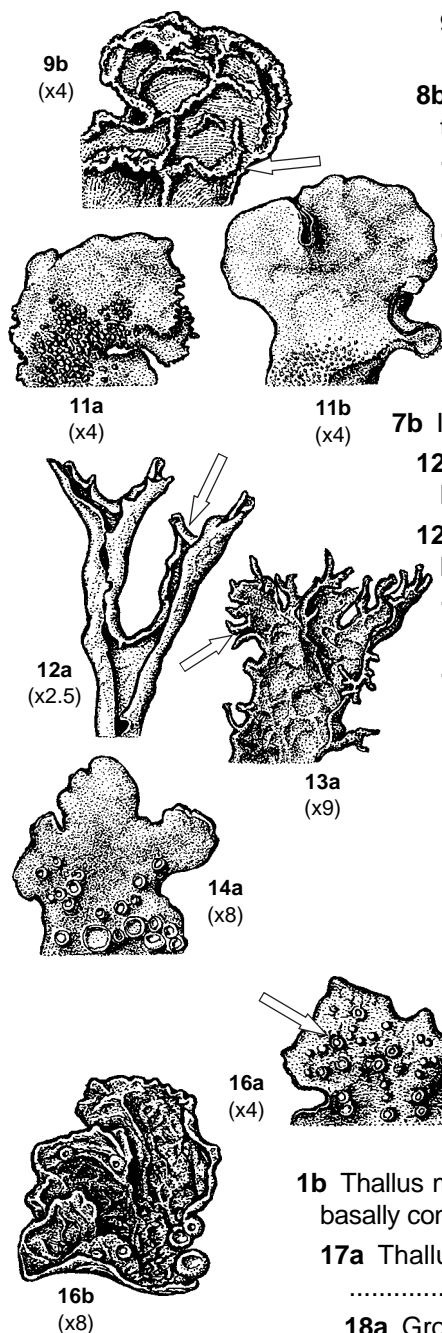
Common Name: Conveys the dark, often somewhat shiny lobes characteristic of this genus.

Notes: *Leptogium* is a cosmopolitan genus comprising more than 150 species, most of which are restricted to tropical and subtropical regions. Approximately 50 species occur in North America, with 16 of these reported for B.C. The western species need taxonomic revision. Chemistry is of no diagnostic value and is omitted in the following species accounts.

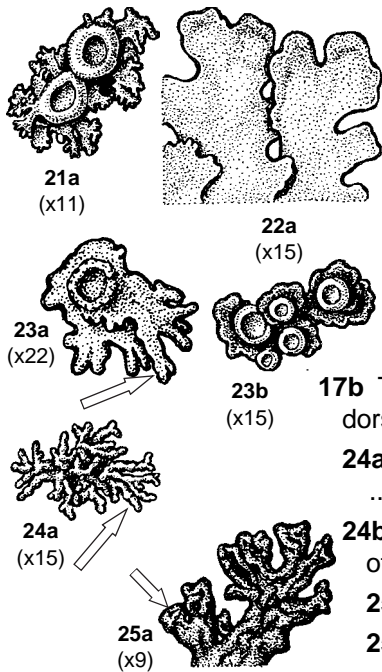
**Key to *Leptogium* and Similar Lichens**



- 1a Thallus small to medium but not minute; lobes averaging to more than 1.5 mm wide, always dorsiventral; isidia present or absent (Note: all lichens having a distinctly wrinkled upper surface key here) ..... 2
- 2a Lobe margins and/or isidia bearing minute, erect white hairs(←) ..... ***Leptochidium albociliatum***
- 2b Lobe margins naked; isidia, if present, naked (upper surface, however, occasionally hairy in *Leptogium burnetiae*) ..... 3
- 3a Lobes narrow, proportionately elongate, more or less erect and bearing distinctly swollen tips; lobe tips averaging to 0.4 mm thick when moist, often strongly collapsed-wrinkled when dry(←); over soil in arid inland localities ..... ***Leptogium schraderi***
- 3b Lobes broad or, if elongate, then never both erect and terminating in distinctly swollen tips; lobe tips averaging to less than 0.2 mm thick when moist, seldom strongly wrinkled when dry; habitat and distribution various ..... 4
- 4a Lower surface densely white-woolly throughout(←) (except often naked along lobe margins) ..... 5
- 5a Upper surface at least in part minutely wrinkled(←); isidia strongly collapsed-dimpled at tips; coastal ..... ***Leptogium furfuraceum***
- 5b Upper surface smooth or rarely in part bearing few scattered wrinkles; isidia not at all dimpled at tips; distribution various ..... 6
- 6a Upper surface distinctly greyish (check sheltered lobes), sometimes in part covered in short whitish hairs; mature isidia cylindrical or branched/coralloid(←) ..... ***Leptogium burnetiae***
- 6b Upper surface olive brownish to blackish, naked; mature isidia usually (but not always) remaining globose(←) ..... ***Leptogium saturninum***
- 4b Lower surface naked or bearing scattered tufts of hair at points of attachment, never distinctly woolly ..... 7
- 7a Isidia and/or lobules present over upper surface ..... 8
- 8a Thallus distinctly thick, averaging to more than 0.15 mm thick when moist; strictly coastal ..... 9
- 9a Upper surface finely wrinkled; isidia coarse, lobulate, scattered(←) ..... ***Leptogium platynum***



- 9b** Upper surface very strongly ridged-wrinkled; isidia fine, granular, often arranged in lines along ridges and lobe margins(←) ..... *Leptogium brebissonii*
- 8b** Thallus distinctly thin, averaging to less than 0.1 mm thick when moist; distribution various ..... 10
- 10a** Isidia partly flattened and lobulate at maturity ..... *Leptogium californicum* aggregate
- 10b** Isidia cylindrical throughout ..... 11
- 11a** Upper surface partly brownish; over (mossy) rock; widespread in rather arid localities; frequent ..... *Leptogium subaridum*
- 11b** Upper surface bluish grey throughout; over trees (rare over mossy rock); restricted to humid localities; rare ..... *Leptogium cyanescens*
- 7b** Isidia and lobules absent over upper surface ..... 12
- 12a** Lobes elongate, margins distinctly turned under and tapering to more or less horn-shaped tip(←) ..... *Leptogium corniculatum*
- 12b** Lobes short or elongate, margins not at all turned under; lobe tips not at all horn-shaped ..... 13
- 13a** Upper surface bearing strongly raised wrinkles; lobe margins strongly lobulate to finely divided-isidiate(←) ..... *Leptogium lichenoides*
- 13b** Upper surface only weakly wrinkled; lobe margins even to weakly lobulate ..... 14
- 14a** Growing directly over maritime rocks above intertidal zone; cellular cortex absent ..... *Collema fecundum*
- 14b** Ecology not as above; cellular cortex present ..... 15
- 15a** Lobes distinctly elongate; upper surface mostly smooth; apothecia rare; over mossy rock in hypermaritime sites ..... *Leptogium californicum* aggregate
- 15b** Lobes short or elongate; upper surface wrinkled or smooth; apothecia usually abundant; habitat and distribution various ..... 16
- 16a** Over bark or among mosses over bark; apothecia crowded(←), somewhat sunken; spores 4 per ascus; coastal ..... *Leptogium polycarpon*
- 16b** Over soil or mossy rock; apothecia scattered, not sunken; spores 8 per ascus; widespread ..... *Leptogium gelatinosum*
- 1b** Thallus minute; lobes averaging to less than 1 mm wide, occasionally cylindrical; true (i.e., basally constricted) isidia absent (Exception: isidia occasionally present in *L. schraderi*) ... 17
- 17a** Thallus entirely or largely consisting of dorsiventral lobes (check basal primary lobes) ..... 18
- 18a** Growing over soil at base of *Peltigera venosa* ..... (blue-green phototype of) *Peltigera venosa*
- 18b** Not associated with *Peltigera venosa* ..... 19
- 19a** Upper surface usually somewhat wrinkled; thallus consisting of non-cellular interior surrounded by cellular outer cortex ..... 20
- 20a** Lobe margins strongly lobulate to finely divided-isidiate ..... *Leptogium lichenoides* (see lead 13a)
- 20b** Lobe margins even to weakly lobulate ..... *Leptogium gelatinosum* (see lead 16b)
- 19b** Upper surface sometimes angular, but generally not at all wrinkled; thallus cellular (paraplectenchymatous) throughout ..... 21



- 21a Thallus mostly erect-cylindrical ..... *Leptogium tenuissimum* aggregate
- 21b Thallus flattened/dorsiventral more or less throughout ..... 22
- 22a Growing directly over rock in or near running water ..... [*Leptogium rivale*]
- 22b Over trees, moss or soil ..... 23
- 23a Lobes distinctly elongate(←), appressed throughout (except occasionally weakly ascending near lobe tips), averaging to less than 0.1 mm wide; over decaying wood or moss ..... *Leptogium subtile*
- 23b Lobes short to elongate, mostly somewhat ascending and overlapping, often averaging to more than 0.1 mm wide; over soil or bark .....  
..... *Leptogium minutissimum*
- 17b Thallus entirely or at least primarily erect-cylindrical (primary lobes may be partly dorsiventral) ..... 24
- 24a Over bark in humid climates; terminal lobes distinctly constricted at intervals(←) ....  
..... *Leptogium teretiusculum*
- 24b Over soil (also rarely over bases of trees), often in semi-arid localities; terminal lobes often somewhat contorted, but never distinctly constricted at intervals ..... 25
- 25a Lobe tips in part strongly wrinkled(←) ..... *Leptogium schraderi*
- 25b Lobe tips not wrinkled ..... *Leptogium tenuissimum* aggregate (see lead 21a)

***Leptogium brebissonii* Mont.**

Map 45

Jellied vinyl

Habitat/Range: Rare over mossy trees and shrubs in open hypermaritime forests at lower elevations; western N Am – western Eurasia.

Notes: In North America, *L. brebissonii* is known to occur only in B.C. (Goward et al. 1994a).

***Leptogium burnetiae* Dodge**

Map 46

Peppered vinyl

Habitat/Range: Infrequent over trees and rare over mossy outcrops in sheltered intermontane forests, also rare in maritime localities; incompletely circumpolar, N to AK, S to OR and NM.

Notes: Specimens having minute white hairs over the upper surface can be referred to var. *hirsutum* (Sierk) P.M. Jørg.

***Leptogium californicum* Tuck.**

Peppered vinyl

Habitat/Range: Infrequent over (mossy) rock in open, dry maritime (CDF zone) and intermontane localities; western N Am, N to AK, S to CA.

Notes: As defined here, *L. californicum* unites both isidiate and nonisidiate forms. It also appears to freely intergrade with *L. lichenoides* which is typically a much more wrinkled and lacerate species. Further work is needed.

***Leptogium corniculatum* (Hoffm.) Minks**

(Syn. *Leptogium palmatum* (Hudson) Mont. in Webb & Berth.)

Antlered vinyl

Habitat/Range: Common over soil, moss and thin soil over rock in open coastal sites at lower elevations; western N Am – western Eurasia – eastern Eurasia, N to AK, S to CA.

***Leptogium cyanescens* (Rabenh.) Körber**

Map 47

Blue vinyl

Habitat/Range: Rare over trees at lower elevations in sheltered humid, intermontane forests; incompletely circumpolar, N to AK, S to CO.

Notes: Although Sierk (1964) claims that *L. cyanescens* “is the most common species of *Leptogium* in North America,” it is obviously very rare in B.C.



***Leptogium furfuraceum* (Harm.) Sierk**

Map 48

Peppered vinyl

Habitat/Range: Infrequent over deciduous trees, especially Garry oak, in open maritime (CDF zone) and intermontane (BG, PP zones) localities; western N Am – western Eurasia, S to CA.

***Leptogium gelatinosum* (With.) Laundon**(Syn. *Leptogium sinuatum* (Hudson) Massal.)

Petalled vinyl

Habitat/Range: Frequent over mossy outcrops in open to somewhat sheltered sites throughout; circumpolar, N to AK, S to CA and NM.

Notes: Some specimens of *L. gelatinosum* have tattered lobes and may be difficult to distinguish from *L. lichenoides*.***Leptogium lichenoides* (L.) Zahlbr.**

Tattered vinyl (brown cushion lichen)

Habitat/Range: Frequent over soil and especially over mossy rock outcrops at lower elevations throughout, also rare over bases of trees; circumpolar, N to AK, S to CA.

Notes: See comments under *L. californicum*.***Leptogium minutissimum* auct., non (Flörke) Fr.**

Lilliput vinyl (mackerel lichen)

Habitat/Range: Apparently rare over (mossy) soil in open inland localities at lower elevations; circumpolar, N to AK, S to CA.

***Leptogium platynum* (Tuck.) Herre**

Map 49

Butterfly vinyl

Habitat/Range: Infrequent over mossy rock in open coastal forests, especially in CDF zone; western N Am, S to CA.

Notes: The local material differs from typical *L. platynum* in being thinner than average (i.e., less than 0.2 mm thick) and consistently bearing lobulate isidia over the upper surface.***Leptogium polycarpon* P.M. Jørg. & Goward**

Map 50

Peacock vinyl

Habitat/Range: Rare over (deciduous) trees in sheltered coastal forests at lower elevations; apparently western N Am, N to BC, S to OR.

**[*Leptogium rivale* Tuck.]**

Streamside vinyl

Habitat/Range: Over rock in or close to water; western N Am, N to OR, S to CA and CO.

Notes: *Leptogium rivale* has not been found in B.C., but is expected to occur. The species does occur in the Cascade Mountains of Oregon.***Leptogium saturninum* (Dickson) Nyl.**

Peppered vinyl (mouse lichen)

Habitat/Range: Infrequent over trees and mossy rock in sheltered inland and maritime localities, especially at lower elevations; circumpolar, N to AK, S to CA and NM.

***Leptogium schraderi* (Ach.) Nyl.**

Map 51

Wrinkled vinyl

Habitat/Range: Rare (possibly overlooked) over soil in arid intermontane localities (BG zone) at lower elevations; apparently western N Am – western Eurasia.

Notes: The local material might be referred to *L. turgidum* Nyl., though according to P.M. Jørgensen (Bergen, pers. comm., 1993) that species appears to be merely a growth form of *L. schraderi*.***Leptogium subaridum* P.M. Jørg. & Goward**

Pincushion vinyl

Habitat/Range: Infrequent over soil and mossy rock in open sites in dry intermontane localities at lower elevations, also rare in similar sites in CDF zone; apparently western N Am, N to BC, S to OR.



**Leptogium subtile (Schrad.) Torss.**

Map 52

(Syn. *Leptogium minutissimum* (Flörke) Fr.)

Appressed vinyl

Habitat/Range: Rare over decaying bark and mossy rock in humid intermontane localities (ICH zone) at lower elevations; apparently western N Am – western Eurasia.

Notes: *Leptogium subtile* was subsumed under *L. tenuissimum* by Sierk (1965), though other authors (e.g., Santesson 1984) recognize it as a distinct species.

**Leptogium tenuissimum (Wallr.) Körber auct.**

Lilliput vinyl (brown turf lichen)

Habitat/Range: Infrequent over trees and mossy soil in open localities at lower elevations throughout; circumpolar, N to AK, S to CA.

Notes: The material assigned to *L. tenuissimum* is heterogeneous and may represent two or more different taxa. *Leptogium tenuissimum* itself may not occur in B.C.

**Leptogium teretiusculum (Wallr.) Arnold**

Shrubby vinyl

Habitat/Range: Rare over trees (and soil?) in humid forests at lower elevations throughout, except probably absent in boreal regions; probably incompletely circumpolar, N to BC, S to MT.

Notes: The local material assigned to this species may be heterogeneous.

**LOBARIA**

**Lobaria Schreber**

**The Lung Lichens**

Medium to **large stratified foliose lichens**, corticate above and below, sorediate or isidiate or not, sometimes bearing internal cephalodia, lobes **loosely attached, short to subrotund** or occasionally elongate, averaging to (0.6–) 1–20 (–30) mm wide, thin. Upper surface greyish, greenish or brownish, shiny to dull, often net-ridged/reticulate. **Lower surface tomentose, tomentum often interrupted by white naked patches.** Medulla white. **Photobiont green and/or blue-green.**

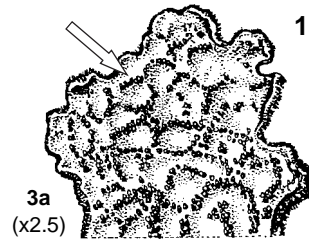
Apothecia located near lobe margins, disc usually reddish brown; spores (2–) multi-celled, spindle-shaped to needlelike, usually colourless when mature, 8 per ascus.

**Over trees**, rarely over rock.

References: Yoshimura (1971); Jordan (1973).

Common Name: Traditional, based on the resemblance of certain species to lung tissue.

Notes: *Lobaria* is a cosmopolitan genus consisting of approximately 80 species. Eleven of these occur in North America and six in B.C.



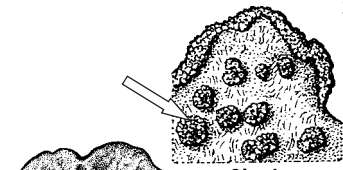
**1a** Photobiont a dark blue-green cyanobacterium; upper surface usually greyish or brownish (except pale greenish in *L. scrobiculata*, which has textured/scabrid upper surface) ..... 2

**2a** Isidia and soredia absent; over mossy rocks; coastal ... [*Lobaria pseudopulmonaria*]

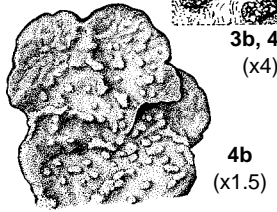
**2b** Isidia or soredia present; ecology and distribution various ..... 3

**3a** Isidia present(←); soredia absent; upper surface dark, usually distinctly shiny, not at all textured/scabrid ..... *Lobaria retigera*

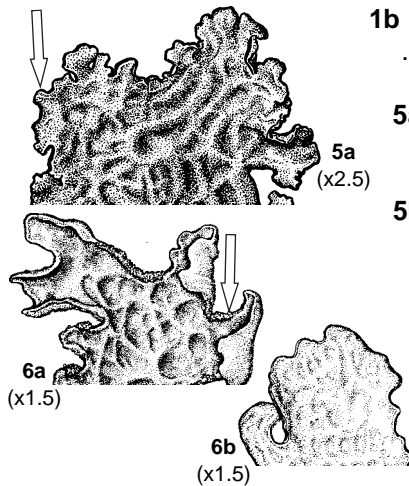
**3b** Isidia absent; soredia present(←); upper surface usually pale, dull, often textured/scabrid 4



**4a** Upper surface greyish or at least not obviously greenish, often (but not always) covered in minute erect hairs, K+ strong yellow; medulla KC- ..... *Lobaria hallii*



**4b** Upper surface pale milky greenish (rarely greyish), hairless or at least not strongly covered in minute erect hairs, K- (or occasionally K+ pale yellow); medulla KC+ reddish ..... *Lobaria scrobiculata*



- 1b Photobiont a grass-green alga; upper surface usually greenish, never textured/scabrid ..... 5
- 5a Upper surface distinctly yellowish green; lobe margins more or less fringed with lobules(←); essentially coastal ..... **Lobaria oregana**
- 5b Upper surface bluish green or at least not distinctly yellowish green; lobe margins not at all lobulate; widespread in humid localities ..... 6
- 6a Isidia and/or soredia present(←); medulla K+ yellow or orange ..... **Lobaria pulmonaria**
- 6b Isidia and soredia absent; medulla K- ..... **Lobaria linita**

**Lobaria hallii (Tuck.) Zahlbr.**

Iron lung

Habitat/Range: Infrequent over conifers in open to somewhat shady forests at lower elevations in humid regions throughout, except possibly absent in hypermaritime localities; western N Am – western Eurasia, N to AK, S to CA.

Reactions: Cortex K+ yellow.

Contents: Various unknown substances.

**Lobaria linita (Ach.) Rabenh.**

Cabbage lung (veined lichen)

Habitat/Range: Frequent over mossy rocks in snowy districts at higher elevations throughout, and common in coastal localities over bases of conifers in humid old-growth forests at lower elevations; incompletely circumpolar, S to OR.

Reactions: All spot tests negative.

Contents: Methyl evernate, methyl gyrophorate, tenuiorin, and various unknown substances (Maass 1975).

Notes: Two varieties of dubious taxonomic status occur in B.C.:

- 1a Apothecia absent; over mossy rocks at higher elevations ..... var. **linita**
- 1b Apothecia present; over bases of conifers at lower elevations ..... var. **tenuior (Hue) Asah.**

**Lobaria oregana (Tuck.) Müll. Arg.**

Lettuce lung

Habitat/Range: Frequent over conifers in open to somewhat shady coastal old-growth forests, usually most abundant at higher elevations; western N Am, N to AK, S to CA.

Reactions: Medulla K+ yellow, PD+ orange.

Contents: Constrictic, cryptostictic, norstictic, stictic and usnic acids and one unknown.

**[Lobaria pseudopulmonaria Gyelnik]**

Smoker's lung

Habitat/Range: Over mosses and mossy rock in open coastal sites; western N Am – eastern Eurasia, N to AK.

Reactions: Medulla K+ yellow or red, PD+ yellow or orangish, tomentum K+ blue-green.

Contents: Norstictic acid, various triterpenoids, (stictic and constrictic acids), and thelephoric acid in tomentum and rhizines.

Notes: Not yet recorded from B.C., but known to occur in southern coastal Alaska.

**Lobaria pulmonaria (L.) Hoffm.**

Lungwort

Habitat/Range: Frequent over trees and mossy rocks in open to shady forests in humid localities at lower elevations throughout, except essentially absent from boreal regions; incompletely circumpolar, S to CA.

Reactions: Medulla K+ yellow, PD+ orange.

Contents: Constrictic, norstictic and stictic acids and one unidentified substance.

**Lobaria retigera (Bory) Trevisan**

Map 53

Smoker's lung

Habitat/Range: Rare over trees and mossy logs in rather shady coastal and intermontane (ICH zone) old-growth forests at lower elevations; western N Am – eastern Eurasia, N to AK, S to BC.

Reactions: Tomentum K+ blue-green.

Contents: Thelophoric acid in tomentum and various unknowns.

**Lobaria scrobiculata (Scop.) DC. in Lam. & DC.**

Textured lung

Habitat/Range: Frequent over trees and mossy outcrops in open forests, throughout, usually absent from boreal regions; circumpolar, S to CA.

Reactions: Cortex K+ pale yellow or (more often) K-; medulla K+ pale yellow or orangish, KC+ red, PD+ orange (rarely PD-).

Contents: Constrictic, norstictic, stictic, and usnic acids, scrobiculin, and one unknown.

**MASONHALEA**

**Masonhalea Kärnefelt**

**The Tumbleweed Lichen**

Small to occasionally medium **stratified foliose lichen**, corticate above, corticate and partly noncorticate below, lacking soredia and isidia, lobes **unattached to substrate, elongate**, averaging to 2–5 (–20) mm wide, thin to somewhat thick. Upper surface **dark brown**, dull or shiny, smooth. **Lower surface dark brown, except decorticate patches whitish, lacking rhizines**. Medulla white. Photobiont green.

Apothecia unknown in B.C. material.

**Growing unattached over soil and duff.**

Reference: Kärnefelt (1977).

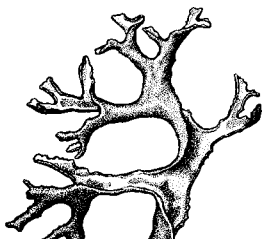
Common Name: Reflects the tendency of the species, which grows unattached, to be blown about in the wind.

Notes: *Masonhalea*, a monotypic genus, is restricted to arctic-alpine localities at northern latitudes. It was formerly treated within *Cetraria*.

**Masonhalea richardsonii (Hook.) Kärnef.**

Map 54

(Syn. *Cetraria richardsonii* Hook.)



(x1.5)

Arctic tumbleweed (tumble lichen)

Habitat/Range: Infrequent and growing unattached over open soil or duff in northern inland alpine localities; western N Am – eastern Eurasia, S to northern BC.

Reactions: Medulla KC+ red, UV+ bluish.

Contents: Alectoronic acid.

**MASSALONGIA**

**Massalongia Körber**

**The Mouse Lichens**

**Small to medium stratified foliose or squamulose lichens**, corticate above and below, **more or less isidiate**, lobes/squamules closely appressed or loosely appressed, elongate or subrotund, averaging to 0.1–1.5 (–2) mm wide, thin. Upper surface **medium brown**, dull, smooth. Lower surface whitish or brown, bearing scattered brown rhizines. Hypothallus absent. Medulla white. **Photobiont blue-green**.

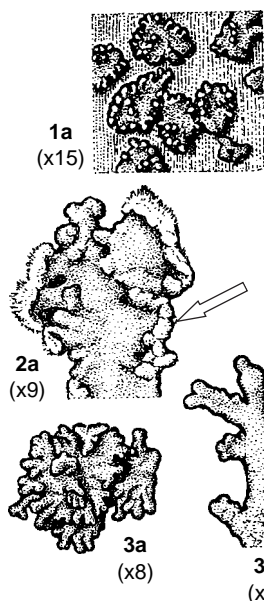
Apothecia located near margins, disc reddish brown; spores 2–4-celled, ellipsoid to spindle-shaped, colourless, 8 per ascus.

Over mossy rocks and soil.

Reference: Henssen (1963a).

Common Name: Reflects the miniature size of the lobes and their dull greyish brown colour.

Notes: *Massalongia* is primarily a temperate genus consisting of two species worldwide. Both of these occur in B.C.



**Key to Massalongia and Similar Lichens**

- 1a Thallus resting on conspicuous black hypothallus; lobes mostly scalelike/isodiametric; over bark or moss; humid climates ..... ***Parmeliella triptophylla***
- 1b Hypothallus absent or inconspicuous; lobes scalelike or elongate; habitat and distribution various, but never over bark ..... 2
- 2a Upper surface of exposed lobes greyish brown to almost black; lobe tips and/or “isidia” often soft-corticate or pale-felted(←); forming dense mats that completely obscure substrate; spores 1-celled ..... ***Pannaria praetermissa***
- 2b Upper surface of exposed lobes dark medium brown (never greyish or blackish); lobe tips and “isidia” hard-corticate, never pale-felted; forming loose mats that usually do not completely obscure substrate; spores 2-celled or more ..... 3
- 3a Lobes mostly scalelike/isodiametric, averaging to less than 2 mm long, less than two times longer than broad; over soil; arid climates; rare ***Massalongia cf. microphylliza***
- 3b Lobes mostly elongate, often averaging to more than 2 mm long, usually more than two times longer than broad; over moss (rare over rock); widespread; frequent ..... ***Massalongia carnosa***

**Massalongia carnosa (Dickson) Körber**

Bluff mouse

Habitat/Range: Common over moss and mossy rock in open sites throughout; also rare directly over acid rock; circumpolar, S to CA and CO.

Reactions: All spot tests negative, except hymenium I+ strong blue.

Contents: No lichen substances reported.

**Massalongia cf. microphylliza (Nyl. ex Hasse) Henssen**

Map 55

Soil mouse

Habitat/Range: Rare over soil in open, semi-arid intermontane localities; western N Am, N to BC, S to CA.

Reactions: All spot tests negative.

Contents: No lichen substances reported.

Notes: The report is tentative, pending detection of apothecia. The material may represent an undescribed species.