













APPENDIX 2. Excluded species

Arctomia delicatula Th. Fr. was reported for B.C. by Noble et al. (1987). Though some forms might be considered foliose, and hence deserving treatment here, its inclusion in the B.C. checklist is apparently based on a misidentification. The specimen in question, Brodo 21313 (CANL), collected from the northern Rocky Mountains, contained mostly *Placynthium asperellum* (Ach.) Trev. and fragments of *Leptogium* cfr. *tenuissimum* (Dicks.) Körber.

Asahinea chrysantha (Tuck.) Culb. & C. Culb. was reported by Noble et al. (1987), but no specimens have been located at either CANL or UBC.

Catapyrenium heppioides (Zahlbr.) Thomson (Syn. *Dermatocarpon heppioides* Zahlbr.) was reported by Noble (1982), but the specimens upon which this report is based are umbilicate, not rhizoidal, as would be expected in that species (Thomson 1987). The specimens are therefore provisionally referred to *Dermatocarpon intestiniforme* (Körber) Hasse, although the spores are longer (17–23 μ) than previously reported for that species (see Imshaug 1957).

Cetraria islandica (L.) Ach. ssp. orientalis (Asah.) Kärnef. was reported by Noble et al. (1987), but no authentic specimens of this subspecies have been examined by us.

Dermatocarpon vagans Imsh. was reported from B.C. by Goward and Thor (1992) who noted, however, that it may not be taxonomically distinct, intergrading freely with *D. miniatum* (L.) Mann and *D. reticulatum* Magnusson. This point is discussed at greater length by Rosentreter and McCune (1992), who argue that *D. vagans* is an environmental modification of *D. reticulatum*.

Erioderma mollisimum (G. Sampaio) Du Rietz was first reported by Noble et al. (1987) based on a single specimen at UBC that, on re-examination, can be referred to the recently described species, *Erioderma solediatum* D. Gallo-way & P.M. Jørg.

Lasallia papulosa (Ach.) Llano was included in the B.C. checklist of Noble et al. (1987), based on an early specimen supposedly collected by Macoun from Mt. Benson on Vancouver Island and first reported by Llano (1950). That record is suspect, however, because Macoun was notorious for cross-labelling his specimens. No further B.C. material has been discovered in more than a century. While admitting the possibility that *L. papulosa* may yet be found in B.C. (Llano [1950], for example, reports its occurrence in Oregon and the Yukon), we prefer for the present to exclude it from the B.C. lichen flora.

Lobaria isidiosa (Bory) Trevisan has been reported for North America from Alaska (Krog 1968) and B.C. (Noble et al. 1987). Jordan (1973) discussed the earlier report and concluded that the material should actually be referred to *L. retigera* (Bory) Trevisan. Presumably the later report is based on two specimens at CANL, labelled as *L. isidiosa*, and collected by Ohlsson in 1970 near Terrace. Both are in fact *L. retigera*.

Physcia cascadenis Magnusson was first reported for B.C. by Noble (1978) and was tentatively included in the B.C. checklist (Noble et al. 1987). We have examined specimens assigned to this species and prefer to place them as merely a pale variant of *P. phaea* (Tuck.) Thomson.

Physcia wainioi Räsänen is the name usually given to forms of *P. caesia* (Hoffm.) Fűrnr. in which the soredia are located at the lobe tips. It was first reported for B.C. by Bird and Bird (1973). Noble et al. (1987) include it in the B.C. checklist with the comment: "the delimitation of this species from *P. caesia* needs further study." We agree.

Pseudocyphellaria mougeotiana (Delise) Vainio was first reported for B.C. by Ohlsson (1973); it is here treated as a variant of *P. crocata* (L.) Vainio. See the remarks under that species.

Psora russellii (Tuck.) A. Schneider (Syn. *Lecidea russellii* Tuck.) was first reported from B.C. by Tuckerman (1888) and most recently by Noble et al. (1987). Timdal (1986), however, has shown that this species is restricted to desert areas of the intermontane United States. Most B.C. specimens previously assigned to *P. russellii* can be referred to *P. tuckermanii* R. Anderson ex Timdal.

Umbilicaria arctica (Ach.) Nyl. was reported for B.C. by Noble et al. (1987). The single specimen so labelled at CANL (Brodo 10981, from the Queen Charlotte Islands) seems to fall within the normal range of variation for *U. hyperborea* (Ach.) Ach. Llano (1950) treated *U. arctica* as a morphotype of that species.

***Umbilicaria decussata* (Vill.) Zahlbr.** was first reported for B.C. (as *Omphalodiscus decussata*) by Szczawinski and Krajina (1959) and has been subsequently reported by several other authors. Because, however, no specimens are on deposit at either CANL or UBC, we prefer for the present to exclude this species from the B.C. flora, while admitting the likelihood that it will in fact eventually be found to occur here.

***Xanthoparmelia hypopsila* (Müll. Arg.) Hale** was first reported for B.C. by Noble (1978), though according to Hale (1990) this species is actually restricted to South America; the North American specimens previously attributed to *X. hypopsila* are usually referable to *X. angustiphylla* (Gyelnik) Hale. The B.C. material, however, is closer to *X. planilobata* (Gyelnik) Hale, with elongate-linear lobes that are, at most, sparsely rhizinate.

***Xanthoparmelia lineola* (Berry) Hale** (Syn. *Parmelia lineola* Berry) was reported for B.C. by Noble et al. (1987). However, the B.C. material examined in the course of our study is invariably less closely adnate than typical *X. lineola* and often produces copious secondary lobes in the central portions of the thallus. Such material is more appropriately placed in *X. coloradoensis* (Gyelnik) Hale. A few authentic specimens have, however, been collected from northern Montana.

***Xanthoparmelia somloensis* (Gyelnik) Hale** (Syn. *Parmelia somloensis* Gyelnik) was first reported for B.C. by Ahti et al. (1987), who stated (apparently on the authority of the monographer Mason Hale), that "most reports of *X. taractica* (Gyelnik) Hale in North America and Europe actually refer to this species." Hale later, however, adopted a narrower concept for *X. somloensis*, which he considered to be a maculate narrow-lobed Eurasian and eastern North American species (Hale 1990). The western material, by contrast, is non-maculate and somewhat broader-lobed and can be assigned to *X. coloradoensis* (Gyelnik) Hale. See, however, the notes under that species.

***Xanthoparmelia taractica* (Krempelhuber) Hale** (Syn. *Parmelia taractica* Krempelhuber) is a soil-dwelling lichen widespread in the southern hemisphere and extending northward also into Mexico (Hale 1990). British Columbia specimens previously assigned to *X. taractica* are usually referable to *X. coloradoensis* (Gyelnik) Hale.

***Xanthoparmelia tasmanica* (Hooker & Taylor) Hale** (Syn. *Parmelia tasmanica* Hooker & Taylor) was reported for B.C. by Noble et al. (1987), but is not accepted here. Specimens previously identified as that species have a dark, but never uniformly jet black lower surface and are accordingly assigned here to *X. coloradoensis*.

GLOSSARY AND ABBREVIATIONS

- acicular:** in lichens, said of spores: needlelike, long, very slender, and pointed.
- acid:** referring to rock or bark lacking free calcium carbonates. Most quartzites are acidic (= siliceous) and most conifers have acid bark. See also **base-rich**.
- AK:** Alaska.
- algae** (sing.: alga): in lichens, tiny photosynthetic cells (also called the **photobiont**) usually grass-green in colour, from which the lichen fungus derives its carbohydrate requirements. In many lichen species the photobiont is a **cyanobacterium**.
- ampulliform:** flask-like and with a narrow neck.
- apothecia** (sing.: -ium): in lichens, the saucer-shaped or button-shaped fruiting bodies (ascomata) in which the sexual **spores** of the fungal partner are produced. Macroscopically, a typical apothecium is comprised of a disc and a rim (see Figure 9a, page 13). See also **perithecia**.
- apothecial rim** (= apothecial margin): the sterile outer portion of an **apothecium**. The apothecial rim is said to be **thalline** when it contains **photobiont** cells and is the same colour as the rest of the cortex.
- apotheciate:** bearing **apothecia**.
- asci** (sing.: ascus): microscopic, saclike structures within the **ascocarp** of an **ascomycete**, in which sexually produced spores are borne.
- ascocarp:** general term for the fruiting body of an **ascomycete** (i.e., the class of fungi to which most lichens belong). **Apothecia** and **perithecia** are both ascocarps.
- ascomycete:** a species belonging to the fungal Class Ascomycetes, in which the spores are produced in saclike **asci**.
- AT:** Alpine Tundra biogeoclimatic zone: a cold, often snowy upland zone occurring at and above treeline throughout British Columbia. See page 5.
- AZ:** Arizona.
- base-rich:** referring to rock or bark containing free calcium carbonates or giving rise to such. Limestone and peralkaline basalt are base-rich rocks, whereas maple and cottonwood are base-rich trees. See also **acid**.
- BC:** British Columbia.
- BG:** Bunchgrass biogeoclimatic zone: a lowland zone of semi-arid **intermontane** regions. See page 5.
- boreal:** in B.C., pertaining to **inland** regions of cool, rather continental climate lying to the east of the Rocky Mountains (see Figure 2, page 4).
- buttoned** (= **omphalodisc**): characterized by a central knob. Refers to an **apothecium** (of the genus *Umbilicaria*) in which the surface of the **disc** is interrupted by a central knob of sterile material.
- C:** in this manual, used as an abbreviation for calcium hypochlorite (in water), a reagent used to perform spot tests in lichens. Such tests reveal the presence of specified chemical substances. See page 13.
- CA:** California.
- cephalodia** (sing.: -ium): small, localized colonies of **cyanobacteria** occurring within or on the surface of lichens in which the primary **photobiont** is otherwise an **alga** (see Figures 4e, 8e, page 10, 12).
- cephalodiate:** bearing **cephalodia**.
- cilia** (sing.: -ium): thin, hairlike appendages usually occurring along the **lobe** margins (see Figure 8g, page 12).
- CO:** Colorado.
- coast:** in B.C., pertaining to areas west of the coast ranges i.e., including **maritime** and **hypermaritime** regions (see Figure 2, page 4). See also **inland**.
- coralloid:** resembling coral: elongate and much-branched; often used in reference to **isidia**.
- cortex:** in lichens, the hardened outer "skin" consisting of closely packed fungal threads (see Figures 4a, d, page 10).
- corticate:** having a **cortex**.
- CDF:** Coastal Douglas-fir biogeoclimatic zone: a lowland zone of dry **maritime** regions. See page 5.
- crustose:** in lichens, pertaining to **thalli** that lack a lower **cortex** and **rhizines** and are so closely applied to the **substrate** as to be virtually inseparable from it (see Figure 7b, page 12).
- CWH:** Coastal Western Hemlock biogeoclimatic zone: a lowland zone of wet **maritime** and **hypermaritime** regions (see page 5).
- cyanobacteria** (sing.: -ium): in lichens, tiny photosynthetic cells (also called the **photobiont**), usually bluish green to bluish grey, from which the lichen fungus derives its carbohydrate requirements. In many lichen species the photobiont is an **alga**, not a cyanobacterium.

- cyphellae** (sing.: -a): rimmed, crater-like pores that open into the medulla via the lower surface; characteristic of the genus *Sticta* (see Figure 8c, page 12).
- decorticate**: formerly **corticate**, but now lacking a **cortex**.
- dichotomous** (= fork-branched): Y-shaped branching (see Figure 6b, page 11).
- disc**: as viewed from above, the central portion of an **apothecium** (excludes the **apothecial rim**).
- dorsiventral**: having an obvious upper and lower surface.
- ESSF**: Engelmann Spruce – Subalpine Fir biogeoclimatic zone: a subalpine zone of **intermontane** regions. See page 5.
- farinose**: powdery, like flour; used in reference to **soredia**.
- fissured** (= **gyrodisc**): characterized by fissures or vertical cracks; in lichens, pertaining to an **apothecium** (of the genus *Umbilicaria*) in which the surface of the **disc** is more or less concentrically ridged.
- foliose**: in lichens, pertaining to leaflike **thalli** in which the lower **cortex** is separable from the substrate (see Figure 7d, page 12).
- foveolate**: more or less irregularly and delicately pitted; usually used in reference to the upper **cortex**.
- fruticose**: in lichens, pertaining to club-like, shrub-like, or hairlike **thalli** that are more or less radially symmetrical in cross-section (see Figures 7e–g, page 12).
- gyrodisc**: an **apothecium** (of the genus *Umbilicaria*) in which the surface of the **disc** is more or less concentrically fissured.
- heteromerous** (= **stratified**): in lichens, pertaining to **thalli** in which the **photobiont** and **medulla** are organized in distinct layers. In such species, the **medulla** is pale (see Figure 4, page 10). See also **homoimerous**.
- HNO₃**: nitric acid (in water); a reagent used to perform spot tests in lichens. See page 13.
- homoimerous**: (= **nonstratified**): in lichens, pertaining to **thalli** in which the **photobiont** and **medulla** are not organized in distinct layers. In such species, the **medulla** is dark and often gelatinous when moist (see Figure 5, page 10). See also **heteromerous**.
- hymenium**: within the **ascocarps** of fungi, the spore-bearing layer in which the **asci** arise.
- hypermaritime**: in B.C., pertaining to **coast** regions of high oceanity, lying adjacent to the open Pacific Ocean (see Figure 2, page 4).
- hypothallus** (= **prothallus**): in lichens, a thin, typically dark, tightly appressed weft of fungal threads that in some species develops on the underside of the **thallus**, and may sometimes extend outward from it, so as to be visible when seen from above (see Figure 6g, page 11).
- I**: iodine (in potassium iodide solution); a reagent used to perform spot tests in lichens. A positive reaction indicates the presence of certain kinds of starch. See page 13.
- ICH**: Interior Cedar–Hemlock biogeoclimatic zone: a lowland zone of wet **inland** regions. See page 5.
- ID**: Idaho.
- IDF**: Interior Douglas-fir biogeoclimatic zone: a lowland zone of dry **inland** regions. See page 5.
- inland**: in B.C., pertaining to regions east of the coast ranges; (i.e., including **intermontane** and **boreal** regions). See Figure 2, page 4. See also **coast**.
- intermontane**: in B.C., pertaining to **inland** regions lying between the coast ranges and the Rocky Mountains. See Figure 2, page 4.
- isidia** (sing.: -ium): tiny fingerlike, globular or **coralloid** asexual reproductive structures that contain both fungal threads and **photobiont** cells, are **corticate**, and protrude from the upper **cortex** of many lichen species (see Figure 9g, page 13). See also **soredia**.
- isidiate**: bearing **isidia**.
- isodiametric**: having approximately equal diameters in all directions.
- K**: in this manual, used as an abbreviation for potassium hydroxide (in water), a reagent used to perform spot tests in lichens. Such tests reveal the presence of specified chemical substances. See page 13.
- KC**: in this manual, used as an abbreviation for potassium hydroxide followed by calcium hypochlorite, reagents used to perform spot tests in lichens. Such tests reveal the presence of specified chemical substances. See page 13.
- laminal**: occurring on the (upper) surface of **lobes**. See also **marginal**.
- leiodisc**: an **apothecium** (of the genus *Umbilicaria*) in which the surface of the **disc** is smooth.
- lenticular**: lens-shaped.
- leprose**: in lichens, pertaining to **thalli** composed entirely of granular or more often powdery **soredia** (see Figure 7a, page 12).

- lobe:** a flattened branch or projection.
- lobule:** tiny **lobe**-like, dorsiventral outgrowths, often occurring along the **lobe** margins or stress cracks.
- lobulate:** bearing **lobules**.
- maculae** (sing.: -a): small, pale spots in the upper **cortex** of some lichen species, often caused by differences in the thickness of the cortex or clumping of algae beneath the cortex (see Figure 8b, page 12).
- maculate:** bearing **maculae**.
- marginal:** occurring along the margin of a **lobe** or **apothecium** or other structure.
- maritime:** in B.C., pertaining to **coast** areas of moderate oceanity, usually occurring somewhat inland of the open Pacific Ocean. See page 5.
- medulla:** in lichens, the interior portion of a **thallus**, composed mostly of loose fungal threads. In **stratified** species the medulla is pale, whereas in **nonstratified** species it is dark (see Figure 4c, page 10).
- MH:** Mountain Hemlock biogeoclimatic zone: a forested subalpine zone of **coast** areas. See page 5.
- MT:** Montana.
- muriform:** pertaining to **spores** in which both transverse and longitudinal **septa** are present.
- MX:** Mexico.
- mycobiont:** the fungal partner of a lichen. See also **photobiont**.
- needlelike** (= **acicular**): long, very slender, and pointed.
- NM:** New Mexico.
- nonstratified** (= **homoiomorous**): in lichens, pertaining to **thalli** in which the **photobiont** and **medulla** are not organized in distinct layers. In such species, the **medulla** is dark and often gelatinous when moist (see Figure 5, page 10). See also **stratified**.
- NV:** Nevada.
- omphalodisc:** an **apothecium** (of the genus *Umbilicaria*) in which the surface of the **disc** is interrupted by a central knob of sterile material.
- OR:** Oregon.
- papillae** (sing.: -a): minute, discrete, typically rounded protruberances of the **cortex**.
- papillate:** bearing **papillae**.
- PD:** in this manual, used as an abbreviation for paraphenylenediamine (in alcohol), a reagent used to perform spot tests in lichens. Such tests reveal the presence of specified chemical substances. See page 14.
- peltate:** in lichens, referring to a shield-shaped **thallus** attached to the **substrate** at a single point.
- perithecia** (sing.: -ium): in lichens, the minute, flask-shaped **ascocarps** in which the sexual **spores** of the fungal partner are produced. Macroscopically, a typical perithecium resembles a tiny dot as seen from above (see Figure 9b, page 13). See also **apothecia**, **pycnidia**.
- peritheciate:** bearing **perithecia**.
- photobiont:** the photosynthetic partner in a lichen, consisting of a green **alga**, a blue-green **cyanobacterium** or, in some species, both. The lichen fungus derives its carbohydrate requirements from the photobiont.
- phototype:** a general term designating one of two possible states in lichens containing both an **alga** and a **cyanobacterium** as photobionts: "green" (when the algal partner dominates) or "blue-green" (when the cyanobacterium dominates). The green and blue-green phototypes of a single species are often quite dissimilar in form and colour.
- podetia** (sing.: -ium): the hollow, upright, **ascocarp**-bearing stalks characteristic of the genus *Cladonia* (see Figure 7e, page 12).
- podetiate:** bearing **podetia**.
- PP:** Ponderosa Pine biogeoclimatic zone: a sparsely forested lowland zone of semi-arid **intermontane** regions. See page 5.
- pruina:** in lichens, a thin, white frosting of minute crystals, especially calcium oxalates.
- pruinose:** covered in **pruina**.
- pseudocyphellae** (sing.: -a): tiny, pale, unrimmed pores in the upper or lower **cortex** through which the **medulla** is exposed. In form, pseudocyphellae may be dot-like, angular or irregular (see Figure 8d, page 12).
- pseudocyphellate:** bearing **pseudocyphellae**.
- pubescent:** covered in minute, soft, usually woolly, hairs.
- pustulate:** bearing **pustules**.
- pustule:** blister-like swellings.

pycnidia (sing.: -ium): in lichens, minute, flask-shaped, asexual spore-producing structures of the fungus, usually imbedded in the **thallus** and visible from above as a black dot that may occasionally be protruberant (see Figure 9c, page 13).

pycnidiate: bearing **pycnidia**.

pycnoconidia: in lichens, asexual reproductive **spores** produced by **pycnidia**.

reagent: a liquid chemical that, when applied to lichen **thalli**, may cause a colour change. Such changes reveal the presence of specified chemical substances. See also **spot test**.

reticulate: pertaining to a netlike, ridged pattern.

rhizinate: bearing **rhizines**.

rhizines: in lichens, rootlike hairs or bundles of fungal threads that attach the **thallus** to the **substrate** (see Figures 6a–e, page 11).

rhizoids (= **rhizines**).

rim: see **apothecial rim**.

scabrid (= scabrous): having a minutely roughened appearance. In lichens, said of the upper **cortex** of some species.

scales: small, rounded, often somewhat overlapping **lobes** (see Figure 7c, page 12). See also **squamules**.

septum (pl.: -a): a cross-wall, especially of a cell or a **spore** (see Figures 9d, e, page 13).

simple: a) lacking **septa** (usually said of **spores**); or b) unbranched (said of rhizines) (see Figures 6a, 9d pages 11, 13).

soralia (sing.: -ium): the organs or regions of a **thallus** in which **soredia** are produced (see Figure 9f, page 13).

soredia (sing.: -ium): tiny powdery or granular asexual reproductive structures that lack a **cortex**, contain both fungal threads and **photobiont** cells, and protrude from the upper or lower **cortex** of many lichen species (see Figure 9f, page 13). See also **isidia**.

spore: general term for the microscopic sexual or asexual reproductive units of fungi. The sexual spores of most lichens are produced in **asci**, which in turn arise in the **hymenia** of **ascocarps**. **Thalloconidia** represent one form of asexual spore, **pycnoconidia** another (see Figures 9d, e, page 13).

spot test: one of several chemical tests for colour reactions obtained by applying liquid **reagents** to a lichen. See page 13.

squamules: small, rounded, often somewhat overlapping **lobes**, the lower surface of which typically lack a **cortex** (see Figure 7c, page 12).

squamulose: consisting of **squamules**.

squarrose: branching by many short perpendicular branches from a single main axis; usually in reference to **rhizines** (see Figure 6c, page 11).

stratified (= **heteromerous**): in lichens, pertaining to **thalli** in which the **photobiont** and **medulla** are organized in distinct layers. In such species, the **medulla** is pale (see Figure 4, page 10). See also **nonstratified**.

submuriform: pertaining to **spores** in which both transverse and longitudinal **septa** are present, though the latter are sparse or poorly developed (see Figure 9e, page 13). See also **muriform**.

substrate: in lichenology, a general term for the surfaces colonized by lichens, whether wood, bark, rock, soil or other.

thalline margin: see **apothecial rim**.

thalloconidia (sing.: -ium): minute asexual **spores** produced on the cortex of some lichens. In *Umbilicaria*, thalloconidia confer a black, sooty texture to the lower surface and **rhizines** of several species.

thallus (pl.: -i): the vegetative body of a lichen (see Figures 4, 5, page 10).

TLC: thin-layer chromatography. See page 14.

tomentose: bearing **tomentum**.

tomentum: a minute, felt-like mat of fungal hyphae covering the upper and/or lower surface of some lichens (see Figure 8a, page 12).

umbilicate: bearing an **umbilicus**.

umbilicus: a thickened, centrally positioned point of attachment characteristic of some rock-dwelling **foliose** lichens (see Figure 6f, page 11).

UT: Utah.

UV: ultraviolet light; used in lichenology to detect certain lichen substances. See page 14.

WA: Washington State.

WY: Wyoming.

YU: Yukon.

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