Corticolous Crustose Lichens on Forest Inventory Plots in Northern Idaho

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Cover: *Menziesia ferruginea* twig with its three most common crustose lichens, *Biatora flavopunctata* on the far left, *Biatora meiocarpa* var. *tacomensis* in the middle and *Caloplaca sorocarpa* on the far right and across the bottom; *Haldeman 993B.* Photo courtesy of Richard Droker.

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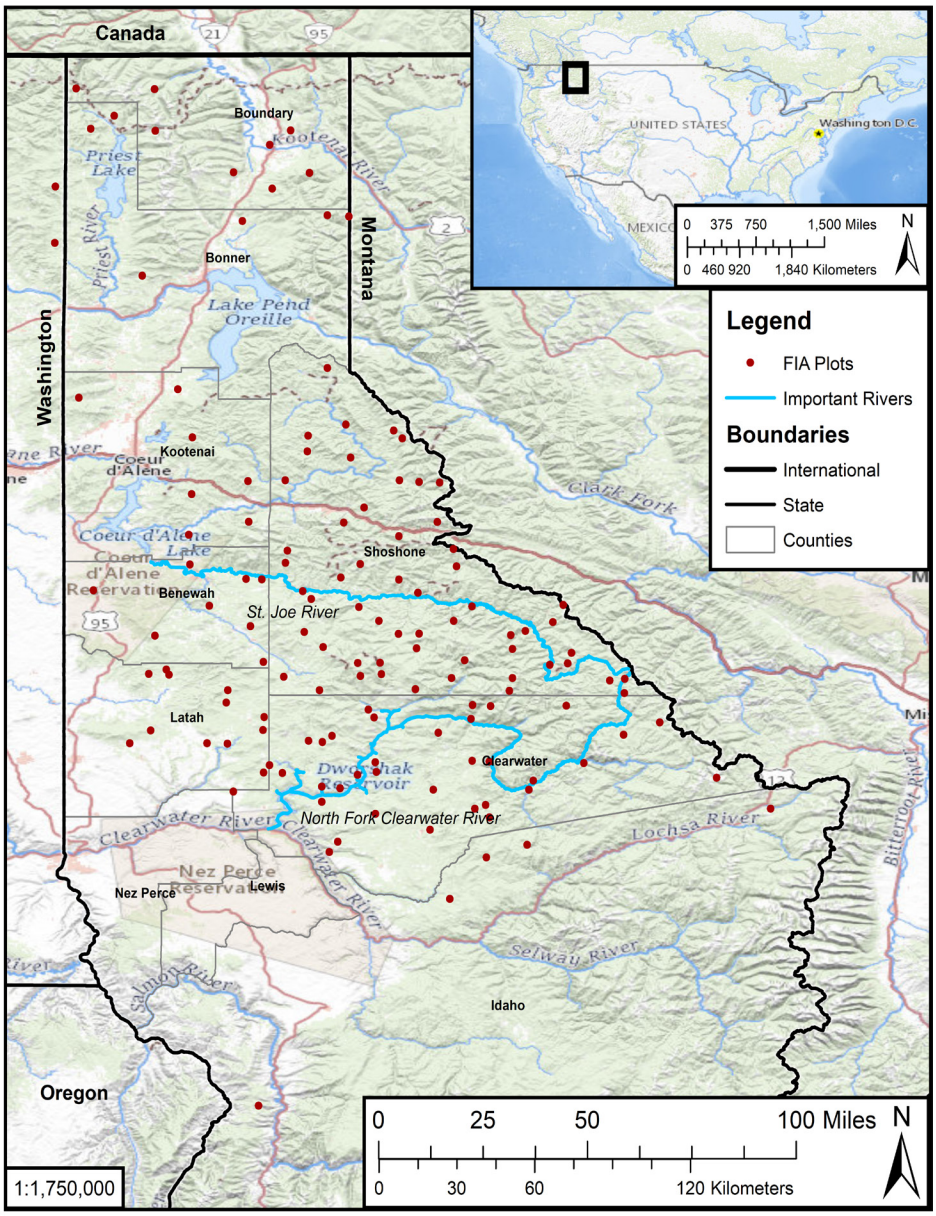
Contents



Forest Inventory and Analysis plots (red dots) in northern Idaho where corticolous crustose lichens were collected. Inset map shows study location in the United States.

Introduction

From 2005 to early 2018 I worked for the Forest Inventory and Analysis (FIA) program, with my base in Coeur d'Alene, Idaho. During this time, it was my job to visit our forest inventory plots throughout northern Idaho and collect all our tree, vegetation and transect data among many other variables (see O'Connell et al. 2016). From 2015 to early 2018, in addition to my normal ecological measurements on these plots, I also collected crustose lichens from bark when possible. There was no collection protocol for this bark crustose lichen project; I simply collected some of the crustose lichens I found on bark during lunch or other breaks. On some plots I collected more than others. I usually searched more in particularly rich or unique habitats, but this was not always the case. Weather also played a major role. In bad weather, which is common in northern Idaho, I may have skipped collecting all together. On a nice day, I may have used all my break time for collecting, no matter the habitat.

Area - Although I worked on plots from the Salmon River to the Canadian border in Idaho (map on facing page), during the years 2015 to 2018, when collecting for this project, I spent most of my time in Clearwater and Shoshone Counties. I also visited two plots in Pend Oreille County in northeast Washington; these were within a few miles of the Idaho border and are included here. Appendix I shows the species of bark crusts that I recorded for each county, but this is not an indication of a county's lichen diversity. It is merely a list of which species have been verified for which counties by this project. For example, Idaho County is likely as species-rich as any of these counties, but since I collected on only five plots there during this time, the list included here is not as long as those for Clearwater and Shoshone Counties.

Substrate – Over the past years I have spent much time studying all the lichens I could find in northern Idaho. This project, however, deals solely with lichens found on bark on FIA plots. I wanted to use a substrate that is found on all FIA plots. Rock and bare soil are not always found on FIA plots. Wood, in the form of snags, logs, or decorticate branches, is usually common on FIA plots, although not as common as bark. It also has a broad ecological range. The wood of decorticate branches often, but not always, has the same lichens as bark. Bare snags and burnt snags have their own unique crusts; logs often favor still other lichen species. The level of decay of wood also changes the lichen flora, with very rotted logs often inhabited by soil- and moss-dwelling lichens. So, to slightly narrow the focus of the project, and to keep things straightforward, I kept this study focused on bark only. This excludes lichens found on decorticate twigs or wood of standing live trees. However, in a few cases, this includes lichens that have overgrown moss and are now growing onto bark. I have also included one resinicolous specimen, *Sarea resinae*.

All the identifications for this project were made from collected specimens. Crustose species are, in many cases, impossible to identify with certainty in the field. Some of these species only show themselves as black dots on the bark and may be nearly identical to another crust that is not even in the same family. Even though I eventually came to recognize many of these species in the field, I have based this study on lab identifications with spores inspected for all fertile specimens (except one of *Icmadophila ericetorum*, see below). I always based spore measurements on an average of at least five spores, with the exception of some very large-spored species, such as those in the genera *Brigantiaea*, *Lepra*, *Lopadium*, *Pertusaria* and *Phlyctis,* when less than five spores may have been measured.

By confining these collections to FIA plots, I simply had to record the plot number and substrate so the collection could be linked to all the ecological data already collected for the plot. In the future, someone looking into all the plots on which I collected, for example, *Ochrolechia montana*, can see if there is any variable with unique values or ranges for those plots. One restriction with this is my lack of a uniform methodology. Since I put more effort into some plots, absence of a lichen species from a particular plot has no significance. Indeed, there were some plots that, for weather or time constraints, I only collected one to a few lichens if they seemed particularly significant. In no cases did I attempt to collect one of every crustose species I encountered on bark from a particular plot. There was just never going to be enough time for all those identifications. In the beginning, I collected some of the more noticeable species, especially *Ochrolechia*. I even considered making *Ochrolechia* the target of this project, to see if different species of this common genus preferred different habitats or substrates. But soon I found myself trying to identify all of the incidental species that I found on bark adjacent to my *Ochrolechia* specimens. And then, back in the field, I would try to find those species on different substrates and in different habitats.

Each winter that I spent time identifying the lichens I had collected, I learned many new species, both from going through my collections, and from going through the literature. *Microlichens of Pacific Northwest* (McCune 2017a, b) was not yet published, but I used *Montana Lichens: An Annotated List* (McCune et al. 2014) to determine what could reasonably be expected. As I took a winter's worth of learning into the next field season, my search tactics changed. I had different target species each season that I knew I should be finding. Many I eventually found, but I still have a long target list. I also targeted different substrates. Not until late in my second season did I think to look at the bases

of shrubs. I then made this a focus of the third season. I also did not know to look at fine twigs of *Alnus viridis* and as a result I only have a few collections of *Phaeocalicium compressulum*, even though I have never failed to find this species when actually searching for it. And I am sure that I will soon learn of other species for which I have not yet checked the right microhabitats.

Over the years I developed a basic understanding of where many of the bark crusts are typically found and paid special attention when I found them in other circumstances. For example, by the 2017 season, if I saw what looked like another *Ochrolechia montana* on *Abies grandis* I would not have collected it. But if, on the same plot, I noticed this lichen on *Menziesia ferruginea*, I would collect it, since I had never seen it on this substrate. This kept the project interesting for me, but is misleading if you try to put a linear significance on the numbers below. Although I collected *O. montana* on *Abies grandis* bark on 17 different plots, I could have collected it from this substrate many more times. I know, however, that I have only seen *O. montana* one time on *Menziesia*. So, one could draw the conclusion that in northern Idaho *O. montana* is much more likely to be found on *Abies* than on *Menziesia*. But one should not draw the conclusion that *O. montana* is 17 times more likely to be on one substrate over the other. Also, a particular lichen may be just as likely to be found on an individual *Abies grandis* as an individual *Pinus monticola*. But since there are so many more *Abies grandis* than *Pinus monticola*, the information below may lead one to think a particular lichen "favors" *Abies grandis* when in fact the reality may be that there is just more *Abies grandis* bark surface area.

This point about the abundance of the phorophytes deserves another example. *Acer glabrum* and *Frangula purshiana* are both smooth-barked, tall, multistemmed trees that can be densely covered in a patchwork of crustose species. *Acer glabrum* can be abundant in many different habitats and was a common feature on so many of the plots I visited. *Frangula purshiana*, while not at all a rare species, was only occasionally noticed on plots, and then it was-

What is FIA?

The Forest Inventory and Analysis (FIA) program is a part of the U.S. Forest Service and is run through the four research stations (Northern, Southern, Rocky Mountain, and Pacific Northwest). According to the FIA fact sheet, "The FIA Program collects, analyzes, and reports information on the status and trends of America's forests: how much forest exists, where it exists, who owns it, and how it is changing, as well as how the trees and other forest vegetation are growing and how much has died or has been removed in recent years" (https://www.fia.fs.fed.us/library/fact-sheets/overview/What_is_FIA_FS_2018_update.pdf). In 1928 the McSweeney-McNary Forest Research Act first created a periodic national forest survey. Although this forest survey was started primarily to track timber reserves, it eventually encompassed a much broader range of ecological variables that differed between regions. In 1998, the Research, Extension, and Education Reform Act mandated a standardization of protocols across the nation and an annual inventory in every state (Gillespie 1999; Simons et al. 2020).

FIA plot locations represent a probabilistic sample. A hexagonal grid was overlaid on the United States and one permanent plot was randomly located within each hexagon. In this way there is roughly one plot every 5 km across the country; each of these plots is visited once every 10 years in the western United States and every 5 to 7 years in the east. Plots from adjacent hexagons are not scheduled to be sampled in the same year to prevent clumping (Simons et al. 2020). The project is federally mandated to continue in perpetuity and is conducted across all land ownerships – federal, state and private. From the data gathered, FIA is able to generate regular reports on the health and status of the nation's forests. These can be accessed at the FIA DataMart: https://apps.fs.usda.gov/fia/datamart/datamart.html. Although FIA data are not specifically designed towards highlighting biodiversity, they have been shown to be a valuable tool for its assessment (Gray et al. 2012; Smith et al. 2020).

Lichens were a regular part of FIA data collection from 1992 to 2012. During these years, one or more of the four FIA regions collected epiphytic macrolichens from a subset ($1/16^{th}$) of FIA plots to monitor changes in air quality and climate (Jovan 2008, 2012; Will-Wolf 2010). Jovan (2008) and Will-Wolf (2010) are examples of how these data have been used to track air quality in different parts of the United States. These collections also add to the body of biodiversity information put forth by FIA in the form of a national lichen atlas (Jovan et al. in press) and are archived at the Oregon State University herbarium (OSC). Jovan et al. (2020) have provided a user guide for the FIA lichen database. This work is the first look at crustose lichens on FIA plots.

not as dominant as *Acer glabrum*. I'm sure I could go into low-elevation forests in the North Fork of the Clearwater and find a large *Frangula* with twenty crustose lichen species on it. But the few *Frangula* that I happened to notice on plots did not have much lichen coverage, or I did not have the time to look for lichens those days, or there was something else on those plots that may have caught my attention. Anyone who has spent time botanizing in northern Idaho can tell you that *Frangula purshiana* and *Pinus monticola* are common species, but they are not as abundant as *Acer glabrum* or *Abies grandis*. Even on plots where *Pinus monticola* is a common species, *Abies grandis* is usually more common. So I came in close contact with *Abies grandis* bark much more and noticed its lichens more frequently. I was not performing a lichen study, I was opportunistically collecting some of the lichens I encountered. Abundant trees and shrubs had many more opportunities to display their lichens. So even though I made an effort to collect from the less abundant plants, it was inevitable that I would find more species on the more common plants.

Populus trichocarpa (black cottonwood) is an example of a species with a distributional pattern where the FIA plot distributions might not capture all the variation on the landscape. This abundant riparian species in northern Idaho has a conspicuous linear pattern that is difficult to capture with the random distribution of FIA plots. As a result, I visited only one plot with cottonwoods over this time period. This plot, in a pasture, did not have much lichen coverage, yet many riparian cottonwoods are rich in lichen species. This can be said of other riparian trees and shrubs as well. I have elucidated some of these concerns in the individual substrate accounts in Section 3.

Nomenclature – For lichens this work follows the North American checklist (Esslinger 2019) in most cases but McCune (2017a and b) for some of the large genus revisions. As noted in the species accounts, some of these species are not lichens – they have no association with algae or cyanobacteria. But certain nonlichenized fungi have come to be studied by lichenologists due to their similarity with some lichenized fungi. Therefore, I have included here any species considered a crustose or microlichen or allied fungus that is also included in the North American checklist (Esslinger 2019). Lichenicolous fungi names follow the world checklist by Diederich et al. (2018) unless there have been more recent revisions noted in the text. The names of phorophytes follow the USDA PLANTS database (USDA, NRCS 2020). For terminology, techniques, keys and accounts of crustose lichens, I used *Microlichens of the Pacific Northwest* (McCune 2017a, b), *Lichens of North America* (Brodo et al. 2001), *Keys to Lichens of North America: Revised and Expanded* (Brodo 2016), and *Lichens of the Greater Sonoran Desert Region* (Nash et al. 2002, 2004, 2007). Additionally, for identifications I used *American Arctic Lichens 2. The Microlichens* (Thomson 1997) and *The Lichen Flora of the Coastal Douglas-fir Dry Subzone of British Columbia* (Noble 1982). *Macrolichens of the Pacific Northwest* (McCune and Geiser 2009) was also consulted for methodology and terminology. Other publications were heavily relied on for particular groups, especially for *Rinodina* (Sheard 2010), *Ochrolechia* (Brodo 1991), *Biatora* (Printzen and Tønsberg 1999) and *Lepraria* (Lendemer 2013). Also consulted often were references for *Bacidia* and *Bacidina* (Ekman 1996), *Myochroidea* (Printzen et al. 2008), calicioid species (Selva 2014) and sterile crusts (Tønsberg 1992). See the full list in References.

Elevation – The list of substrates is usually followed by an elevation range. Occasionally this is followed by a description of how these elevations are distributed within that range, especially if one or a few of the elevations are much different than the others. The elevations for these plots were evenly distributed from 618 to 1808 m. I also made one collection from a plot at 1947 m and six collections from a plot at 2305 m in eastern Clearwater County. As I mentioned above, if I noticed a particular lichen at an unexpected elevation I was more likely to collect it for confirmation.

Habitat types – These were taken from *Forest Habitat Types of Northern Idaho: A Second Approximation* (Cooper et al. 1991). This valuable resource for understanding the forests of northern Idaho can be found online at https://www.fs.fed.us/rm/pubs_int/int_gtr236.pdf. Habitat typing uses indicator plant species to predict what the climax forest community will be. This seeks to encompass factors such as elevation, precipitation, slope, aspect and soil and is not concerned with the current dominant tree species (see Forest Type section below). For species with more than a few records there are too many habitat types to list, so in most cases I have only mentioned the habitat series. Mostly I've referred to the two most mesic series, TSHE (*Tsuga heterophylla*) and THPL (*Thuja plicata*), to show when a lichen seems to favor the most mesic habitats. Although ABGR (*Abies grandis*) isn't often thought of as a dry-site species, a habitat type in the ABGR series means that TSHE are THPL are not reproducing successfully at this site and that may mean it does not receive enough moisture. This may limit the occurrence of certain lichens. However, the site could receive plenty of moisture but not retain that moisture due to steep, rocky terrain, or a loss of the moisture-retaining ash cap (see Cooper et al. 1991). In these cases, the habitat type may be that of a drier ABGR or PSME (*Pseudotsuga menziesii*) series but the abundant moisture and humidity would still favor lichens that are often associated with *Thuja* and *Tsuga* habitats. In steep, rocky terrain in high precipitation areas the lichens often do not "match" the trees. In these cases, I've tried to include details about the plots if they help to explain an anomalous habitat series.

Another problem with using habitat types for lichens is that lichens can take advantage of small niches. These microsites are ignored by habitat types, which seek to describe a larger area. A dry site may harbor wetter microsites near seeps, streams, or even the north side of a large boulder. Conversely dry site lichens can often be found in litterfall in mesic forests. Even in old-growth *Thuja plicata* forests, one emergent *Larix occidentalis*, with its canopy exposed to much more sun and wind than the forest below, provides habitat for lichens that may not be competitive below. Newly fallen branches were examined if I could determine the substrate species.

Forest type – For rare species or for species where it seems significant I mention forest type. I use the FIA variable forest type, which is defined as "the tree species forming a plurality of all live stocking" (O'Connell et al. 2016). Forest type tries to capture which tree species is the dominant overstory tree at that moment, so I express it here as the dominant species. In contrast, the habitat type tries to capture the potential climax forest community.

Stand age – This is the average age of all live trees measured within the predominant size class (O'Connell et al. 2016). The plots on which I collected lichens had stand ages from 12 years to 187 years, with one outlier in the Isabella Creek drainage with a stand age of 287 years. I did not always include this information. However, for rare species or those with only one or a few records I usually mentioned stand age. For common species I occasionally mentioned the range of stand ages to show that this variable did not seem significant. Finally, I included stand age if I noticed that a species was found only in old forests. Although this is not a statistically rigorous study, nor is there sufficient sample size to draw formal conclusions, I noticed that *Brigantiaea praetermissa*, *Chaenotheca chrysocephala*, *Lopadium disciforme*, *Micarea synotheoides*, *Myochroidea porphyrospoda*, *Myochroidea rufofusca* and *Rhymbocarpus neglectus* were found only in older forests.

Range extensions – Range extensions found during this project for *Arthopyrenia plumbaria*, *Caeruleoconidia ochrolechiae*, *Lepraria pacifica*, *Lichenopeltella biatorae*, *Llimoniella pertusariae*, *Pseudosagedia aenea* and *Rinodina trevisanii* were already mentioned by Haldeman (2018). A *Tephromela* species new to science (Haldeman and McCune in prep) was first found as part of this project. The Idaho portions of the range extensions for *Lecanora excludens* and *L. intumescens* reported by Brodo et al. (2019) are also from this project. In addition, *Cliostomum flavidulum* and *Violella fucata* are reported here from the Rocky Mountains for the first time and *Lecania naegelii* is newly reported from the U.S. portion of the Rocky Mountains. Very few records exist for *Biatora globulosa* from the Pacific Northwest and the species is newly reported here from Idaho. The lichenicolous fungus *Everniicola flexispora* is newly reported from the 48 contiguous United States and from a new host species, *Lecanora circumborealis*. Also, a species of bark fungus on *Abies grandis*, *Pseudotryblidium neesii*, originally thought to be lichenicolous on *Ochrolechia* (because it had been found growing through several thalli of that genus) was reported from North America based on specimens from this project (Suija et al. 2020).

Organization of sections – Section 1 provides a photographic sampling of the forest habitats visited for this work. **Section 2** gives accounts for 111 lichen species. This includes nonlichenized fungi considered lichen allies (various calicioids, pyrenocarpous fungi and *Sarea*). **Section 3** provides an entry for each phorophyte substrate — 41 species of trees and shrubs — and a list of crustose lichens found on them. For many of these phorophytes, there is additional information given to explain the abundance of lichens found on them, or a note about lichens that seem to prefer that substrate. **Section 4** includes 15 species of lichenicolous fungi with details of the host species and habitats where they were found.

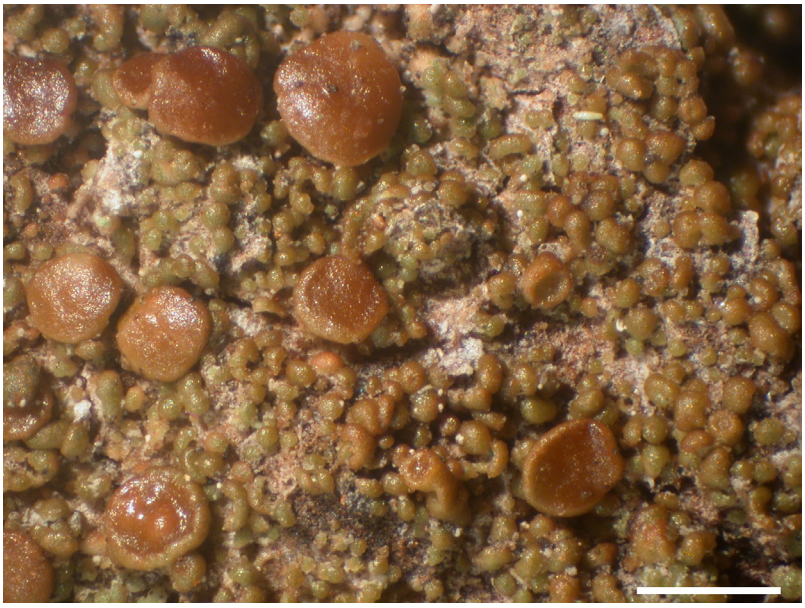
Species account format – The species accounts vary in format, but all of them start with the species name and authority, followed by the species of plant on which the lichen was found. For these plant substrates the four-letter USDA plant code is used. This code uses the first two letters of the genus followed by the first two letters of the specific epithet. For example, the code for *Abies grandis* is ABGR. In cases of ambiguity due to multiple plants having the same four letters, the USDA adds a number to the end. For example, AMAL2 is the code for *Amelanchier alnifolia*. A five-letter code denotes a subspecies. The fifth letter of the code is the first letter of the subspecific epithet; ALVIS is the code for *Alnus viridis* ssp. *sinuata*. See Appendix III for all plant codes used in the text. Section 3 also shows the codes for the phorophytes.

Format for Species Entries

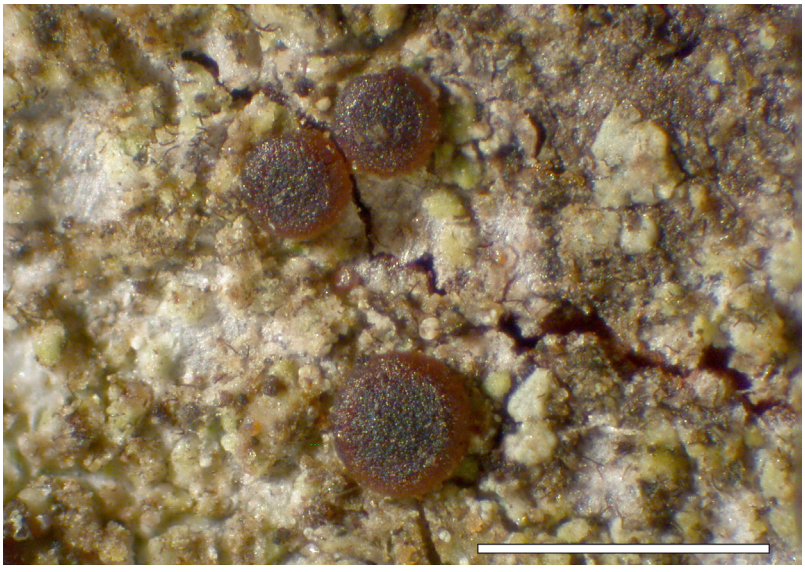
Species name Species authority – [Substrate species in 4-letter USDA plant code] (# of plots on that substrate), [next substrate species alphabetically] (# of plots on that substrate)…., elevation and habitat type information (for plant codes see Section 3 and Appendix III), stand age and forest type information if noteworthy, explanation of anomalies, further information when applicable.

After each plant code, in parentheses, is the number of plots in which that lichen was found. So PIMO3 (4) indicates the lichen was found on bark of *Pinus monticola* (which has the code PIMO3) on four different plots. Since most of these crustose species cannot be identified in the field, I occasionally collected the same species from the same substrate on the same plot. These were counted as only one occurrence for that species/substrate/plot. However, if I collected the same species from two different substrate species on the same plot then both of those records are included here.

Figures – Scale bars are 1 mm for photos taken with a dissecting microscope, unless otherwise noted. For light (compound) microscope photos the scale bars are 10 µm, unless otherwise noted. See Appendix II for details of specimens in the photos.



Protoparmelia ochrococca on the bark of a *Pseudotsuga menziesii* trunk, Benton County, Oregon, *McCune 31673*. Photo by Bruce McCune.



Bacidia idahoensis on the bark of an *Acer glabrum* stem, Flathead County, Montana, *McCune 29055*. Photo by Bruce McCune.

Section 1 – Habitat Photos

The following habitat photos provide a sampling of the forest communities included in this study. Every FIA plot is photographed at the time of sampling; these were selected to represent both typical and special habitats for corticolous lichens. Plot identification numbers have been cropped out or otherwise obscured in accordance with confidentiality agreements.

This 70-year-old *Pseudotsuga menziesii* stand in the *Thuja plicata/Asarum caudatum-Asarum caudatum* habitat type at 853 m in Benewah County had a typical assortment of lichens. On the conifers were *Buellia penichra*, *Lecanora circumborealis*, *Lecanora laxa* and *Ochrolechia juvenalis,* while the tall shrubs had *Lecanora pulicaris*, *Lecidella elaeochroma/euphoria* and *Ochrolechia montana*. This was the site of the aberrant *Ochrolechia gowardii* mentioned under that lichen species account.

View towards Shoshone County from a young stand in Benewah County at 1158 m.

Forest types with *Betula papyrifera* are more typical at the northern edge of the study area, as seen in this Bonner County plot at 695 m. The habitat type is *Tsuga heterophylla/Clintonia uniflora-Aralia nudicaulis*. *Aralia nudicaulis* is only found in the far north of this study area. This plot was the site of the lone *Lecania naegelii* collection, a new record for Idaho. It is also the only plot on which lichens were collected from *Mahonia aquifolium* and *Shepherdia canadensis*.

The *Abies lasiocarpa* on this plot in the Selkirk Mountains in Boundary County held a typical assortment of open forest lichens: *Lecanora circumborealis*, *Lecanora fuscescens*, *Lecanora laxa* and *Palicella schizochromatica*. The lichenicolous fungus *Lichenopeltella biatorae* was found on the *Biatora flavopunctata* that paints the bases of *Rhododendron albiflorum* in these subalpine areas.

This 137-year-old *Thuja plicata* stand in the *Thuja plicata*/*Athyrium filix-femina*–*Adiantum aleuticum* habitat type held interesting lichens for the east side of the Cascades, such as *Chaenothecopsis tasmanica*, *Lepraria pacifica*, *Micarea synotheoides* and *Trapelia corticola*.

Thuja plicata/Clintonia uniflora–Menziesia ferruginea habitat type at 970 m in Clearwater County. Tall shrubs on this plot hosted a typical assortment of crusts: *Arthopyrenia plumbaria*, *Buellia griseovirens*, *Caloplaca atrosanguinea*, *Pertusaria carneopallida* and *Pertusaria stenhammarii*.

At 2304 m, this eastern Clearwater County plot was the high-elevation outlier. The habitat type here was *Abies lasiocarpa/Xerophyllum tenax–Vaccinium scoparium*. *Picea engelmannii* at this site harbored *Buellia punctata*, *Lecanora circumborealis*, *Lecanora fuscescens* and *Palicella schizochromatica*.

Same stand as preceding photo, with view to neighboring ridges.

This 125-year-old *Thuja plicata* stand in the *Thuja plicata/Clintonia uniflora-Taxus brevifolia* habitat type at 785 m in western Clearwater County was home to interesting fungi, such as *Lichenodiplis anomala* (on *Ochrolechia szatalaënsis*), *Rhymbocarpus neglectus* (on *Lepraria jackii*) and *Sarea resinae*. The sparse cover of relatively low-elevation *Vaccinium membranaceum* hosted an abundance of lichens, including *Pertusaria sommerfeltii* and *Pseudosagedia aenea*. This photo is aimed uphill and away from the old-growth *Thuja plicata* that make up most of the plot.

This Idaho County plot in the *Abies grandis/Asarum caudatum-Asarum caudatum* habitat type at 1429 m had the common *Rinodina orculata* on both *Acer glabrum* and *Vaccinium membranaceum* (tall yellow and short red shrubs pictured here). The tuft of *Xerophyllum tenax* in the lower left is more typical of slightly higher and drier sites.

This Shoshone County plot in the *Abies lasiocarpa/Xerophyllum tenax-Coptis occidentalis* habitat type at 1553 m was dominated by *Pseudotsuga menziesii* with a typical array of lichens, including *Buellia penichra*, *Japewia tornoënsis* and three *Ochrolechia* species.

Menziesia ferruginea on this southern Shoshone County, *Thuja plicata*/*Clintonia uniflora*–*Menziesia ferruginea* plot had the typical assortment of crusts: *Biatora flavopunctata*, *Biatora meiocarpa*, and *Caloplaca sorocarpa,* as well as the fungus *Arthopyrenia plumbaria*. The *Abies lasiocarpa* at this site hosted *Cliostomum spribillei* and *Lecidea rubrocastanea*, in addition to the typical *Lecanora circumborealis*, *Ochrolechia* spp. and *Palicella schizochromatica*.

The open, subalpine *Tsuga mertensiana* forests in Clearwater and Shoshone Counties are often carpeted with *Menziesia ferruginea* and *Vaccinium membranaceum,* as in this plot in the *Tsuga mertensiana*/*Menziesia ferruginea*–*Xerophyllum tenax* habitat type.

Thuja plicata/*Athyrium filix-femina* habitat type at 1228 m in southern Shoshone County.

Looking out from a *Tsuga mertensiana*/*Xerophyllum tenax*–*Luzula glabrata* habitat type, 1947 m in southern Shoshone County.

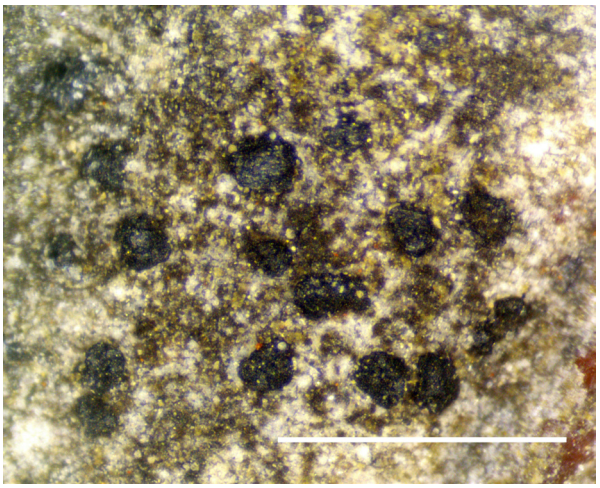
This 103-year-old stand in the *Tsuga mertensiana/Menziesia ferruginea–Xerophyllum tenax* habitat type in southern Shoshone County harbored *Myochroidea rufofusca* on *Abies lasiocarpa* and *Vaccinium membranaceum*.

Myochroidea porphyrospoda was found at the base of a *Tsuga mertensiana* in this 138-year-old stand in Shoshone County at 1756 m. This is a typical stand of the *Tsuga mertensiana/Xerophyllum tenax–Vaccinium membranaceum* habitat type.

Menziesia ferruginea completely covers many of the steep slopes in northern Idaho, making off-trail travel frustrating. This Shoshone County plot at 1613 m is in the *Tsuga mertensiana*/*Clintonia uniflora*–*Menziesia ferruginea* habitat type.

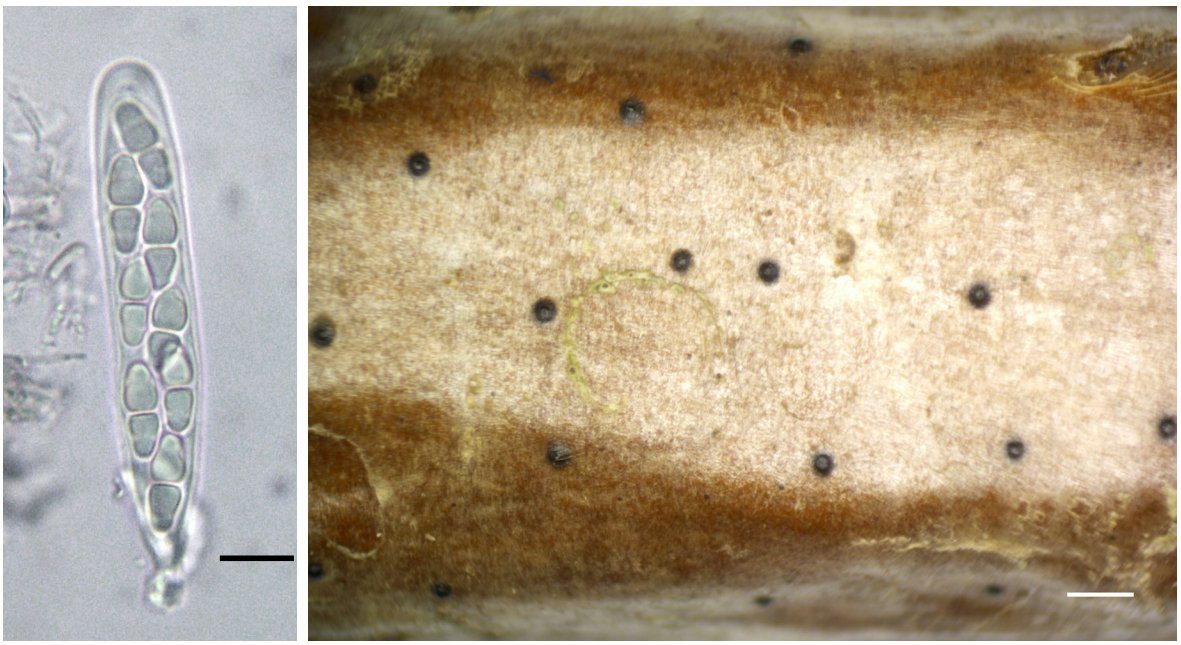
Absconditella lignicola Vězda & Pišút – ACGL (1), 1070 m in THPL/CLUN2-MEFE dominated by Abies grandis, with stand age of 56 years. This plot was in Hammond Creek, north of Avery in the St. Joe River drainage.

Arthonia apatetica (A. Massal.) Th. Fr. – MEFE (1), PAMY (2), PHMA5 (1), VAME (2) from 817 to 1315 m, from a variety of habitat and forest types. Off-plot I've found this species often on *Alnus incana* but that substrate has not been common on the plots I've visited. This tiny lichen is easily overlooked and was noticed in the lab in collections of other species.



Arthonia apatetica on *Alnus incana, 1757*.

Arthopyrenia plumbaria (Stizenb. ex Hasse) R. C. Harris – ALVIS (1), MEFE (2), SOSC2 (3), VAME (2) between elevations 970 and 1654 m. This tiny pyrenocarpous fungus was often first noticed upon examination of the collections under a dissecting scope. The spores are 1-septate and each cell is pinched in the middle (each cell wall has a mid-lumen thickening). Aptroot (2002) gives spore size as 15-18 × 4.5-6 µm while Harris (1995) shows (13-)15-20 × 4.5-6.5(-7.5) µm. Two of these collections are from the St. Joe River drainage in Shoshone County and have spores a little wide for this species. For two thalli in one collection on *Menziesia ferruginea* on Junction Ridge, spores averaged 17.7 × 7.2 (see photo) and 18.6 × 7.7 µm. For another collection near Gospel Hill, spores averaged 19.4 × 8.6 µm. For the other six locations (in Clearwater and Idaho Counties and in Shoshone County in the North Fork of the Coeur d'Alene and the St. Joe), spore width averages ranged from 4.7 to 5.5 µm, within the expected widths. Also of note, I did not make many lichen collections for this project from *Sorbus scopulina*, so it seemed notable that three of my eight collections of this fungus came from that substrate, especially with how many other shrubs I routinely scrutinized (e.g., *Acer*, *Holodiscus*, *Menziesia* and *Vaccinium*). This could easily be coincidence, but there remains a possibility that SOSC2 is a preferred substrate of *A. plumbaria* in this area.



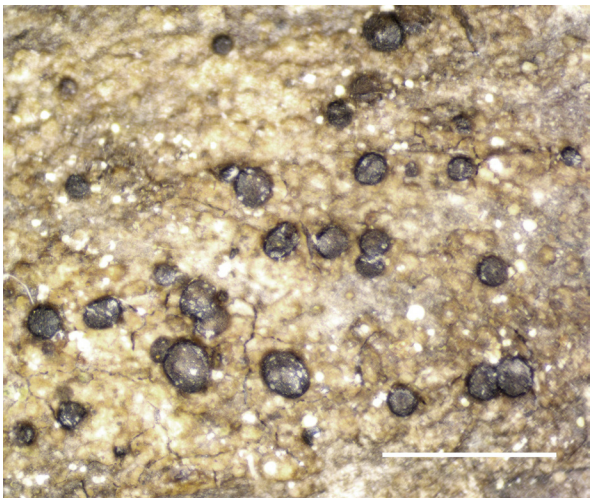
Arthopyrenia plumbaria. Left: ascus in K/IKI. Note the 1-septate spores with a mid-lumen thickening in each cell. *Haldeman 993C*, from *Menziesia ferruginea* bark. Right: perithecia on *Sorbus scopulina* twig, *2184.*

Bacidia circumspecta (Nyl. ex Vainio) Malme – VAME (1), elevation 1429 m in ABGR/ASCA2-ASCA2 habitat type dominated by *Pseudotsuga* with a stand age of 30 years. This plot is just south of Weitas Lookout, Idaho County.

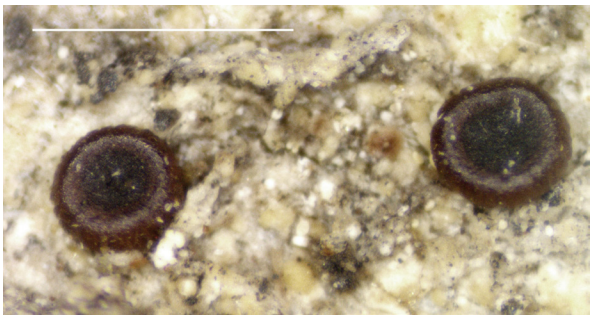
Bacidia idahoensis H. Magn. – ABGR (3), AMAL2 (2), CRDO2 (1), HODI (1), THPL (3). Six collections were made from low-elevation plots in western Clearwater County, one from adjacent Shoshone County, one from Bonner County and two (from different substrates on the same plot) from eastern Latah County. All were between 626 and 974 m except one from 1134 m. Six of the nine plots are from the mesic THPL or TSHE series habitat types. Stand ages spanned almost the full range, from 28 to 268 years. Although this species can be found in mesic forests throughout northern Idaho, it is only common in the North Fork of the Clearwater.

Bacidina ramea S. Ekman – ABGR (1), 855 m and CRDO2 (1), 841 m. The first is from a flat pasture in southeastern Benewah County (see photo). The other plot is in Latah County in a hawthorn stringer along Mannering Creek as it flows through an older conifer forest adjacent to a pasture.

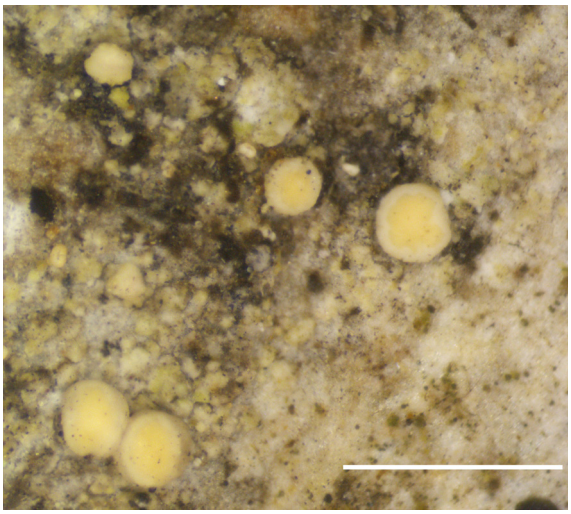
Biatora flavopunctata (Tønsberg) Hinter. & Printzen – ABLA (3), ACGL (1), ALVIS (2), LEGL (2), MEFE (6), OPHO (1), PAMY (3), RHAL2 (1), SOSC2 (1), TABR2 (2), THPL (1), TSHE (1), VAME (7), VAMY2 (1). Of the 31 collections, the lowest elevations were 817 m on *Paxistima myrsinites* and *Vaccinium membranaceum* and 848 m on *V. membranaceum*. All others were between 1096 and 1744 m. It was collected from a wide range of habitat and forest types that correspond to those elevations, and from young and old forests (stand ages spanned almost the full range, from 22 to 268 years). This is the most common of the lichens that prefer the nearly horizontal stems at the bases of ericaceous shrubs. The



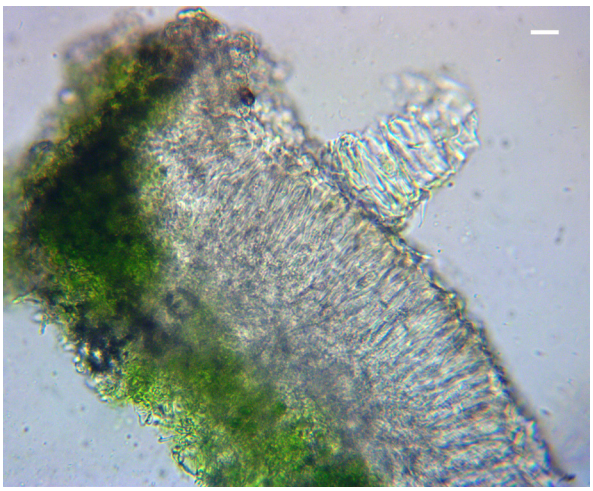
Bacidia circumspecta on *Vaccinium membranaceum* from Stove Creek near Weitas Lookout, Idaho County, *1731*.



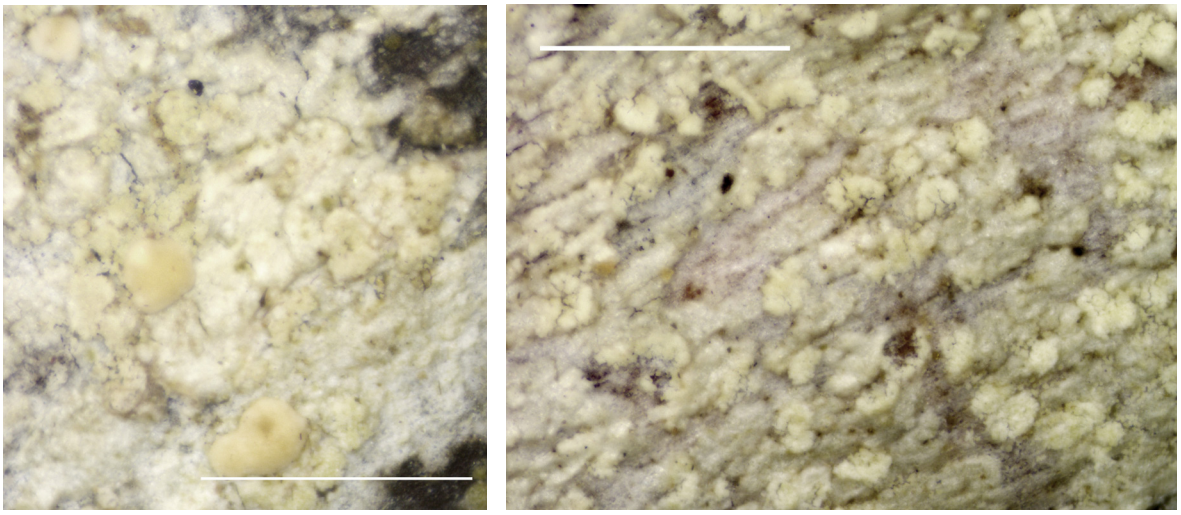
Distinctive young apothecia of *Bacidia idahoensis* on *Abies grandis* bark, Bonner County, *590A*.



Bacidina ramea on flake of *Crataegus douglasii* bark, Latah County, *2010.*



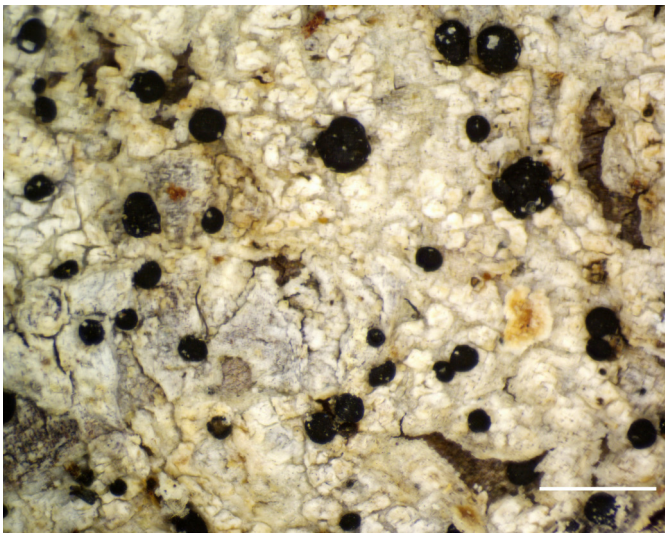
Young apothecium of *Bacidina ramea*. Note abundant algae in margin, *1780*.



Biatora flavopunctata. Left: with apothecia and soralia, from *Vaccinium membranaceum* bark, *1861A.* Right: with just soralia, from a sterile patch of *Biatora flavopunctata* on *Ledum glandulosum*, *1334*.

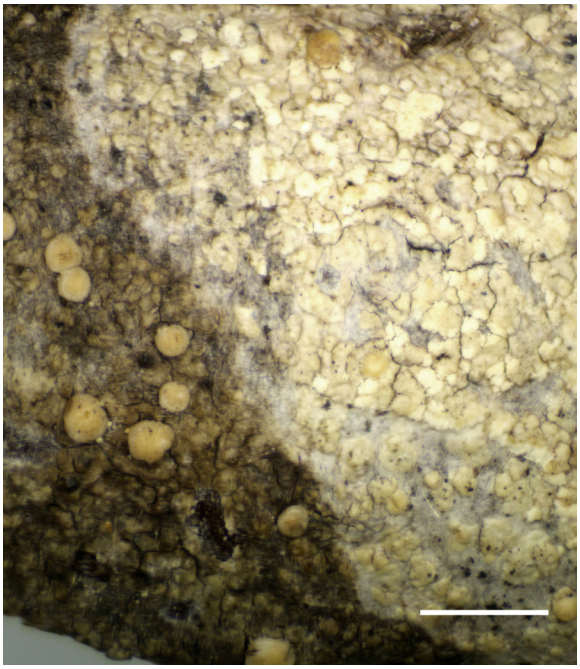
pale green thalli can be found covering *Menziesia* bases — especially easy to notice if your job requires you to climb through this dense brush. The three records from *Abies lasiocarpa* were collected close to the ground: one from a sapling that was bent horizontal from snow, one on a large tree but only 15 cm above the litter, and one on fine twigs of a sapling close to the ground. Both collections from *Taxus brevifolia* were close to the ground on horizontal stems and the one collection from *Acer glabrum* was on a horizontal branch above a small stream. On one plot above the East Fork of Steamboat Creek in the North Fork of the Coeur d'Alene at 1102 m, an old logging road cut through an old growth *Tsuga heterophylla* forest. The regenerating saplings and shrubs along this old, shaded road, where snow accumulates and remains well into spring, seemed to all host *Biatora flavopunctata,* as well as other lichens that share its substrate and habitat affinities. This was the only plot on which I found this lichen on *Oplopanax*, *Thuja* and *Tsuga heterophylla*, the latter two conifer records from saplings and close to the ground. This species is much more common on *Menziesia* and *Vaccinium membranaceum* than the above numbers indicate. After establishing this as a common lichen on those shrub species, I ignored most sightings on those substrates. Note that this species, and other lichens with similar substrate affinities, were not or only rarely found on *Alnus viridis* ssp. *sinuata,* which is common in the same habitat and also commonly grows horizontally along the ground for the first meter or so. *Biatora flavopunctata* was also found on a plot on the bark shell of a completely rotted log 3 cm above the ground. All of these substrates seem to show that this species prefers bark that is covered by snow late into the spring. See also *Menziesia ferruginea* in Section 2 and *Lichenopeltella biatorae* in Section 4.

Biatora globulosa (Flörke) Fr. – ABGR (1), 902 m, in the TSHE/ASCA2-ASCA2 habitat and dominated by *Abies grandis* with a stand age of 62 years. This is my only record of this species for Idaho, and as far as I can tell the only record for the state. It is also known from Montana, Manitoba and the Southwest (McCune et al. 2014). This is another black dot lichen and therefore easily overlooked, but it is microscopically distinctive. This specimen has mostly simple spores (some 1-septate) that average 9.4 × 2.4 µm, and the epithecium and upper hymenium contain a patchy blackish gray, K– pigment.



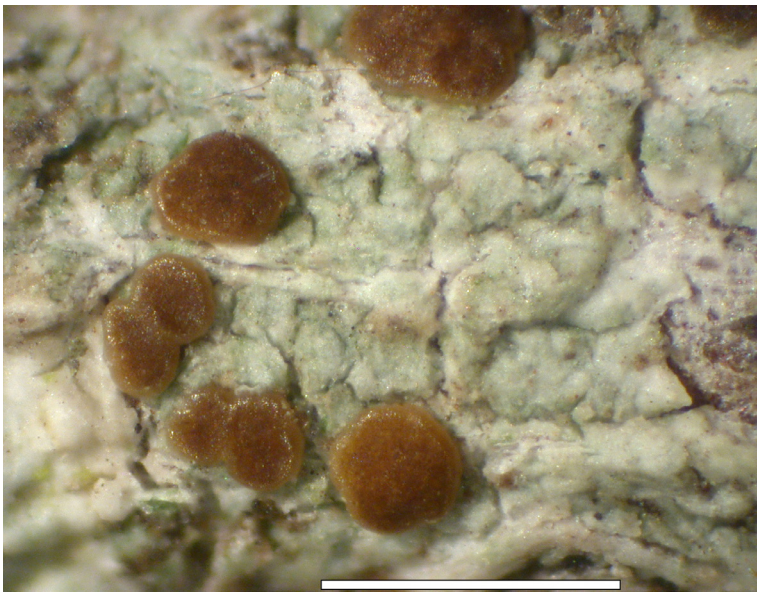
Biatora globulosa on the bark of a 30-cm diameter *Abies grandis* bole, *2090*.

Biatora meiocarpa var. ***tacomensis*** (Printzen & Tønsberg) Printzen & Tønsberg – ABLA (3), ALVIS (2), MAAQ2 (1), MEFE (5), PAMY (1), VAME (7), VAMY2 (1) with one record from 695 m, one from 902 m (with small apothecia), one from 936 m and all other records between 1128 and 1756 m, with 11 of the 20 records over 1524 m (5000 feet). It seems best represented in the TSME habitat series with several each from the ABLA, TPHL and TSHE series. This and *Caloplaca sorocarpa* are the next most common lichens on ericaceous shrubs after *Biatora flavopunctata*. The darker green, esorediate thalli are commonly surrounded by the pale green extensive thalli of *B. flavopunctata* at the base of *Menziesia* and *Vaccinium membranaceum*. Like those other species, this lichen will take advantage of similar substrates within its habitat, such as the smooth bark of subalpine fir close to the ground, especially when leaning close to horizontal. One specimen from *Menziesia* was originally called *Lecidea albohyalina* based on small spores (8.9 × 2.8 µm, average of 18), and a completely hyaline apothecial section with pale cream apothecia. I changed this identification to *B. meiocarpa* var. *tacomensis* due to excipular hyphae with rounded lumina and tips expanded to nearly 4 µm, but this is the smallest-spored specimen I collected. A few other specimens also had completely hyaline apothecial sections.



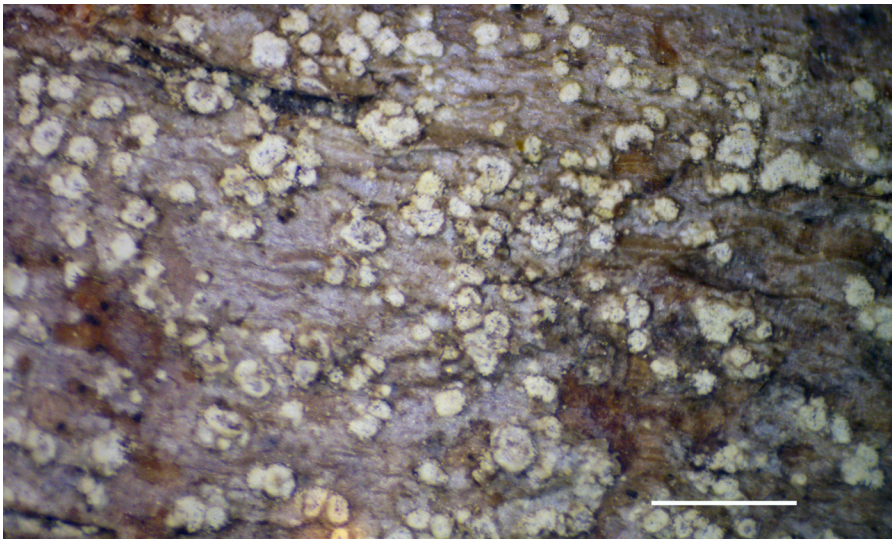
Vaccinium membranaceum bark from a horizontal stem near the ground with *Biatora meiocarpa* var. *tacomensis* on the left and *Biatora flavopunctata*, *1054*. See another example of *B. meiocarpa* in the middle portion of the cover photo.

Biatora rufidula (Graewe) S. Ekman & Printzen – ABGR (4), ACGL (2), FRPU7 (1), HODI (1), PIEN (1), PIMO3 (1), PSME (1), THPL (5), fairly equally distributed between 797 and 1571 m. All collections except two are from the THPL or TSHE habitat series and found in young and old forests (26 to 164 years). This species was found most often on conifer branches but also conifer boles and smooth-barked tall shrubs.



Biatora rufidula on a conifer twig from the Blue Mountains, Wallowa County, Oregon, *McCune 28827.* Photo by Bruce McCune.

Biatora vacciniicola (Tønsberg) Printzen – ALVIS (2), MEFE (1), PAMY (3), THPL (1), VAME (7) from 797 to 1311 m. This inconspicuous species is fairly common on shrubs and in northern Idaho seems most common on *Vaccinium,* as the name implies. Locally, the only sign of this sterile lichen is small, discreet green soralia usually near the bases of shrubs. These soralia contain gyrophoric acid (Printzen and Tønsberg 1999) and will briefly turn red with a drop of bleach (C+R). In northern Idaho it is most common below the elevations where the shrub bases are dominated by *B. flavopunctata* and *B. meiocarpa* var. *tacomensis*.



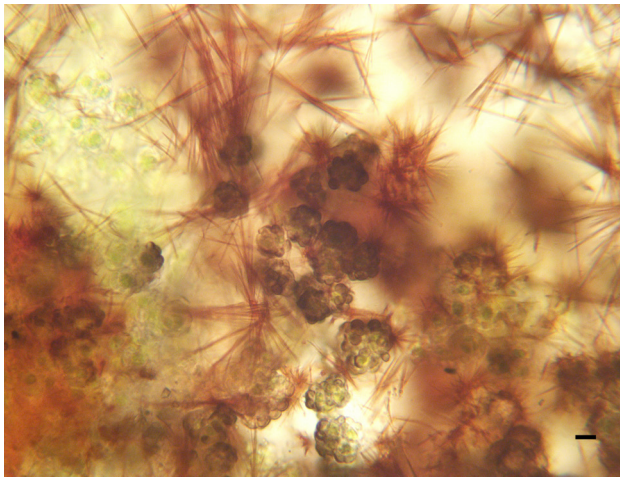
Biatora vacciniicola on *Menziesia ferruginea* bark, *1425*.

Brigantiaea praetermissa Hafellner & St. Clair – THPL (3) at elevations of 785, 841 and 1058 m, two on *Thuja* saplings under the canopy of larger *Thuja* in the TSHE/CLUN2 habitat type and one on branches of a larger *Thuja* in the THPL/ASCA2-ASCA2 habitat type. One plot is close to Marble Creek south of the St. Joe River, Shoshone County, another is along Cedar Creek in the northwestern corner of Clearwater County, and the third is in Idaho County southeast of Weippe. The stand ages of these plots were 74, 125 and 179 years respectively. Although these plot records are from saplings or branches, I have seen this species on large *Thuja* boles elsewhere in northern Idaho. On two of these plots this species was also found on the wood of *Thuja* branches.

Brigantiaea praetermissa on bark of a *Thuja plicata* bole, *1015A.* Photo by Richard Droker.

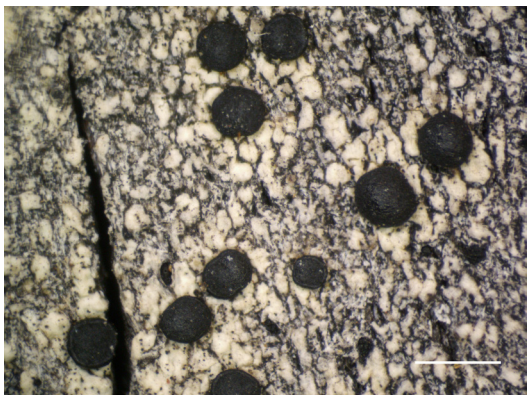
Bryobilimbia hypnorum (Lib.) Fryday, Printzen & S. Ekman – PHCA11 (1), PSME (1), THPL (1) from 647 to 785 m. This species is fairly common on moss. Two of these records were overgrowing moss onto bark. The other record, from the THPL/ATFI-ADAL habitat type, 647 m, in Isabella Creek in the North Fork of the Clearwater, was directly on *Thuja* bark 1.5 m above the ground. It was found adjacent to *Trapelia corticola*, a species from west of the Cascades only recently reported from Idaho (Orange 2018). *Thuja* trees with diameters of 102–127 cm were common here. The stand age was 137 years.

Buellia griseovirens (Turner & Borrer ex Sm.) Almb. – ABGR (4), ACGL (2), AMAL2 (2), HODI (2), PIMO3 (1), PIPO (1), THPL (4), VAME (1) from 759 to 1426 m elevation. This usually sterile crust, at least in northern Idaho, is very common on the bark of conifer twigs and tall shrubs at low to mid elevations. It has discreet, concave, greenish white soralia often speckled with some blackish soredia on top of the greenish white soredia. Many specimens were found incidentally on collections of other species. The specimens listed here were originally identified with spot tests. I sent a few, along with other sterile crusts, to James Lendemer at the New York Botanical Garden for verification. One of the specimens I had labeled *Buellia griseovirens* turned out to be *Violella fucata*. After learning this I reexamined all my *B. griseovirens* collections. I looked more directly for the presence of norstictic acid by placing soredia on a slide, under a cover slip, and then applying KOH under the slip. Under the compound microscope I watched for the red needlelike crystals of norstictic acid. I decided to include here only specimens that could be verified by norstictic acid crystals or, for the few fertile specimens, spores. McCune et al. (2014) mention that all the material they studied in Montana contained atranorin and norstictic acid. See Allen and Lendemer (2013) for a discussion of chemotypes. One collection, from *Amelanchier alnifolia* along the Kelly Fork, North Fork of the Clearwater, was abundantly fertile with equal numbers of apothecia and soralia scattered across the thallus. Two other specimens showed one to a few apothecia and the rest were sterile. See also cf. *Laeviomyces pertusariicola* in Section 4.



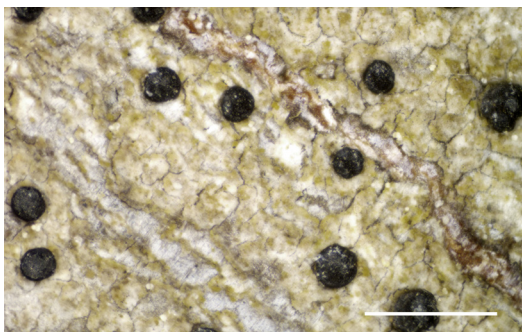
Buellia griseovirens soredia in KOH under compound scope. This shows the formation of red needlelike norstictic acid crystals, which usually follows a minute or two after the application of KOH under the cover slip, *2617*.

Buellia penichra (Tuck.) Hasse – ABGR (5), ABLA (2), ACGL (1), BEPA (1), PIMO3 (2), PIPO (1), PSME (3), THPL (1) from 782 to 1571 m. This is a common black dot on conifer boles and branches found in many habitat and forest types with a wide range of stand ages. The submuriform spores easily separate it from the other corticolous black dots in northern Idaho. See also cf. *Laeviomyces pertusariicola* in Section 4.



Buellia penichra on bark of a *Pseudotsuga menziesii* bole, *1000B*.

Buellia punctata (Hoffm.) A. Massal. – ACGL (2), PIEN (1) from 1143 and 1426 m for *Acer* and 2305 m for *Picea*. The two formers were from ABGR habitat types in *Pseudotsuga*-dominated forests while the high elevation record is from ABLA/XETE-VASC dominated by *Picea* and *Abies lasiocarpa*. So, for this project *B. punctata* was not collected from the most mesic sites. This species is also common on wood as well as other substrates.



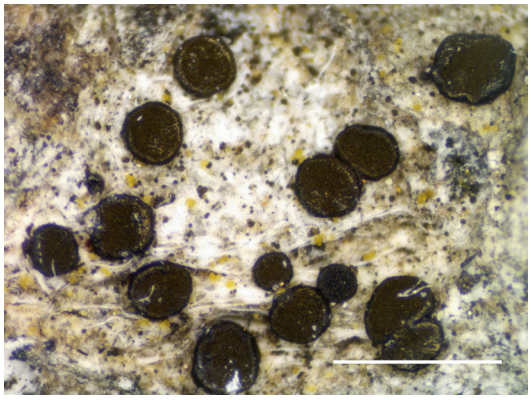
Buellia punctata on *Acer glabrum* bark, *932*.

Calicium adaequatum Nyl. – ABGR (1), CRDO2 (1) PREM (1), PSME (1), SARA2 (1) from 855 to 922 m. The collections on *Abies* and *Crataegus* are from the same plot in patchy forest in a flat pasture in southeastern Benewah County at 855 m. The collection on *Pseudotsuga* was within a dense cluster of *Physocarpus* and *Holodiscus,* and the stalks were white throughout (making the IKI+B reaction obvious). This species is usually easy to find in low-elevation riparian habitats by scanning branches of tall shrubs, especially *Crataegus douglasii*. The stalks are often whitish, at least at the base, and this is the only *Calicium* known from northern Idaho with a stalk that turns blue in Lugol's solution (IKI).

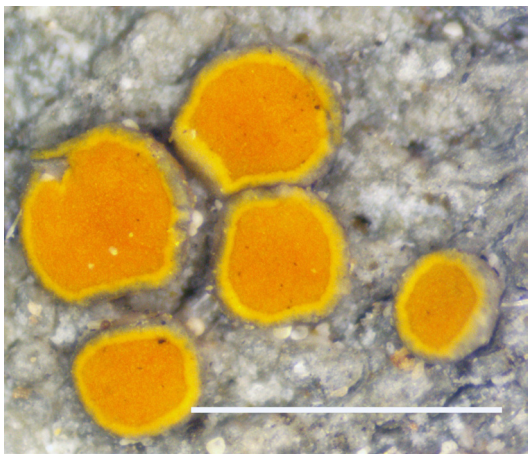
Calicium glaucellum Ach. – ABGR (2), at 797 and 1083 m in THPL/ADAL and ABGR/ASCA2-ASCA2 habitat types dominated by *Abies grandis* with stand ages of 67 and 135 years. Both records are from Clearwater County. This species was found on a few other plots on the wood of conifer snags.

Calicium viride Pers. – ABGR (2), ABLA (1), PIEN (1), PSME (1), THPL (2), TSHE (1), from 903 to 1745 m in the THPL and TSHE series. This species was often found on the boles of large conifers under dense branching. The stand ages ranged from 90 to 129 years, excluding one plot with a stand age of 17 years. This 17 year-old plot was located in a densely regenerating sapling thicket that had intermittent patches of large, older trees where the *Calicium* was collected.

Caloplaca atrosanguinea (G. Merr.) I. M. Lamb – ABGR (1), ACGL (5), ALINT (1), FRPU7 (2), HODI (1), PHLE4 (1), SOSC2 (1), SYAL (1), THPL (3) from 782 to 1147 m with one at 1309 m. Most collections are from the THPL series with a few from TSHE and ABGR habitat types. In the field the dark apothecia may be confused with the black dots of *Buellia* and *Lecidella*, but a close look reveals the dark brown coloration. Under a dissecting microscope a golden, shiny, crystalline luster like pyrite is usually apparent. Most common on smooth-barked, tall shrubs at low elevations.



Caloplaca atrosanguinea on a *Thuja plicata* twig, *1416*. The brownish golden luster of the apothecia sets this lichen apart from the black dots of the genera *Buellia* and *Lecidella*.



Caloplaca cerina on *Acer glabrum* bark, *864*.

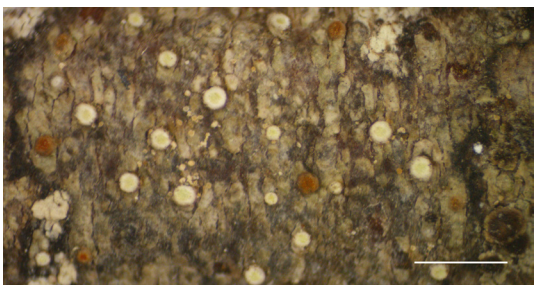
Caloplaca cerina (Ehrh. ex Hedwig) Th. Fr. – ACGL (1), ALVIS (2) from 1291 to 1654 m. The specimen from *Acer* was from a patchy forest on talus in the Selkirk Mountains, Boundary County, and the other two from open subalpine forests in Shoshone and Clearwater Counties near their shared border.

Caloplaca flavorubescens (Hudson) J. R. Laundon – ACGL (1), 841 m, in a forest of large *Picea* and *Abies grandis*, stand age 87 years, on a floodplain along Mannering Creek in Latah County.

Caloplaca oregona H. Magn. – ABLA (1), 1535 m in the THPL/CLUN2-MEFE habitat type just east of Moon Pass, Shoshone County. Twenty spores averaged 16.7 × 10.4 µm with septa averaging 6.3 µm. B. McCune verified this specimen but noted the unusual habitat. It is normally a low-elevation species and is more common on hardwoods west of the Cascades.

Caloplaca pyracea (Ach.) Zwackh – ACGL (1), FRPU7 (1), POTR5 (1), 695 to 1070 m in various habitat and forest types with stand ages from 41 to 56 years.

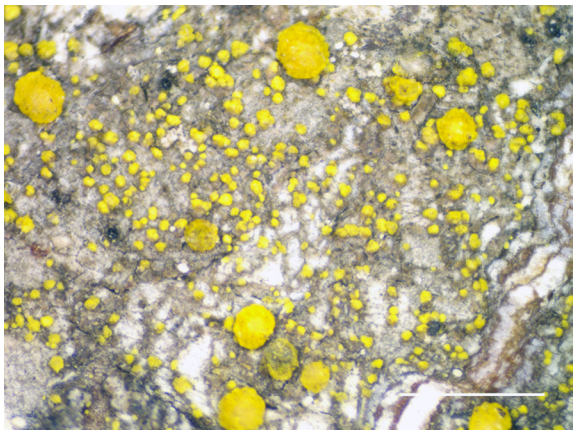
Caloplaca sorocarpa (Vainio) Zahlbr. - ABLA (2), ACGL (1), ALVIS (3), LEGL (1), MEFE (6), PAMY (3), PSME (1), SOSC2 (1), VAME (6), VAMY2 (1), all but two from elevations 1128 to 1654 m with 14 of the 25 collected from over 1524 m. The



Caloplaca sorocarpa on *Paxistima* showing the white-rimmed soralia, *1614*. The presence of apothecia on this specimen is unusual for the local material.

two low-elevation outliers were on the same plot on *Paxistima* and *Vaccinium membranaceum* at 817 m among other lichens normally found higher, such as *Biatora flavopunctata*. These two-low elevation collections were also the only fertile ones found; the one on *Paxistima* had abundant apothecia. The collections on *Abies lasiocarpa* were from a horizontal sapling and on small twigs. The *Pseudotsuga* collection was on a very smooth patch of bark. This species is much more common on *Menziesia ferruginea* and *Vaccinium membranaceum* at subalpine elevations than my collections here imply. The "sharply delimited, minute, doliiform soralia" (Tønsberg 1993) are easy to pick out with a hand lens and are a common component of the subalpine, ericaceous shrub lichen community.

Candelariella lutella (Vainio) Räsänen – ABGR (1), ACGL (2), AMAL2 (1), HODI (1), PIEN (1), PIPO (1), PREM (1), SASC (1) from 618 to 1426 m with one at 2305 m and a wide range of habitat types. These collections are mostly of tiny specimens often near branch scars. All of them have thalli of small, dispersed, corticate granules except the high elevation *Picea* collection. This one had slightly larger, contiguous areoles but still tiny thalli on small twigs. They all appeared to have no or almost no proper exciple, in contrast to the obvious proper exciple of local saxicolous and muscicolous *Candelariella vitellina*. This trait is important in differentiating these two polysporous species (Westberg 2007). This lichen is common as tiny thalli scattered among other crusts on small branches of smooth-barked tall shrubs. Most of these records were collected incidentally with other species.



Candelariella lutella on *Acer glabrum* bark*, 934*.

Chaenotheca brunneola (Ach.) Müll. Arg. – PIEN (1), 903 m. Found on a marshy stream bottom plot north of Upper Priest Lake on the bark of a sheltered *Picea* along with *Calicium viride*. This species is fairly common on snags and on the sheltered bark of large *Thuja* in old-growth forests.

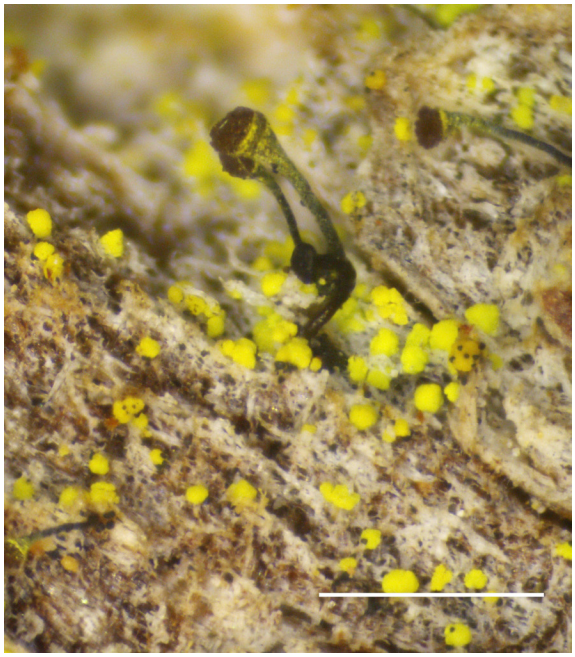
Chaenotheca chrysocephala (Turner) Th. Fr. – ABGR (2), habitat type ABGR/ASCA2-ASCA2 for both. One occurred at 1083 m on a Clearwater County plot with a stand age of 135 years, and the other on an Idaho County plot at 1182 m and a stand age of 178 years.

Chaenotheca trichialis (Ach.) Th. Fr. – THPL (1) at 647 m in the THPL/ATFI-ADAL habitat type. This taxon occurred on the bark of a 114-cm-diameter tree in Isabella Creek in the North Fork of the Clearwater.

Chaenothecopsis nana Tibell – THPL (1), 903 m, in the THPL/ATFI-ATFI habitat type. This plot was in a broad marshy stream bottom with large *Thuja plicata* and *Picea engelmannii* among riparian vegetation, north of Upper Priest Lake in Bonner County.

Chaenothecopsis tasmanica Tibell – THPL (1) at 647 m, in the THPL/ATFI-ADAL habitat type. This taxon occurred on the bark of a 114-cm-diameter tree, at Isabella Creek in the North Fork of the Clearwater. This species occasionally covers the sheltered bark of large *Thuja* in old-growth patches scattered throughout northern Idaho.

Chrysothrix candelaris (L.) J. R. Laundon – BEPA (1), 857 m in PSME/PHMA5-MAST4 habitat type dominated by *Betula papyrifera* and tall brush. The specimen was sheltered within old, curled, exfoliating bark.



Chaenotheca chrysocephala on bark of the bole of a *Pseudotsuga menziesii* from Whatcom County, Washington, *3407*. Small yellow granules make up the thallus. Three stalked apothecia are present. In the foreground of the two *Chaenotheca* stalks in the center is a single black stalk of the parasite *Chaenothecopsis consociata,* which was not found in Idaho during this study.

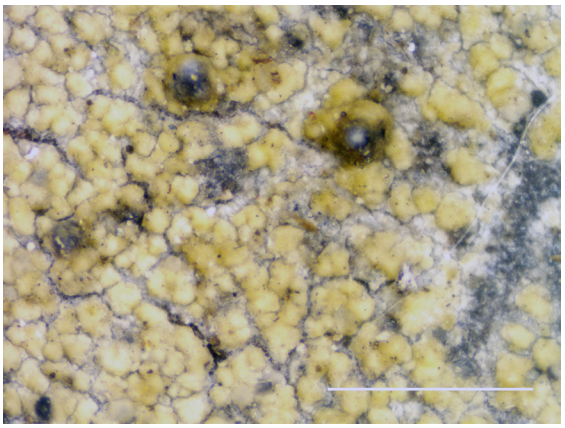
Cliostomum corrugatum (Ach.: Fr.) Fr. – THPL (1), 1042 m, THPL/CLUN2-CLUN2 in a 91-year-old stand. This collection was from a 69-cm-diameter *Thuja* along Alderman Ridge southwest of Elk River in western Clearwater County.

Cliostomum flavidulum Hafellner & Kalb – ABGR (2), both dominated by *Pseudotsuga* in Shoshone County. One collection is from TSHE/CLUN2-CLUN2 in the Marble Creek drainage on the south side of the St. Joe River, 841 m. The other is from Butte Gulch, east of Murray, in a moist, lichen-rich site on a talus slope in the ABGR/CLUN2-PHMA5 habitat type, 1026 m.

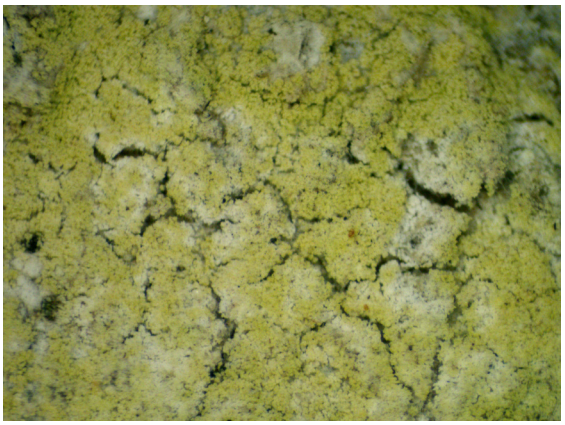
Cliostomum griffithii (Sm.) Coppins – TABR2 (1), from THPL/CLUN2-TABR2, 785 m, in a 125-year-old *Thuja* forest in a deep ravine in northwestern Clearwater County near its borders with Latah and Nez Perce Counties. This species is abundant on angiosperm bark at low elevations on the west side of the Cascades but is difficult to find east of the Cascades. It can superficially resemble *Palicella schizochromatica*, but that species is more often found in well-aerated, open forests (usually dry or subalpine) whereas *C. griffithii* prefers mesic environments. Microscopically *C. griffithii* can be separated by its septate spores versus simple ones in *Palicella*.

Cliostomum griffithii on *Taxus brevifolia* bark, *2500*.

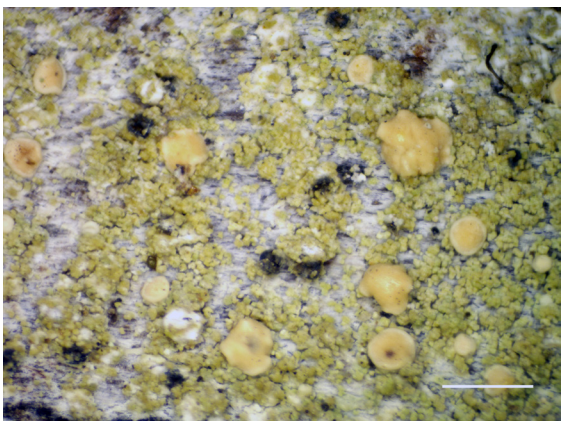
Cliostomum spribillei Goward & Tønsberg – ABGR (1), ABLA (2), PSME (1), THPL (1) from three plots at 1128, 1455 and 1571 m in the THPL and TSHE series. Two plots are on the south side of the St. Joe River and the lowest elevation plot is on Ruby Ridge in the Selkirks of Boundary County. On one of the St. Joe plots, above Boulder Creek at 1455 m in the THPL/CLUN2-CLUN2 habitat type, this species was particularly abundant throughout the area. On this plot I made collections from *Abies grandis*, *Pseudotsuga*, and *Thuja*. This species was recently described by Tønsberg and Goward (2016).



Cliostomum corrugatum thallus with pycnidia on the bark of *Thuja plicata*, *2181*.



Cliostomum flavidulum on *Abies grandis* sapling, Butte Gulch, *2473.*



Cliostomum spribillei on bark of bole of *Abies lasiocarpa*, *2641*.

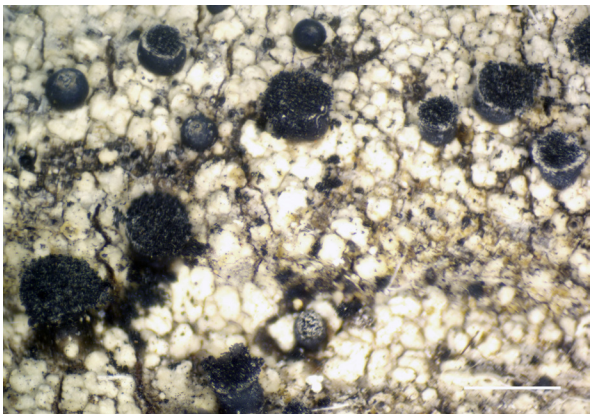
Coenogonium pineti (Ach.) Lücking & Lumbsch – THPL (1), 893 m, TSHE/CLUN2-CLUN2. This specimen was collected 1 cm above the litter layer at the base of a large *Thuja* in a 107-year-old *Thuja* and *Tsuga* forest with little understory. The plot was in Brown Creek, North Fork of the Coeur d'Alene drainage, Shoshone County. I also collected it from two plots on the south side of the St. Joe on soil of a trail cut and on matted detritus within *Tsuga mertensiana* roots.

Coenogonium pineti on *Thuja plicata*, *1596.*

Cyphelium inquinans (Sm.) Trevisan – ABGR (1), ABLA (3), THPL (2), TSHE (1), from 785 to 1497 m in THPL and TSHE series habitats. This species is common on wood (snags and decorticate twigs) throughout northern Idaho. It is also fairly common on the bark of large trees, especially old *Thuja*. The collections on *Thuja* are from trees with diameters of 66 and 102 cm; the collection on *Tsuga heterophylla* is from a tree with a 94 cm diameter. Stand ages ranged from 78 to 125 years.

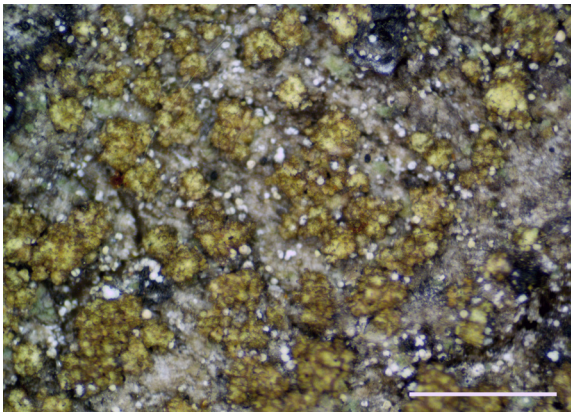
Hypocenomyce scalaris (Ach. ex Lilj.) M. Choisy – LAOC (1), PIPO (1), PSME (2), THPL (1), TSHE (1), 618–1102 m from PSME, ABGR and TSHE habitat series (dry to wet). The species is common on charred conifer snags but is also found on the bark of large conifers. All collections listed are from large trees, including a 102-cm-diameter *Thuja* and a 94 cm diameter *Tsuga hetrophylla*.

Icmadophila ericetorum (L.) Zahlbr. – THPL (1), 1134 m, THPL/ASCA2-TABR2 habitat type. Normally on rotting conifer stumps and logs, this species was found corticolous at the base of a 119-cm-diameter *Thuja* along a steep section of Goat Creek in the North Fork of the Clearwater drainage. Pink apothecia make this species an easy field identification, so this was not collected.

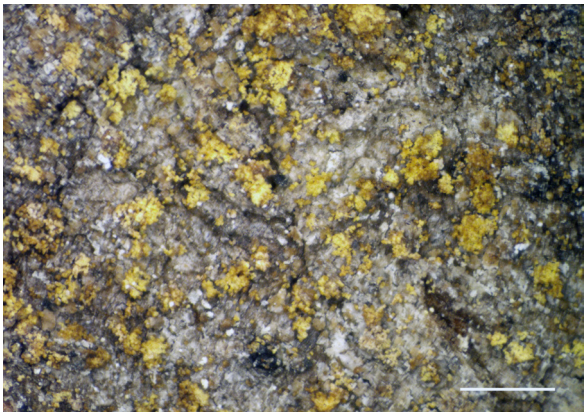


Cyphelium inquinans on *Thuja plicata* bark, *485*. In this photo a white ring is apparent on the smaller apothecia but not visible on the larger apothecia, which have a dense covering of loose, dark spores.

Japewia subaurifera Muhr & Tønsberg – ABGR (2), BEPA (1), PICO (1), PIMO3 (1), PSME (7), THPL (2) from 626 to 1158 m. Although more than half were found in THPL or TSHE habitat types, this lichen was also found in drier sites. Half of these collections are from *Pseudotsuga* bark, and all but one are from conifers. This common species is more often found, at least in northern Idaho, on the boles of conifers with rougher bark and less common on smooth bark or small twigs. The stand ages ranged from 26 to 78 years.



Japewia subaurifera on *Pseudotsuga menziesii*, seemingly a preferred substrate in northern Idaho, *2470*. Notice the mix of yellow and brown soredia. Numerous pale pollen grains sprinkle the whole photo.

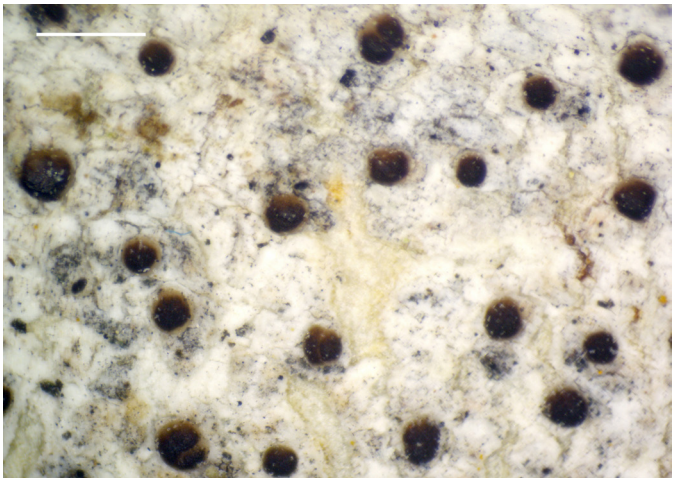


Another look at *Japewia subaurifera*, this one on *Pinus monticola* bark, *895*.

Japewia tornoënsis (Nyl.) Tønsberg – ABGR (3), ACGL (1), AMAL2 (1), LAOC (2), PSME (6), THPL (4), TSHE (1) from 647 to 1158 m, with one from 1553 m. This common species was found in habitats in the TSHE, THPL and ABGR series. The brown thallus with brown apothecia is easy to overlook on bark and often noticed while scanning other species with a hand lens. Like its congener, this species was found mostly on conifers and is more often found on rougher bark. Stand ages ranged from 26 to 137 years. The lowest-elevation collection was on a 76-cm-diameter *Thuja plicata* with *Micarea peliocarpa* and *M. synotheoides*. In the dark understory this specimen had pale orange apothecia and looked more like *Biatora rufidula*, which is commonly found on the same branches *as J. tornoënsis*.

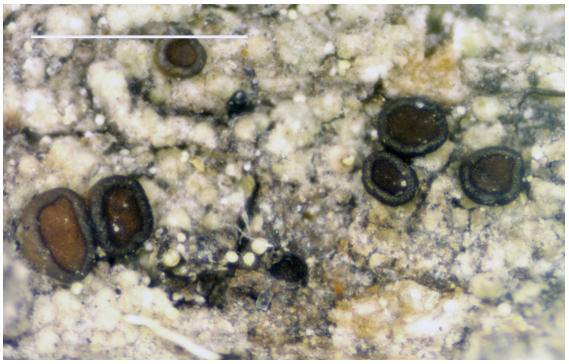
Japewia tornoënsis on *Thuja plicata*, *1666*.

Lecania dubitans (Nyl.) A. L. Sm. – POTR5 (2), 850 m in ABGR/PHMA5-PHMA5 and 970 m in THPL/CLUN2-MEFE. This species is most often found on aspen; see *Populus tremuloides* in Section 3.



Lecania dubitans on *Populus tremuloides*, *659*.

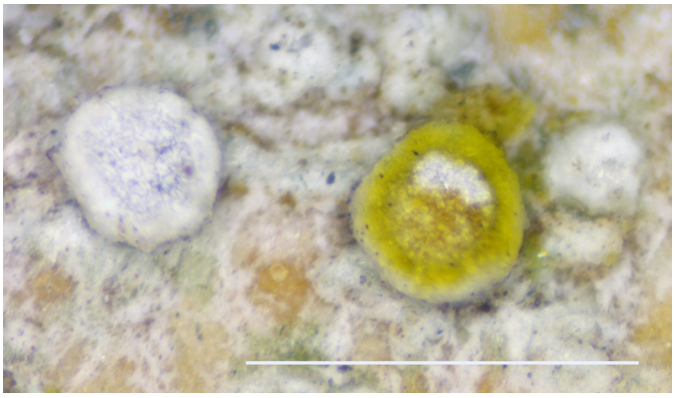
Lecania naegelii (Hepp) Diederich & van den Boom – POTR5 (1), 695 m, TSHE/CLUN2-ARNU2 habitat in a flat *Betula papyrifera* forest near Elmira in Bonner County. The apothecia of this specimen eventually exclude the margin, making it look more like a *Micarea* species. Thus, it does not match the *Lecania naegelii* I have found in northwestern Washington, which have an obvious, persistent margin. This specimen was confirmed by Pieter van den Boom and is new to Idaho and the U.S. portion of the Rocky Mountains.



Lecanora boligera on *Pinus ponderosa* twigs, *1264a*.

Lecanora boligera (Norman ex Th. Fr.) Hedl. – ABLA (1) at 1171 m in THPL/GYDR habitat type, PIPO (1) at 890 m in ABGR/PHMA5-PHMA5. Included here are two specimens in which all of the spores are spherical (see *Lecanora fuscescens* for those with a mix of spherical and broadly ellipsoid spores). Brodo (2016) separated *L. boligera* from *L. fuscescens* by the spherical spores and P- apothecial margin of the former. Ryan et al. (2004) reported *L. boligera* as having a P+O spot test and a lecanorine margin. The two specimens included here have all spores spherical with the collection from *Abies lasiocarpa* with spores 6.4 µm in diameter, P+O thallus, and a dark brown disk and margin. The collection from *Pinus ponderosa* (see photo) has spores with 5.6 µm diameter, P- thallus and apothecial margin, and a reddish brown disk with darker brown margin. Both have persistent margins with disks remaining flat. The collection from *Abies lasiocarpa* shares habitat and P+O reaction with all the records of *L. fuscescens* below and may fit better there ; it is placed here because of the completely spherical spores. The distinctions between these two species and the similar *L. paddensis* are discussed by McCune (2017b.)

Lecanora carpinea (L.) Vainio – ABGR (2), ACGL (4), AMAL2 (1), BEPA (1), CRDO2 (1), HODI (2), PHMA5 (1), POTR5 (1), SASC (1), from 618 to 1294 m in a wide range of habitat types. This species is common on tall shrubs throughout northern Idaho and is also found on conifers. A tiny dab of bleach on the heavily pruinose apothecial disks gives a deep yellow reaction (C+Y).



Lecanora carpinea on a *Salix scouleriana* twig, *2611*. The apothecium on the right turned a deep yellow after a tiny drop of bleach was applied (C+Y).

This *Salix scouleriana* twig shows the pruinose disks of *Lecanora carpinea* on the right, and epruinose disks of *Lecanora pulicaris* on the left, *2611*. Photo by Richard Droker.

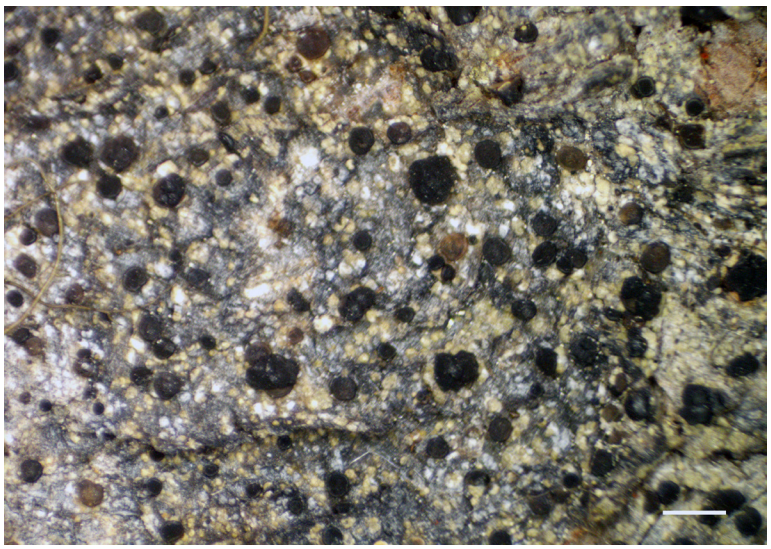
Lecanora circumborealis Brodo & Vitik. – ABGR (4), ABLA (4), ACGL (2), AMAL2 (1), HODI (1), PIEN (1), PIMO3 (1), PIPO (2), PSME (2), TSHE (1), TSME (1), from 823 to 2305 m, evenly distributed throughout all habitat type series. This species is common to abundant on conifer twigs throughout northern Idaho but also found on tall shrubs. The apothecial disks range from pale brown to black, but as mentioned by Brodo (1984), darker disks are more likely to be this species while lighter disks predominate in *Lecanora pulicaris*. This species also seems more likely on conifers and at higher elevations than *L. pulicaris,* but both species have a broad range of substrates, habitats and disk coloration. The small black spots easy noticeable on paler disks are most often *Vouauxiella lichenicola* in northern Idaho (see Section 4 for that species, as well as *Everniicola flexispora*, *Lichenostigma chlaroterae* and *Spirographa lichenicola*).

Lecanora circumborealis on an *Abies lasiocarpa* twig in the Cascade Range, Oregon, *McCune 23772*. Photo by Bruce McCune.

Lecanora confusa Almb. – ABGR (1), ACGL (2), CRDO2 (1), HODI (1) from 850 to 1032 m. This lichen is common on tall shrubs at low elevations, especially in riparian areas.

Lecanora excludens Malme – ACGL (1), 1291 m in the Lion Creek drainage of the Selkirk Mountains, Boundary County. This plot was on a talus slope adjacent to a mature *Tsuga heterophylla* forest. This species was recently documented from North America (Brodo et al. 2019).

Lecanora fuscescens (Sommerf.) Nyl. – ABGR (2), ABLA (5), LAOC (1), PIEN (2), PSME (6), TSME (1), from 1288 to 2305 m. This species is characterized by a biatorine margin, broadly ellipsoid spores and often a P+ orange reaction in the thallus or apothecial margin (Brodo 2016; Ryan et al. 2004). *Lecanora boligera* (and *L. paddensis*) are usually separated by their spherical spores. But the collections recorded here form a continuum with two specimens having about half of the spores spherical (with overall averages of 7.4 × 7.0 µm and 7.2 × 6.8 µm), two other specimens with about a third of the spores spherical (with average spore sizes of 7.0 × 6.2 µm and 6.9 × 6.0 µm) and the rest with all or most spores broadly ellipsoid and average spore sizes of 6.9-10.0 × 5.3-6.7. All of the specimens included here have a P+ orange thallus or apothecial margin. They also have apothecia with a biatorine margin that is usually soon excluded as the apothecia become strongly convex. See *L. boligera* for further discussion and records with all spores spherical and slightly smaller. This lichen is common and occasionally abundant on the bark of conifer boles at mid to subalpine elevations. McCune (2017b) discussed the differences among the three confusing species in this group. The first set of spore sizes given in this account seem close to those expected for *Lecanora paddensis,* but I did not attempt to make distinctions here because, as mentioned, there seems to be a continuum.

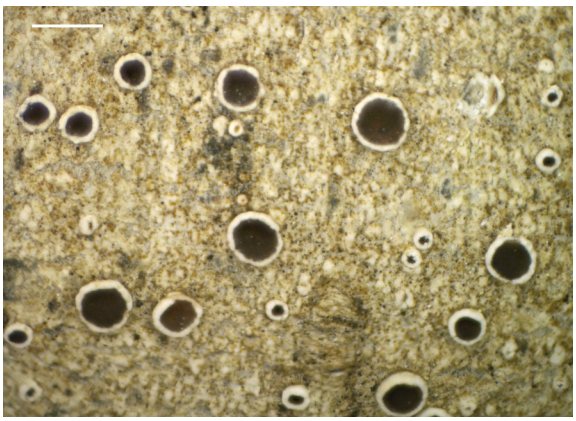


Lecanora fuscescens on *Abies lasiocarpa* bark, *963*.

Lecanora intumescens (Rebent.) Rabenh. – ACGL (1), ALINT (2), FRPU7 (1) from 903 to 1032 m in various habitat types. Two of these collections were on *Alnus incana* in marshes. These specimens are the first records for the United States and were first reported by Brodo et al. (2019). They also mention several records from nearby British Columbia. This species is better known from Europe but may be fairly common in low-elevation mesic forests along wetlands in northern Idaho and adjacent British Columbia.

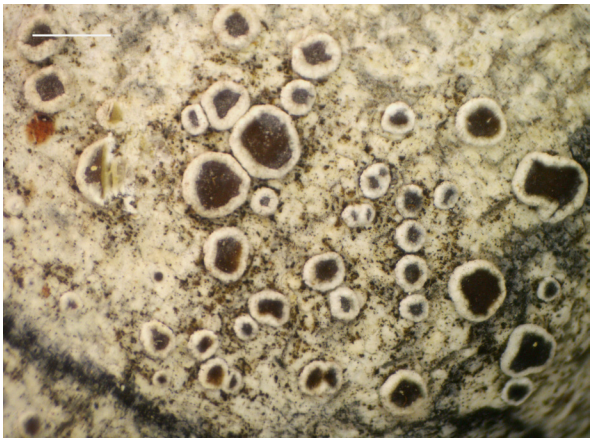
Lecanora laxa (Śliwa & Wetmore) Printzen – ABGR (2), ABLA (2), ACGL (2), ALINT (1), AMAL2 (2), HODI (1), LAOC (1), PHMA5 (1), PIEN (1), PICO (1), PIMO3 (1), PIPO (1), PSME (1), SASC (1), from 759 to 1749 in PSME, ABGR, ABLA, THPL and TSME series habitat types as well as on ALINT in beaver ponds. The species is common on trees and tall shrubs throughout northern Idaho but can be less conspicuous than other common crusts because the thallus is usually not apparent. Look for the greenish-yellow apothecia with constricted bases and sometimes wavy margins while scanning twigs with a hand lens.

Lecanora pulicaris (Pers.) Ach. – ABGR (2), ABLA (1), ACGL (1), AMAL2 (1), CESA (1), HODI (1), PICO (1), PIMO3 (1), PSME (1), SASC (1), SHCA (1), SOSC2 (1), THPL (1) from 618 to 1519 m in a wide range of habitat and forest types and stand ages. The majority of these are the P– chemotype, distinguished from *Lecanora circumborealis* by smaller spores and an excipular cortex that is not as wide, especially at the base.

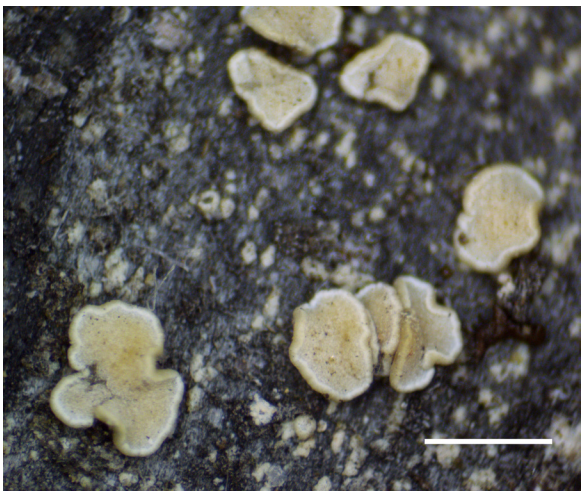


Lecanora pulicaris on *Alnus incana*, *2231*. This specimen has dark disks, but pale brown and reddish brown disks are also common in northern Idaho.

Lecanora salicicola H. Magn. – ACGL (2), ALVIS (2), PSME (1), VAME (1), from 1291 to 1629 m. The collection from *Pseudotsuga* is from a smooth patch of bark. In the study area this species seems most common at subalpine elevations in *Alnus viridis* patches. *Pertusaria carneopallida*, with similarly colored thalli and disks, can



Lecanora intumescens on bark of *Alnus incana*, *1379*.



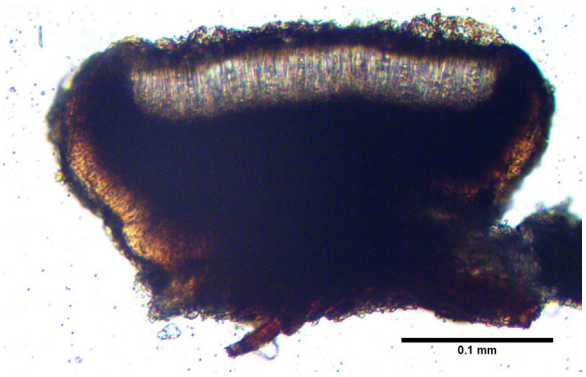
Lecanora laxa on an *Abies grandis* twig showing wavy-margined apothecia mentioned by McCune (2017b), *2060*.

Lecanora salicicola on *Alnus viridis* bark, Whatcom County, Washington, *3200*.

also be common in this habitat, but a close look at the apothecia with a hand lens can easily distinguish these two. *Lecanora salicicola* does not show the range of disk colors seen in *L. circumborealis* and *L. pulicaris*. Those species often form large colonies on twigs and a wide range of browns can often be found on the disks of a single thallus or colony. *L. salicicola* seems to maintain the same pale orange-brown disks across the substrate.

Lecanora symmicta (Ach.) Ach. – ABGR (1), 1352 m, TSHE/CLUN2-MEFE habitat in a 78-year-old *Abies grandis* forest. This specimen is from a plot near the Coeur d'Alene/St. Joe divide in Shoshone County. McCune et al. (2014) did not accept *Lecanora symmicta* for Montana, noting that records they inspected from that state were misidentifications, often of *L. confusa*. This Idaho collection was verified by Bruce McCune in 2016. I have not found this species elsewhere in Idaho.

Lecidea albofuscescens Nyl. – HODI (1), 797 m, THPL/ADAL habitat type. This was from a plot in flat woods on the east side of the Dworshak Reservoir, Clearwater County, with large *Abies grandis*, an open understory and a stand age of 67 years.



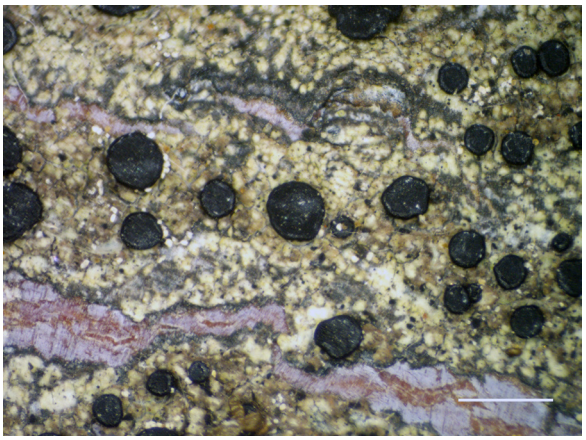
Lecidea albofuscescens showing a pale outer exciple, *1639A*.

Lecidea betulicola (Kullh.) H. Magn. f. ***endamylea*** (Hedl.) Hinter. – MEFE (1), 1015 m, THPL/ASCA2-ASCA2 dominated by *Abies grandis* with a stand age of 90 years. This plot is east of Pierce, Clearwater County. The 12 spores per ascus make this species easy to separate from other *Lecidea* and *Biatora*. *Lecidea betulicola* resembles some individuals of *Lecania dubitans* or other *Lecania,* but *Lecania* has septate spores. In the field the dark disks and paler brown margins superficially resemble some *Rinodina orculata,* which is also occasionally found on the bases of ericaceous shrubs. However, *L. betulicola* lacks the prominent excipular ring of *R. orculata* which can give a clue, even in the field. I have found *L. betulicola* one other time in northern Idaho, also in western Clearwater County, in an old-growth *Thuja* forest near Teepee Creek at an elevation of 1208 m.

Lecidea betulicola on *Menziesia ferruginea* bark 0.5 m above the ground, *1424*.

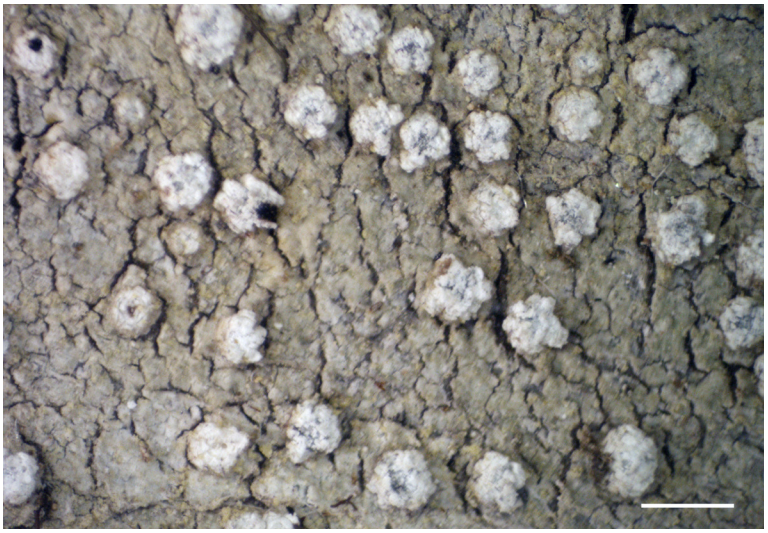
Lecidea rubrocastanea T. Sprib. & Printzen – ABLA (1) at 1570 m in the THPL/CLUN2-MEFE habitat type in a forest with *Picea engelmannii* and *Abies lasiocarpa*. This specimen was on a nearly horizontal tree that had been recently knocked over. It was collected from what was previously 3.5 m above the ground. This lichen resembles *Japewia tornoënsis* in the field, but the spores are much smaller and thin-walled (Spribille and Printzen 2007).

Lecidella elaeochroma (Ach.) M. Choisy and ***Lecidella euphorea*** (Flörke) Hertel – ABGR (5), ACGL (6), AMAL2 (4), CESA (1), HODI (2), PIMO3 (1), PREM (1), PRVI (1), PSME (1), SASC (1), SOSC2 (1), THPL (1), VAME (1) from 773 to 1352 m in a broad range of habitat types. I had originally called most of these *Lecidella elaeochroma*. But I was not confident with the subtle differences between the two species and so decided not to differentiate them here. Brodo (2016) chose not to separate these two in his revised keys due to some overlapping characteristics. For identification details see Knoph and Leuckert (2004) and McCune (2017b). *Lecidella elaeochroma* is a very common species on the west side of the Cascades



Lecidella elaeochroma/euphorea on the bark of an 8 cm diameter *Acer glabrum* stem, *2054*.

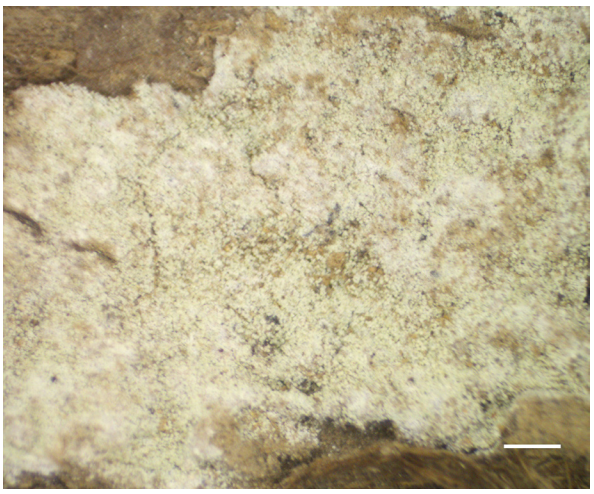
and McCune et al. (2014) stated that *L. euphorea* is "one of the most common black dot crusts on wood and bark in Montana." Northern Idaho is an area of overlap, so an interesting project would be to identify these specimens properly, which is best done with thin-layer chromatography or DNA, and then sort through the FIA data to see which ecological variables favor one species over the other.



Lepra ophthalmiza on bark of a large *Thuja plicata*, *1484*.

Lepra ophthalmiza (Nyl.) Hafellner – ABGR (4), ABLA (1), ACGL (3), ALINT (1), FRPU7 (1), PIMO3 (1), PSME (1), THPL (8), TSHE (1) from 817 to 1288 m with two collections from the ABGR series and all others from the THPL or TSHE habitat series. *Lecanora ophthalmiza* is a very common corticolous lichen in low-elevation mesic forests, much more so than the above numbers would indicate. It is commonly the host of lichenicolous fungi (see *Caeruleoconidia ochrolechiae*, *Lichenostigma alpinum*, *Llimoniella pertusariae* and *Sclerococcum parasiticum* in Section 4.)

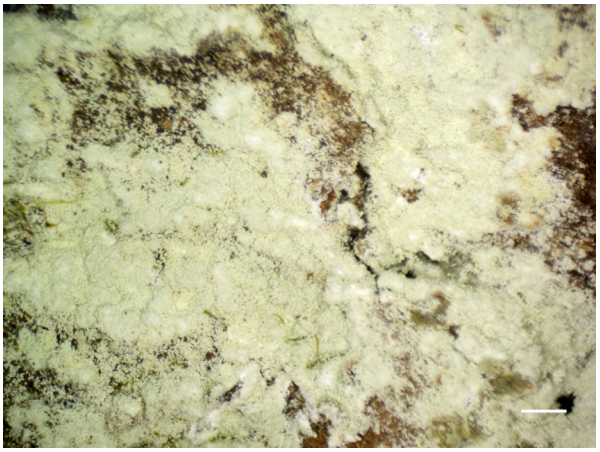
Lepraria Ach. – This genus consists of sterile species made up almost entirely of soredia. They are less likely to form discrete thalli and often cover large areas of tree bases and rocks. Their identification is mostly based on chemistry, but identifying these species with only spot tests is often unreliable (see Lendemer 2013 for details). The identifications below were, in most cases, made using only spot tests and therefore may not be entirely accurate. In northern Idaho, in my experience so far, the deep green *Lepraria* often found on large conifers in shaded old-growth forests are often either *L. pacifica* or *L. torii*. The former can be reliably identified due to its white fluorescence under long-wave ultraviolet (UV) light and a negative reaction to P (UV+white, P-). *Lepraria torii* on the other hand usually turns deep orange with the application of P (UV-, P+O). Paler greenish white or greenish gray thalli are also encountered commonly on conifer bark and not necessarily in mature forest. In my experience these are UV-, P- (or pale Y), and usually turn yellow in KOH (K+Y). These I have called *L. jackii*. *Lepraria elobata* has also been encountered on *Thuja* bark (confirmed by J. C. Lendemer, NY). This is also a paler species but UV-, P+O, K+Y turning brown. Another *Lepraria* likely to occur on bark in the region is *L. rigidula*. This species is similar in color and spot tests to *L. jackii* but the individual soredia have projecting hyphae that are not found in *L. jackii* (Lendemer 2013, including photos). Two other *Lepraria* that could be encountered on bark in the area include *L. eburnea* and *L. finkii*. For full descriptions of all of these species, including details on their morphology and chemistry, see Lendemer (2013). For a treatment confined to those species found in the Pacific Northwest see McCune (2017b). As shown in the species accounts below, most of the *Lepraria* collections from this project come from old forests.



Lepraria elobata from bark at the base of a *Thuja plicata*, *1667A*. A duplicate of this specimen was determined by J. Lendemer.

Lepraria elobata Tønsberg – THPL (1), 848 m, TSHE/CLUN2-CLUN2 habitat type with *Pseudotsuga*, stand age of 129 years and very steep and brushy. This plot was on a north-facing slope above Breakfast Creek in the North Fork of the Clearwater. This specimen was found on bark at the base of *Thuja plicata*.

Lepraria jackii Tønsberg – ABGR (1), LAOC (2), THPL (2), from 783 to 1079 m in ABGR, THPL and TSHE habitat types and with stand ages from 65 to 125 years. These are all from bark at the base of trees 38 cm diameter or larger. One of these harbored the lichenicolous fungus *Rhymbocarpus neglectus*. In fact, the three times I have found *R. neglectus* in northern Idaho have all been on this species (or at least on what I have been calling *L. jackii*).

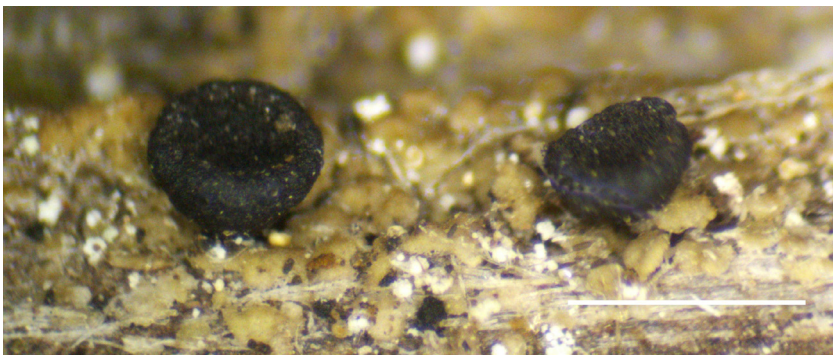


Lepraria jackii on bark at the base of a *Larix occidentalis* bole, *2159*.

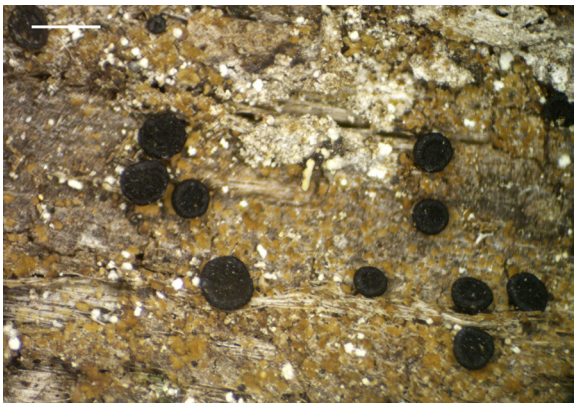
Lepraria pacifica Lendemer – THPL (2), TSHE (1), two from the same plot along Brown Creek in the North Fork of the Coeur d'Alene drainage, 893 m, stand age 107 years. The other is from a plot in Isabella Creek in the North Fork of the Clearwater on a 114-cm-diameter *Thuja*, 647 m, stand age 137 years. This and *L. torii* are both common green leprose crusts on large conifers on the west side of the Cascades (Lendemer 2013), but *L. torii* is thought to be more common inland.

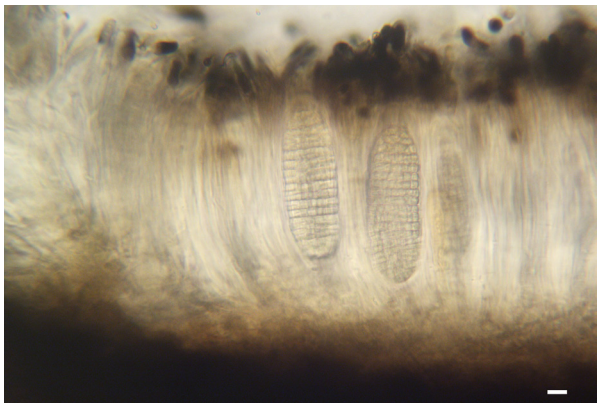
Lepraria torii Perez-Ortega & T. Sprib. – TSHE (1), 893 m, TSHE/CLUN2-CLUN2, dominated by *Tsuga heterophylla* with stand age 107 years. This plot is the same one where I made two of the *L. pacifica* collections. It had little understory and many old *Thuja plicata* and *Tsuga heterophylla*. *Lepraria torii* is fairly common on large *Thuja* in old-growth forests in northern Idaho. Although not shown here, I have found this species to be more common than *L. pacifica* in Idaho.

Lopadium disciforme (Flotow) Kullhem – ABGR (3), PSME (3), THPL (5), between 785 and 1455 m, with most concentrated at the low end of that range. The stand ages ranged from 65 to 171 years with 8 of the 11 over 100 years old. *Lopadium disciforme* is fairly common in mature forests in the THPL and TSHE habitat series and is particularly easy to find on large *Thuja* in low elevations of the North Fork of the Clearwater River drainage.



Close up of *Lopadium disciforme* showing the substipitate apothecia, *1423*.





Lopadium disciforme on *Thuja plicata* bark, *1423*. Left: habit. Right: apothecium section in KOH showing one large, hyaline, muriform spore per ascus.

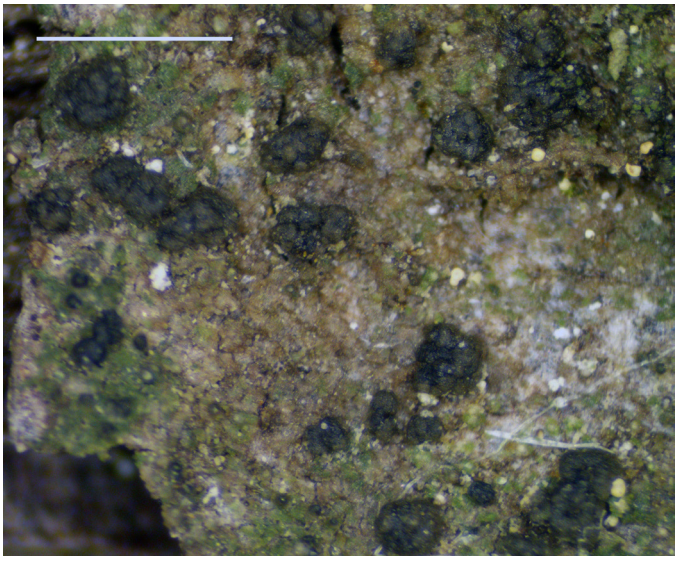
Micarea denigrata (Fr.) Hedl. – THPL (1) in the THPL/CLUN2-CLUN2 habitat type dominated by *Thuja plicata* at 1042 m on Aldermand Ridge in western Clearwater County. The species was abundant from 0.3 to 0.6 m high on a 46-cm-diameter *Thuja*. This plot had a stand age of 91 years.

Micarea peliocarpa (Anzi) Coppins & R. Sant. – THPL (1) in THPL/ATFI-ADAL habitat dominated by *Thuja plicata* at 647 m, with a stand age of 137 years. This plot is in the Isabella Creek drainage of the North Fork of the Clearwater River. This was a pale specimen growing adjacent to *Micarea synotheoides*, 1.5 m above the ground on a a 76-cm-diameter tree. This species is more common on wood.

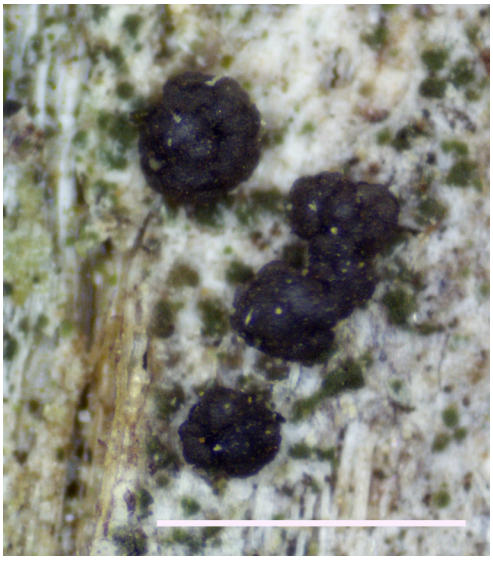
Micarea synotheoides (Nyl.) Coppins – THPL (2), TSHE (1) in THPL and TSHE series habitat types and dominated by *Thuja* or *Tsuga heterophylla* at elevations of 647, 1102 and 1134 m. Stand ages on these three plots were 117, 137 and 268 years. All three collections were made from trees at least 58 cm in diameter.

Micarea denigrata on *Thuja plicata* bark, *2183*.

Micarea peliocarpa on *Thuja plicata*, *2039*.



Micarea synotheoides on *Thuja plicata* bark, *1485A*.



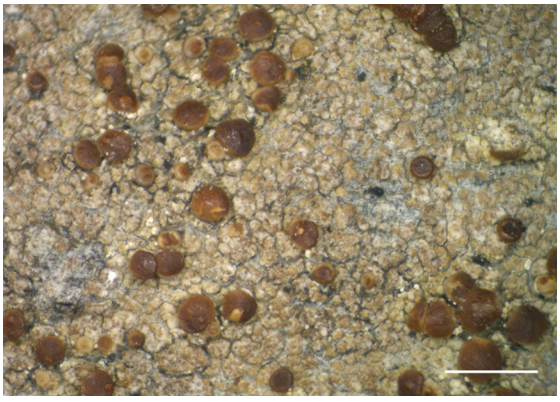
Tuberculate apothecia of *Micarea synotheoides* on *Thuja plicata* bark, *2040*.

Mycoblastus sanguinarius (L.) Norman – ABGR (1), FRPU7 (1), PSME (2), THPL (3), from 817 to 1455 m with one record from the ABGR series and all others in the TSHE or THPL series. Stand ages were from 71 to 268 years with one stand of 17 year-old-saplings with clumps of large remnant trees. This species is most common on large *Thuja* in mature forests. The distinctive red color below the hypothecium is not always present.

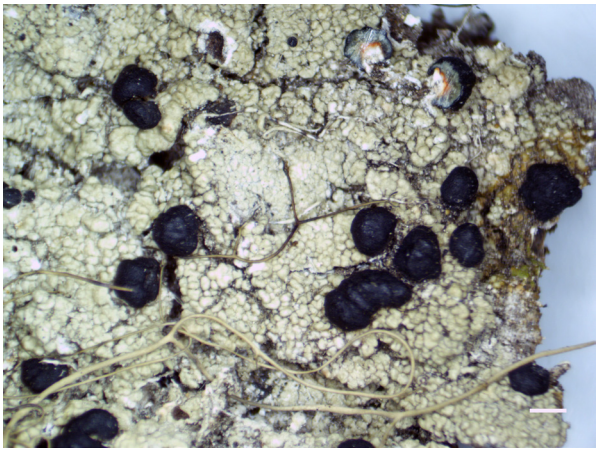
Mycocalicium subtile (Pers.) Szatala – ABGR (1), 797 m, in THPL/ADAL habitat. Found in flat woods near the Dworshak Reservoir in an open understory forest dominated by large *Abies grandis*. This species is usually lignicolous but can occur on bark. Care should be taken to differentiate this from the similar *Chaenothecopsis nana*. See Selva (2014) for features that distinguish the two genera and the species.

Myochroidea porphyrospoda (Anzi) Printzen, T. Sprib. & Tønsberg – ABLA (2) and TSME (3), all from 1553 to 1756 m and the TSME habitat type series. All collections were made from within 45 cm of the ground on mature trees or on saplings bent to nearly horizontal. This taxon was also reported from the bases of shrubs in similar habitats by McCune et al. (2014) and Printzen et al. (2008). An additional collection on a Shoshone County plot is from the remaining bark shell of a completely rotted conifer log. The key to finding this species seems to be looking on bark near the ground in late snow areas. It should also be noted that the five plots on which this species was collected all had stand ages from 109 to 161 years. *Myochroidea rufofusca*, was also found only on plots 103 years or older.

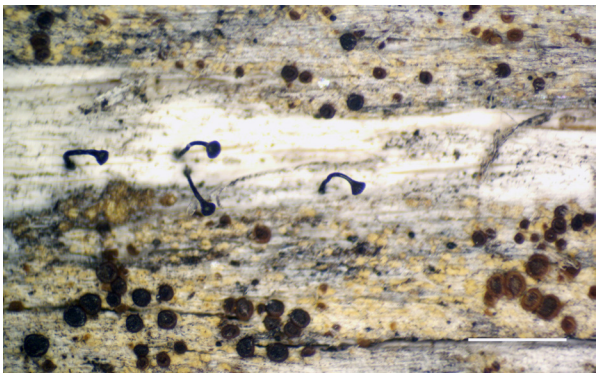
Myochroidea rufofusca (Anzi) Printzen, T. Sprib. & Tønsberg – ABLA (1), MEFE (1), TSME (1), VAME (1) from 1607 to 1808 m and all from TSME series habitat types. Stand ages for the three plots on which these four collections were made are 103, 127 and 133 years. All three plots are in the St. Joe River drainage in Shoshone County.



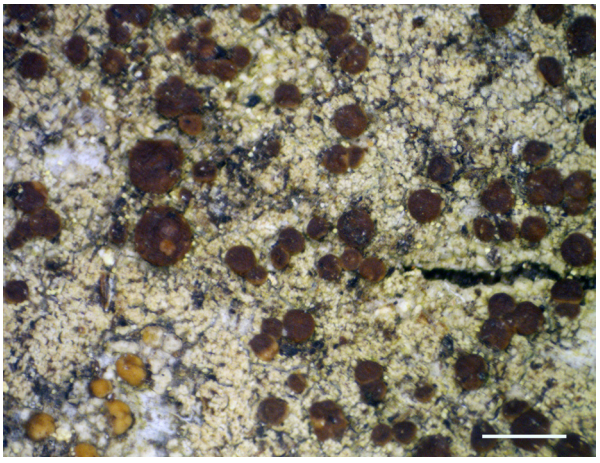
Myochroidea rufofusca on the bark of a dead *Abies lasiocarpa* sapling bent horizontal by snow, thus only 30 cm above the ground, *1029*.



Mycoblastus sanguinarius on *Pseudotsuga menziesii* bark, Bonner County, Idaho, *181*. Note the red color below the hypothecium in the cut apothecia in the upper right.



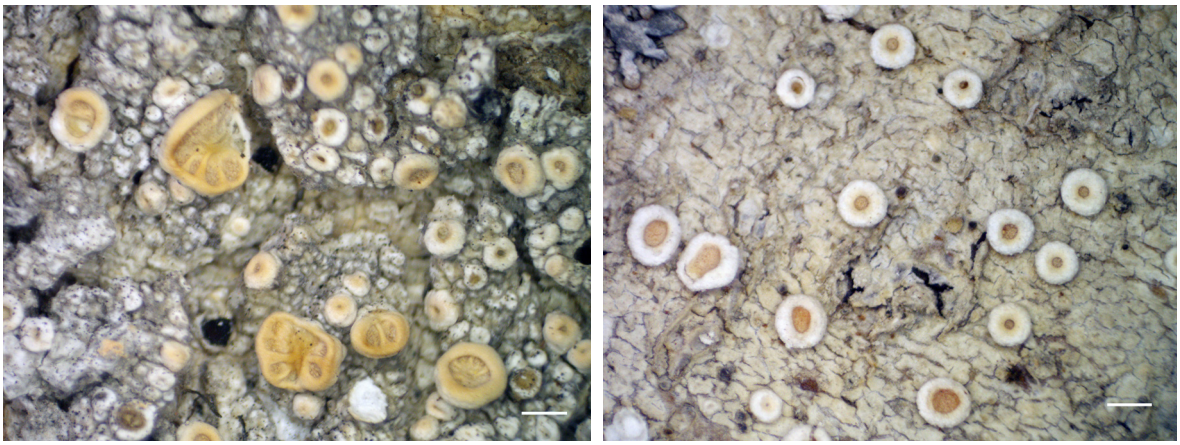
Mycocalicium subtile stalks surrounded by *Lecanora anopta* on wood of a 75-cm-diameter *Tsuga mertensiana* in the Mallard Larkins Pioneer Area, Shosone Co., *1400*.



Myochroidea porphyrospoda on the bark shell of a rotted log about 3 cm above ground level, *1316*. *Biatora flavopunctata* is visible in the lower left.

Ochrolechia A. Massal. – I concentrated on this genus at the beginning of this study, which partially accounts for the large numbers of collections. During this study I also became interested in lichenicolous fungi, which seemed particularly frequent on *Ochrolechia* and *Pertusaria* s. lat. It was in search of these fungi that I continued to collect *Ochrolechia,* especially when dark brown or black spots were noticed on the thalli (see Section 4). Based on some of the literature (Brodo 1991; McCune et al. 2014) I would have expected this many collections to yield some other corticolous *Ochrolechia* species. In particular, I thought I might find *O. oregonensis* and *O. trochophora* var. *pruinirosella*. Brodo (1991) mentioned two Idaho records of the latter from the edges of my study area. I thought I might have collected this a few times, but specimens were sent to Dr. Brodo and identified as other species. Brodo also reported two *O. oregonensis* from northern Idaho, but as far as I can tell I did not find this species. McCune et al. (2014) mentioned that *O. laevigata* and *O. subpallescens*, common west of the Cascades, should be sought in northern Idaho and western Montana. I found a few that I thought might be candidates for *O. subpallescens,* but these were examined by either Brodo or McCune and identifed otherwise. I have looked in the *Alnus rubra* forests in the North Fork of the Clearwater but have not yet found anything resembling *O. laevigata*. But those forests appear so like the forests west of the Cascades where *O. laevigata* is common that they deserve a more thorough search.

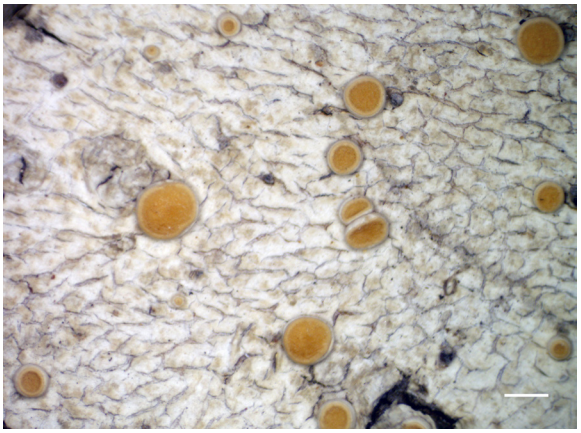
Ochrolechia gowardii Brodo – ABGR (7), ABLA (3), ACGL (2), PICO (1), PIMO3 (2), PIPO (1), PRVI (1), PSME (4), THPL (2) from 848 to 1571 m from a wide range of forest and habitat types. Stand ages ranged from 26 to 107 years. The collection from *Prunus virginiana* was from 853 m in Benewah County and called *O.* cf. *gowardii* by Dr. Brodo due to C+pink spots on the thallus. The thallus should be C- (Brodo 1991). Another unusual collection came from Avery Creek in the St. Joe on *Acer glabrum* at 1098 m. This one had the C+R disk and C- margins of *O. juvenalis* but lacked fatty acids. Brodo tentatively called it *O. gowardii,* but it was esorediate and double-margined. This species usually shows a mix of soralia and apothecia but often on different parts of the thallus, so collect the whole thallus. It is common on conifers at mid to subalpine elevations.



Ochrolechia juvenalis. Left: unusual form with rosulate apothecia and prominent excipular rings, on *Pseudotsuga menziesii* bark, *881*. Right: more typical form with persistently small disks and so appearing young, hence the name (Brodo 1991), on *Abies grandis* bark, *1253*.

Ochrolechia juvenalis Brodo – ABGR (10), ABLA (1), ACGL (2), LAOC (2), PIEN (1), PIMO3 (1), PIPO (1), PSME (10), THPL (7), TSHE (2) from elevations 773 to 1654 m with only 26 of the 37 collections below 1219 m, suggesting a slightly higher elevational distribution than *O. montana*. It was found in a wide range of habitat types, and stand ages spanned almost the full range for the project, from 18 to 268 years. This species is common on conifer boles and twigs but also found on tall shrubs. It seems more prevalent on rougher conifer bark, especially of *Pseudotsuga menziesii*, than *O. montana*.

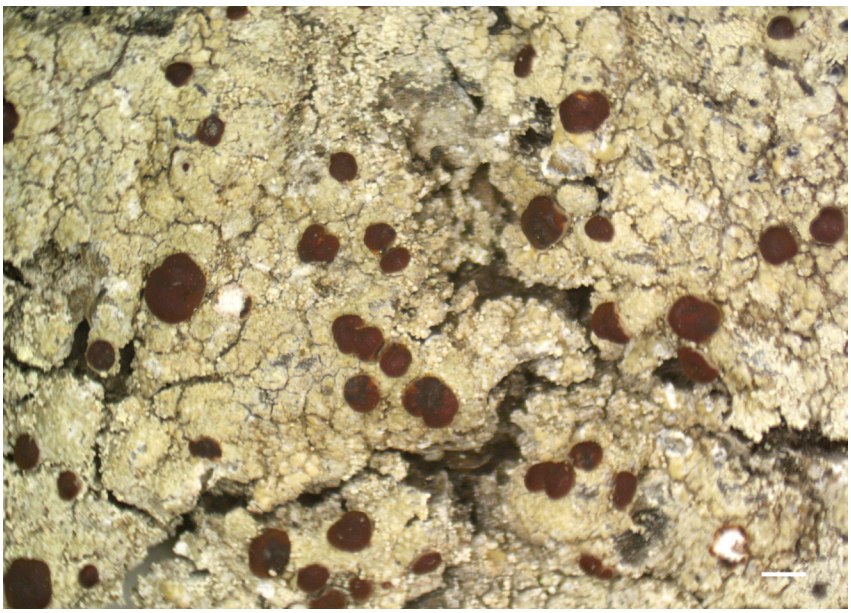
Ochrolechia montana Brodo – ABGR (17), ABLA (3), ACGL (12), ALINT (3), AMAL2 (6), FRPU7 (1), MEFE (1), PIMO3 (2), PREM (1), PRVI (1), PSME (3), THPL (6) from 678 to 1571 m, with 46 of 56 collections from below 1219 m. This lichen was more often found on smooth bark than *O. gowardii* and *O. juvenalis*. Not only is this noticeable in its increased abundance on the smooth-barked tall shrubs such as *Acer glabrum* and *Amelanchier alnifolia*, but even among the conifer collections, this species seemed to favor *Abies* over *Pseudotsuga*. These trees are both very common but *Abies grandis* has smooth bark and that of *Pseudotsuga* is rough except for young stems and branches. In contrast *O. juvenalis* was found at the same frequency on *Abies grandis* and *Pseudotsuga* and much less frequently on tall shrubs.



Ochrolechia montana on *Abies grandis* bark, *1252*. This specimen has particularly well-developed excipular rings.

Ochrolechia szatalaënsis on *Alnus rubra* bark above the Dworshak Reservoir, *1643*. The apothecial disks of this species are usually more pruinose than in this specimen.

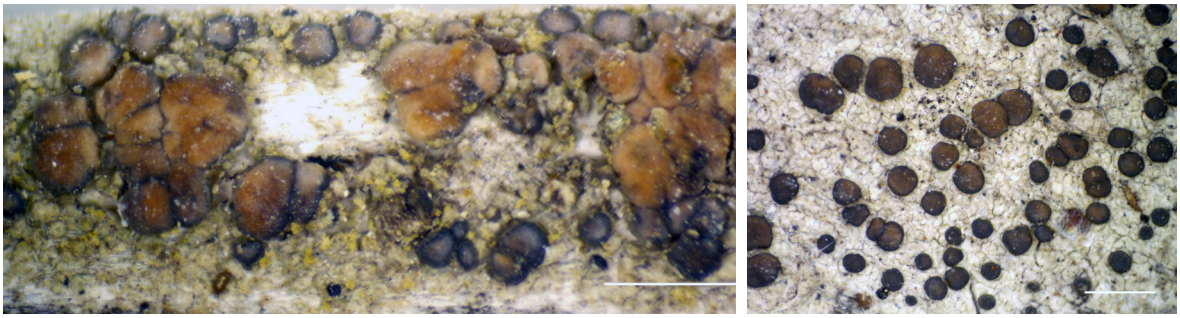
Ochrolechia szatalaënsis Verseghy – ABGR (2), ACGL (8), ALINT (1), AMAL2 (1), HODI (1), PHCA11 (1), THPL (2) from 785 to 1228 m, with two collections from the ABGR series and all others from the THPL or TSHE series. It is fairly common on tall shrubs, especially maple, but also conifers. The pruinose disks make it recognizable in the field but verification requires a C test on an apothecial section. This is the only local corticolous *Ochrolechia* in which no part of the apothecium turns red in C (no gyrophoric or lecanoric acids, see Table 2 in Brodo 1991). Besides its affinity for maple bark, it is often found, at least in northern Idaho, on the wood and bark of small twigs of *Thuja plicata*. The two *Thuja* collections mentioned here were from small twig bark.



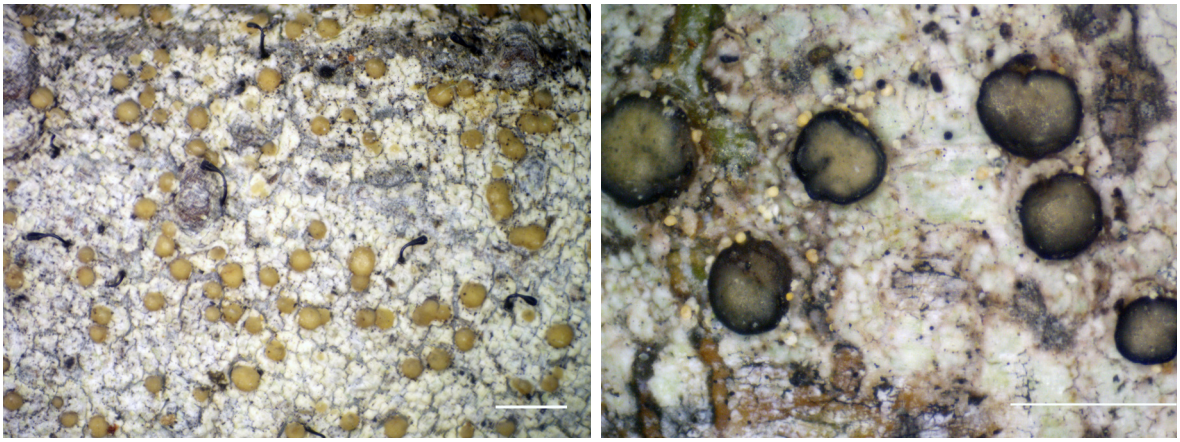
Ophioparma rubricosa on *Pseudotsuga menziesii* bark, *793*.

Ophioparma rubricosa (Müll. Arg.) S. Ekman – PSME (4) from elevations 817 to 1059 m. It was found three times in ABGR series habitats and once in TSHE/CLUN2-CLUN2. All four forests were dominated by *Pseudotsuga menziesii* and stand ages ranged from 54 to 109 years. This species is often found on wood of logs and snags but is also fairly common on the bases and boles of large conifers, especially *Pseudotsuga*.

Palicella schizochromatica (Pérez-Ortega, T. Sprib. & Printzen) Rodr. Flakus & Printzen – ABGR (3), ABLA (4), AMAL2 (1), PIEN (1), PICO (1), PIPO (1), TSME (3) from 817 to 2305 m, across a wide range of habitat types. Found in all forested habitats but most common in more open forests. The distinctive apothecia have disks bicolored blackish and beige with a dark margin. In exposed situations the apothecia can be almost black but usually a hint of the beige coloring is still evident on some apothecial disks (see Pérez-Ortega et al. 2010). Small thalli of this species are commonly found while scanning conifer twigs with a hand lens. It is frequently found with *Lecanora circumborealis*.

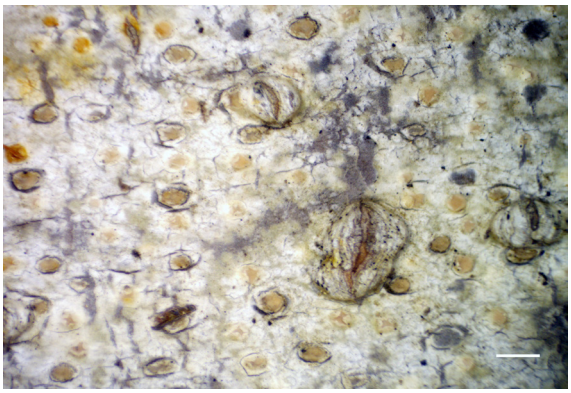


Palicella schizochromatica. Left: on wood of a *Pseudotsuga menziesii* twig, *683A*. Right: on *Abies grandis* bark, *781*. This is a variable species but these are typical looks. They are also commonly all dark and can have excluded margins and convex apothecia looking like *Lecanora fuscescens,* which is commonly found alongside this species in open subalpine habitats.



Palicella schizochromatica. Left: a pale version on *Abies amabilis* in Whatcom County, Washington, *2687*. Note the *Stenocybe major* stalks. Right: another color variation for *Palicella schizochromatica*, this one on *Acer circinatum* from Chelan County, Washington, *2919*.

Pertusaria carneopallida (Nyl.) Anzi – ABGR (3), ABLA (1), ALVIS (1), MEFE (1), PAMY (1), TABR2 (1), VAME (3), from 817 to 1448 m with one collection from 1808 m, from a range of habitat types with most in the THPL or TSHE series. This species is fairly common on a variety of shrubs but is also found on conifers. In the field, to the naked eye, it can resemble *Lecanora salicicola* and both can be common on *Alnus viridis* ssp. *sinuata*. But a close look at *Pertusaria* reveals the erumpent apothecia. This species is also fairly common on the bases of ericaceous shrubs, often with a few thalli scattered within the more common *Biatora flavopunctata*, *B. meiocarpa* and *Caloplaca sorocarpa*. See also *Lichenostigma alpinum* in Section 4.

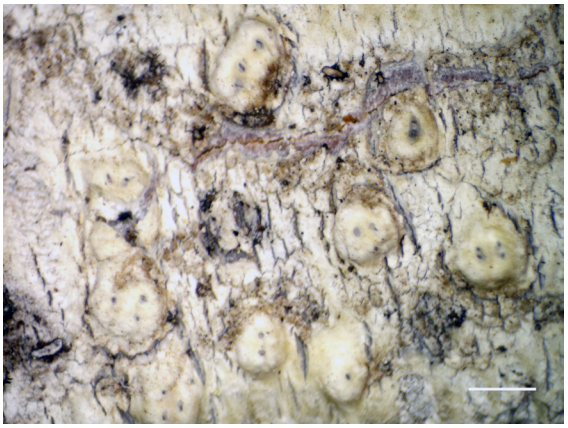


Pertusaria carneopallida on *Alnus rubra* bark, Whatcom County, Washington, *2679*.

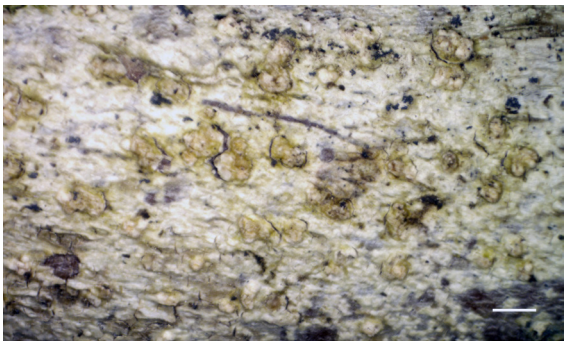
Pertusaria leioplaca DC. – SOSC2 (1), 853 m, THPL/ASCA2-ASCA2 on the south side of St. Maries above the St. Maries River, Benewah County. This plot was dominated by *Pseudotsuga menziesii* with a stand age of 70 years. This species was reported from the Lochsa Valley, Idaho County as *Pertusaria leucostoma* (McCune et al. 2014). In northern Idaho it is most frequent on tall shrubs in low elevation, mesic forests in the North Fork of the Clearwater.

Pertusaria mccroryae C. R. Björk, Goward & T. Sprib. – MEFE (1), 1015 m, THPL/ASCA2-ASCA2, dominated by *Abies grandis* with a stand age of 90 years. This plot is east of Pierce along Rhodes Creek, Clearwater County. This is a unique substrate for this species. Off-plot I have found it only on conifer wood. Spribille et al. (2010), in describing this species, reported it from conifer bark and conifer and *Betula* wood.

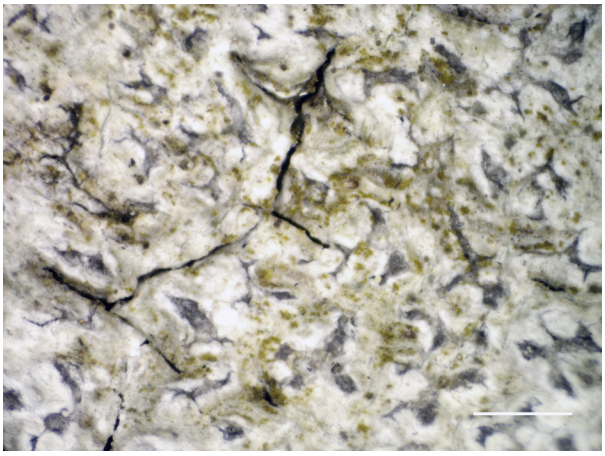
Pertusaria nigristella T. Wheeler & T. Sprib. ined. – PHLE4 (1), 782 m, in ABGR/PHMA5-PHMA5 habitat type dominate by *Pseudotsuga* with a stand age of 69 years. Despite not being in one of the more mesic habitat types, this site was very lichen rich, with *Lobaria anthraspis* and *L. pulmonaria* common. This plot, in western Clearwater County, was on rocky soil, which may account for the lack of *Thuja* and *Tsuga*. This species is not yet formally described but species details were included by McCune (2017b). Its K+ violet spores are unique among the local *Pertusaria*.



Pertusaria leioplaca on bark of a 10-cm-diameter *Amelanchier alnifolia* along Big Creek, in the St. Joe Drainage, *2280*.



Pertusaria mccroryae on *Menziesia ferruginea* bark, *2491*.

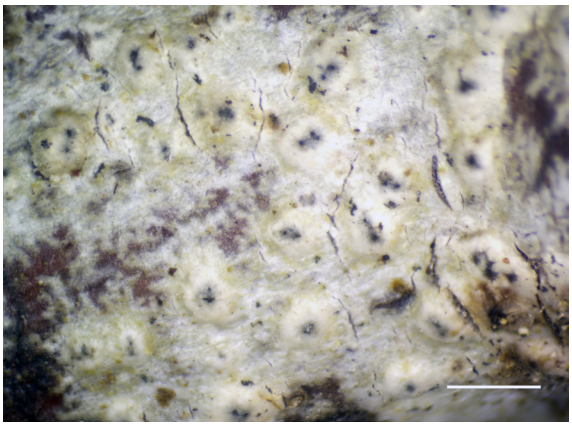


Pertusaria nigristella. Left: on bark flake of *Quercus garryana*, Whatcom County, Washington, *3097*. Right: *Pertusaria nigristella* spore in KOH, *1450*.

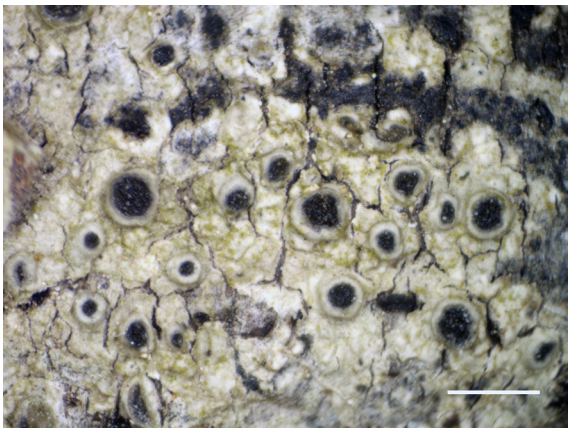
Pertusaria sommerfeltii (Flörke ex Sommerf.) Fr. – MEFE (2), VAME (2), from 773 to 970 m, with stand ages from 67 to 125 years. All collections are from low elevations in western Clearwater County. Three were in THPL series habitat types, the other was in an ABGR/ASCA2-ASCA2 type due to a lack of *Thuja* regeneration, although the shells of large *Thuja* logs were still evident. From this study it would appear that, in northern Idaho, this species favors the ericaceous shrubs that encroach into lower elevation, mesic forests. I have collected this species off-plot two other times in northern Idaho and both were from mesic forests in this part of Clearwater County. However, both of those off-plot collections were even lower (524 and 564 m) and both were on *Acer glabrum*.

Pertusaria stenhammarii Hellbom – ABGR (3), ABLA (2), ACGL (3), PIEN (1), PIMO3 (2), SOSC2 (1), THPL (2), TSME (1) from 850 to 1749 m, in various habitat and forest types. Stand ages ranged from 18 to 140 years. Small thalli of this species were often found while scanning other crusts on conifer twigs, but more extensive thalli were also found on conifer boles. The expanded disks and sloping sides of the apothecia make this species recognizable in the field. And large thick-walled spores, 2 per ascus, and a K+ violet epithecium make it even more distinctive microscopically. This species was most often found on smooth bark.

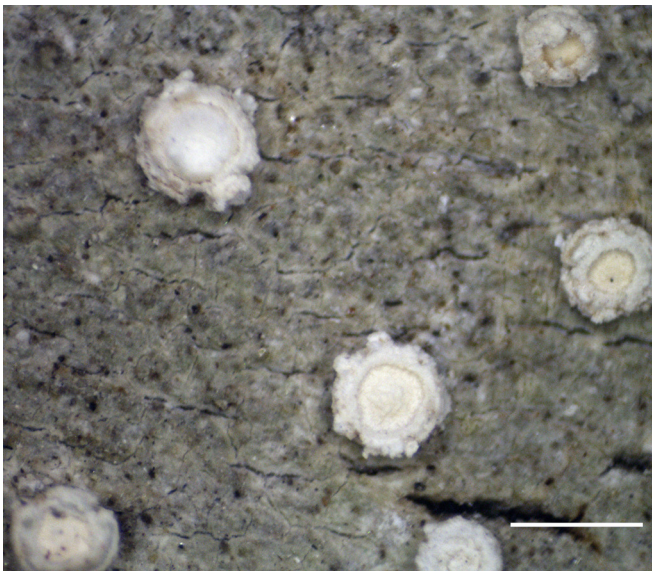
Pertusaria subambigens Dibben – ABGR (2), at 773 m in the ABGR/PHMA5-COOC habitat type with a stand age of 55 years and at 992 m in THPL/CLUN2-CLUN2 habitat type with a stand age of 86 years. Both collections were close to the Dworshak Reservoir in the North Fork of the Clearwater, Clearwater County. This species is abundant on the west side of the Cascades, but in northern Idaho I have found it only at low elevations in the North Fork of the Clearwater, where it is common.



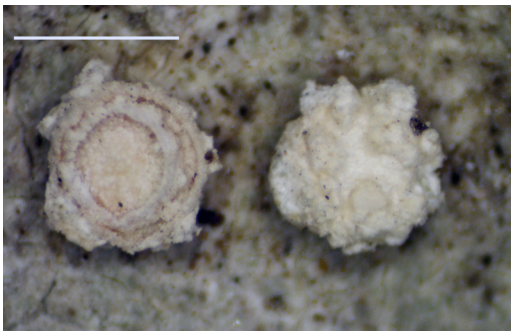
Pertusaria sommerfeltii on *Vaccinium membranaceum* bark, *1637*.



Pertusaria stenhammarii on a *Tsuga mertensiana* twig, *1005*.



Pertusaria subambigens on *Pseudotsuga menziesii* bark, *1404*.



Two *Pertusaria subambigens* apothecia, *1404*. The apothecium on the left shows the "stack of plates" look described by McCune (2017b). The one on the right recalls *Lepra ophthalmiza* (but is P+ orange and has 8 spores per ascus).

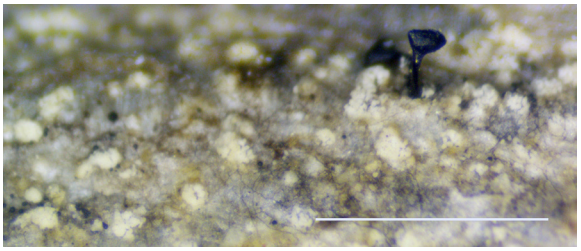
Phaeocalicium compressulum (Nyl. ex Vainio) A. F. W. Schmidt – ALVIS (7), from 902 to 1613 m. I found this species wherever I've searched small twigs of *Alnus viridis* ssp. *sinuata*. Unfortunately, I was not aware of this species and did not look on fine twigs of its host until the final year of this project. Most of the plots I visited during that time were in Shoshone County.

Phaeocalicium* cf. *interruptum (Nyl.) Tibell – SOSC2 (3), 1335, 1565 and 1680 m, all from open subalpine forests dominated by *Picea engelmannii* and *Abies lasiocarpa* for two plots and *Tsuga mertensiana* for the other. All these plots contained large clumps of *Sorbus scopulina* on which this species was found. All three of these plots were in the higher country between the St. Joe and North Fork of the Clearwater River. I have also found this same species in Chelan and Whatcom Counties in northern Washington, always on *Sorbus*. Steve Selva inspected one of the Idaho specimens and found it to be similar to *P. interruptum* and *P. boreale* but noted that he did not see the proper K reactions in the stalks to confirm it as either of these species. Hardman et al. (2017) recently reported the first North American record of *P. interruptum.* Their collection was from *Sorbus sitchensis* in southwestern Washington. The first North American record of *P. boreale* was reported from the far northeastern corner of Montana on *Salix* bark (McCune et al. 2014).

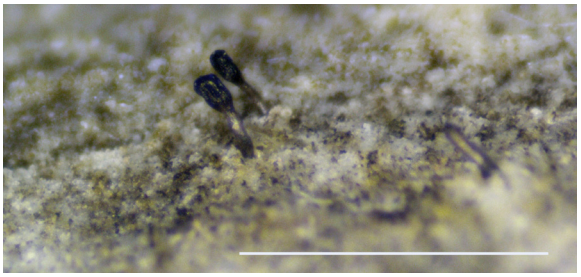
Phaeocalicium populneum (Brond. ex Duby) A. F. W. Schmidt – POBAT (1), 855 m, in a pasture with patches of cottonwood and conifers. This nonlichenized calicioid fungus is common on the small twigs of cottonwood throughout northern Idaho. However, cottonwood only occurred on one inventory plot that I visited while collecting for this project.

Phlyctis argena (Sprengel) Flotow – ABGR (2), ACGL (6), AMAL2 (2), HODI (1), PHCA11 (1), PSME (1), TABR2 (1), THPL (2), VAME (1) from 626 to 1401 m, with most records from the THPL and TSHE series but two from the ABGR and one from the PSME series. Stand ages ranged from 22 to 137 years. This species is common on the smooth bark of tall shrubs at low to mid elevations. It is also fairly common on smooth-barked conifers, especially *Abies grandis*. The collection from *Pseudotsuga* was from smooth bark on the underside of a small branch.

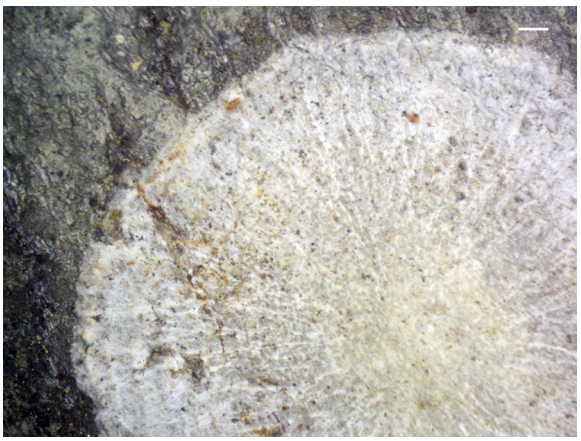
Phlyctis speirea G. Merr. – ABGR (2), ABLA (1), ACGL (1), ALINT (1), THPL (1) from 855 to 1158 m and with stand ages between 26 and 91 years. The collection from *Abies lasiocarpa* was an outlier at 1559 m and a stand age of 187 years. All were in the THPL or TSHE series except one from the ABGR series of habitat types. In the northern Idaho specimens I found, the black disks of the apothecia are usually apparent through the pruina and stand out on the white thallus, making them recognizable in the field. Five of these collections were from the bole of the phorophyte, but the high elevation outlier was on an *Abies lasiocarpa* twig.



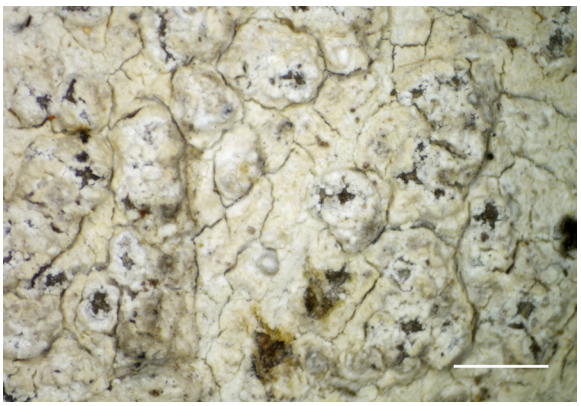
Phaeocalicium compressulum stalk surrounded by *Biatora vacciniicola* soralia on an *Alnus viridis* twig, *2091*.



Phaeocalicium populneum from a fallen *Populus trichocarpa* branch, Whatcom County, Washington, *1634*.



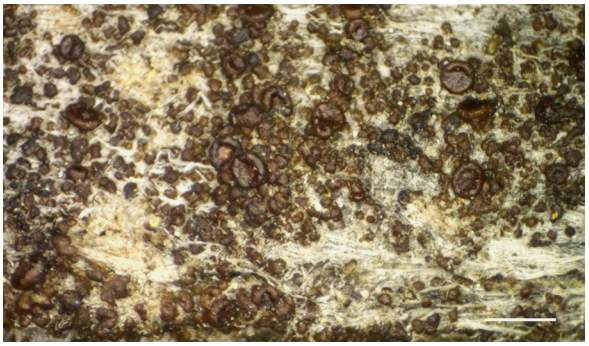
Phlyctis argena on *Acer glabrum*, *1293*.



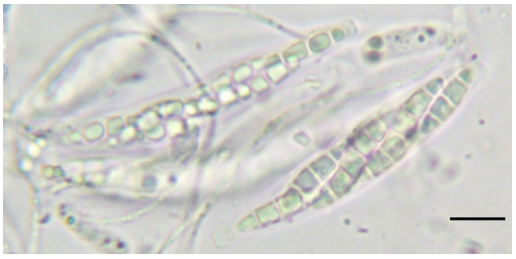
Phlyctis speirea on *Alnus rubra* bark, *674*.

Protoparmelia ochrococca (Nyl.) P. M. Jørg., Rambold & Hertel – ABGR (1), ABLA (1), PSME (2), THPL (2) from 919 to 1519 m. These collections were from a wide range of habitat and forest types and stand ages. I do not have a good idea of where to search for this species, but it seems, at least, to prefer conifer bark.

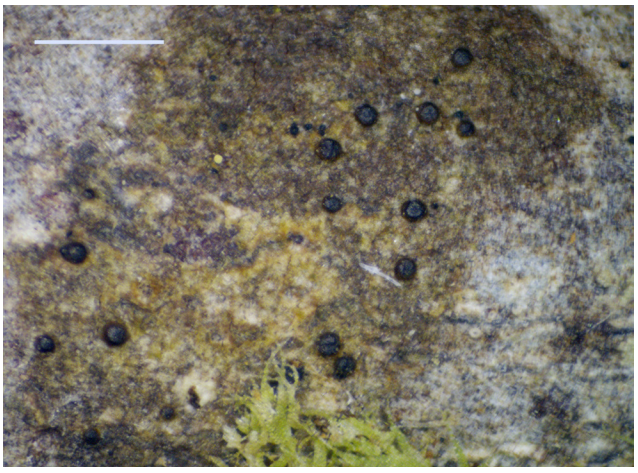
Pseudosagedia aenea (Wallr.) Hafellner & Kalb – VAME (2). Both records are from Clearwater County, one from 785 m in THPL/CLUN2-TABR2 habitat dominated by *Thuja* with a stand age of 125 years. The other is from 1315 m in THPL/ATFI-ATFI dominated by *Abies grandis* with a stand age of 66 years. This species was recently reported as new to inland forests by Haldeman (2018). My only Idaho observations have been in Clearwater County, but this species is easy to overlook.



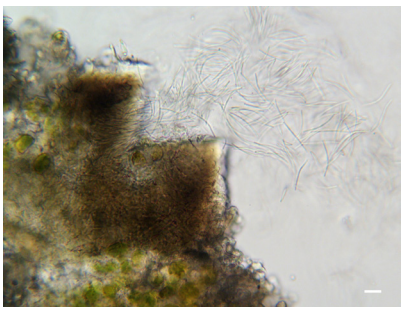
Protoparmelia ochrococca on the bark of a *Thuja plicata* bole, *2178*.

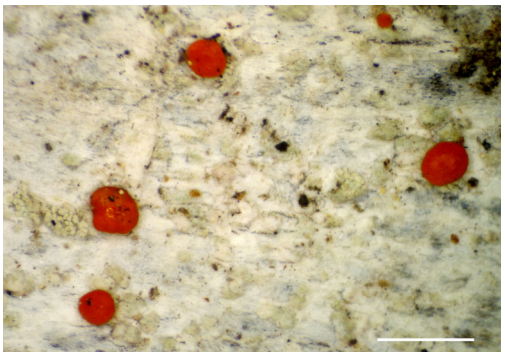


Pseudosagedia aenea asci, *1861B*. The spores differ from those of *Arthopyrenia plumbaria* by having 3 definite septa and being more attenuated.



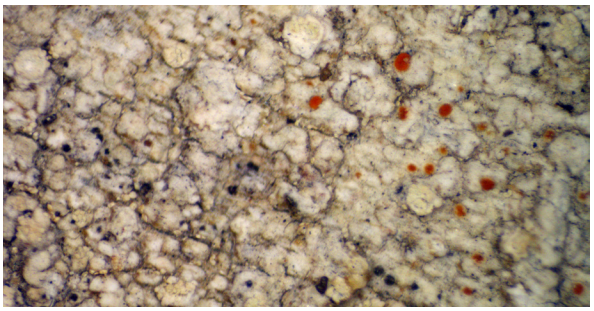
Pseudosagedia aenea on *Vaccinium membranaceum* from Whatcom County, Washington, *1861B*. The liverwort *Ptilidium californicum* at the bottom of the photo is common in northern Idaho.



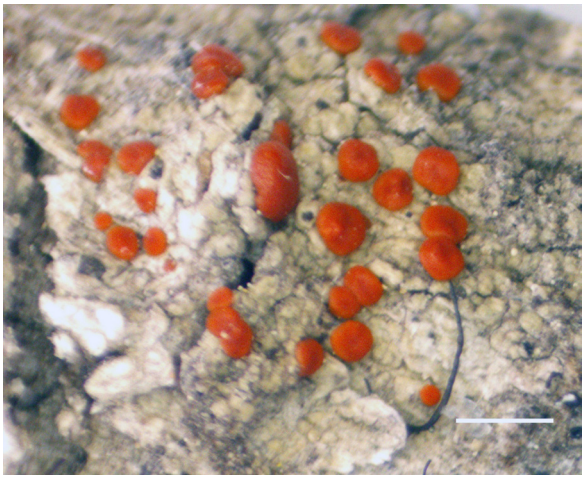


Ramboldia cinnabarina. Right: showing three modes of reproduction: red apothecia, whitish soredia and black pycnidia; on *Abies lasiocarpa* bark, *1340A*. Top: pycnidium under compound scope with long, thin conidia emerging, *1340A*. Above: typical look on smooth bark of an *Abies lasiocarpa* bole, *2366B*.

Ramboldia cinnabarina (Sommerf.) Kalb, Lumbsch & Elix – ABGR (2), ABLA (7), PSME (1), TSME (1). Eight of the eleven records fall between 1497 and 1745 m with lower records from 992, 1128 and 1171 m. This species can be abundant on smooth bark of *Abies lasiocarpa* boles in subalpine forests. It is often sterile and appears as a thin white coating, often covering large areas of the boles. With a hand lens one can pick out the white soralia and by scanning enough surface a few of the bright red apothecia can usually be found.

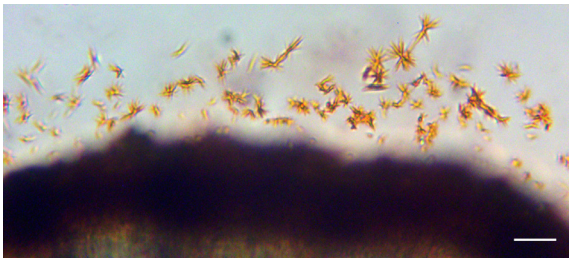


Ramboldia gowardiana (T. Sprib. & Hauck) Kalb, Lumbsch & Elix – ABGR (1), PICO (1), PIPO (1), PSME (2) from 773 to 1448 m. All collections were from ABGR series habitats except one from an ABLA habitat type. The small thalli with densely crowded red apothecia are fairly common on conifer twigs, especially *Pinus* twigs. It is more common in open, drier conifer forests but also present in wetter forests. The larger, densely clustered apothecia and lack of soredia make it easy to separate from *R. cinnabarina* (Spribille and Hauck 2003).

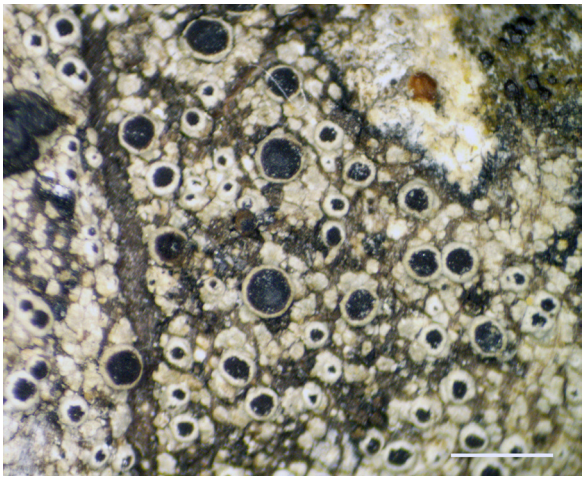


Ramboldia gowardiana on a *Pinus ponderosa* twig, *1264A*.

Rinodina capensis Hampe – ABGR (2), ACGL (3), AMAL2 (2), HODI (4), THPL (4), VAME (1) from 618 to 1165 m and from a wide range of habitat types and stand ages. This includes all of those that were identified as *R. aurantiaca,* which is now considered a synonym of *R. capensis* (Sheard 2018). This species is common on the smooth bark of tall shrubs but also found on smooth conifer bark, especially twigs.

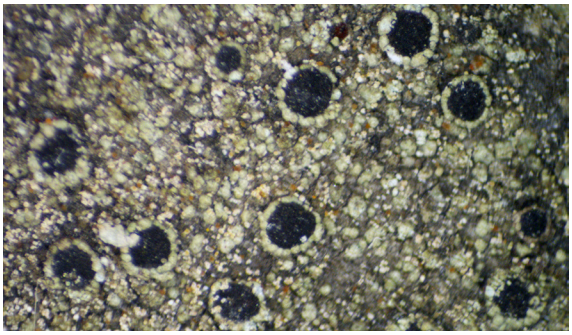


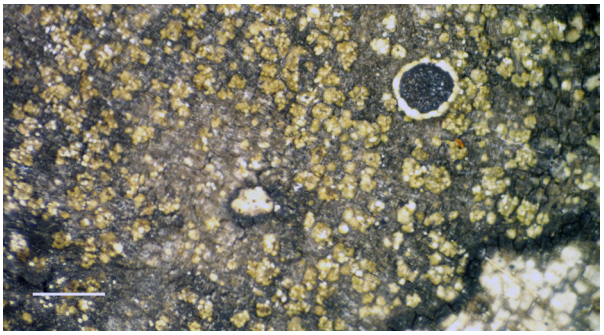
Rinodina capensis, orange pannarin crystals above the epithecium developed a few minutes after application of PD reagent, *684* (confirmed by J. Sheard). These crystals were formerly used to differentiate *R. aurantiaca* (with pannarin) from *R. capensis* (without), but now all are considered *R. capensis* (Sheard 2018).



Rinodina capensis on a *Thuja plicata* twig, *911*.

Rinodina disjuncta Sheard & Tønsberg – ABGR (6), ACGL (3), AMAL2 (2), MEFE (1), PIMO3 (1), PRVI (1), VAME (1) from 626 to 1244 m with 9 of the 15 records below 853 m. Habitat types varied, but 8 of the 15 records are from low elevations near the North Fork of the Clearwater where this species is common. *Rinodina disjuncta* in this area is often sterile, but there are usually one to a few apothecia. The soralia glow white under longwave UV light, but this can be difficult to see because they are small. Based on these collections it prefers smooth bark, although the small soralia would be difficult to spot on more textured bark.





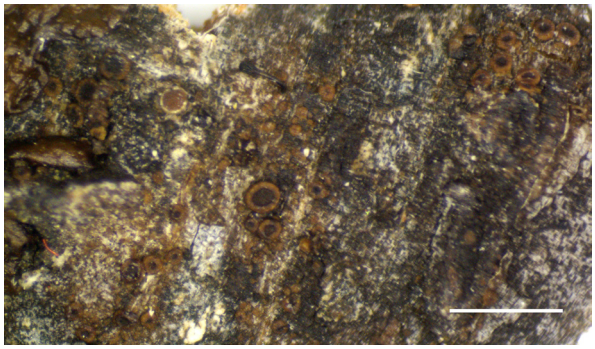
Rinodina disjuncta. Left: abundantly fertile on *Acer glabrum* bark, *2637*. Right: this *Acer glabrum* bark has more typical *Rinodina disjuncta* with a single apothecium among the soralia, *2472*. *Buellia griseovirens* can be seen in the lower right corner.

Rinodina freyi H. Magn. – ABGR (2), AMAL2 (1), CRDO2 (1), HODI (1), PIEN (1), SHCA (1), THPL (1) from 618 to 1364 m with one collection from 2305 m on a *Picea engelmannii* twig. Habitat and forest types and stand ages were particularly variable. The small thalli with crowded apothecia are common on small twigs of tall shrubs, especially at old leaf scars and branch axils (Sheard 2010).

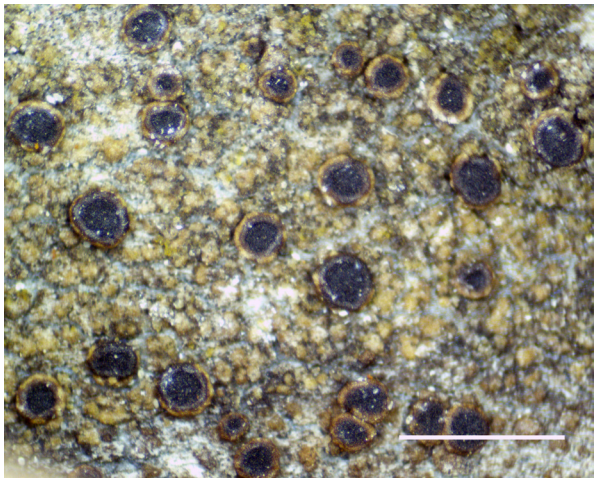
Rinodina laevigata (Ach.) Malme – CESA (1), THPL (1), at 922 m in THPL/ASCA2-ASCA2 and 992 m in THPL/CLUN2-CLUN2 habitat types, respectively. The specimen on *Ceanothus* was with *Lecanora pulicaris* and *Lecidella elaeochroma*; the specimen on *Thuja* was on a twig with *Caloplaca atrosanguinea*.

Rinodina orculata Poelt & M. Steiner – ABLA (1), ACGL (4), ALINT (2), ALVIS (1), AMAL2 (1), HODI (2), MAAQ2 (1), PAMY (1), PSME (1), SOSC2 (1), SYAL (1), VAME (2) from 695 to 1561 m from a wide range of habitat and forest types. Stand ages ranged from 30 to 164 years. In northern Idaho this is the most common corticolous *Rinodina* that lacks atranorin in the cortex (K-). It has a prominent, glossy excipular ring noticeable with a hand lens. It is a common component of the tall shrub lichen community and can cover large patches of smooth shrub bark. The second most common brown (K-), corticolous *Rinodina* is *R. freyi,* which forms small patches usually near branch scars.

Rinodina orculata on *Vaccinium membranaceum* bark, *1617*.



Typical of *Rinodina freyi* are these small thalli clustered around branch scars on small twigs, *644*. This *Populus trichocarpa* twig also has a stalk of *Phaeocalicium populneum* in the top center.



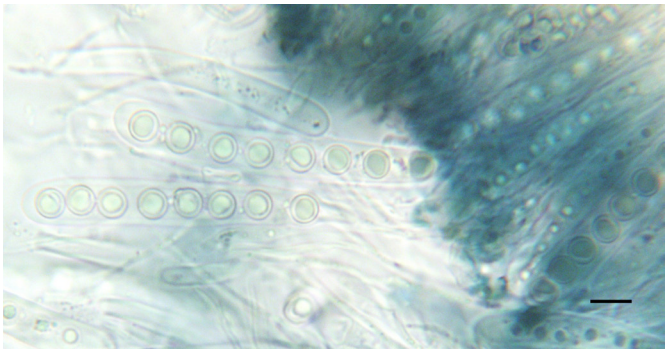
Rinodina orculata with prominent excipular rings on an *Alnus incana* branch, *858*.

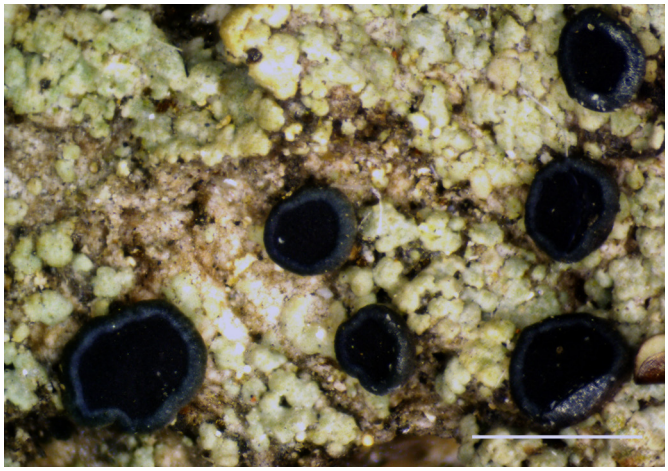
Rinodina pyrina (Ach.) Arnold – PHMA5 (1) at 899 m, in PSME/PHMA5-PHMA5 habitat type dominated by *Pinus ponderosa* with a stand age of 37 years. This plot was in flat woods of *Pinus contorta* and *P. ponderosa* south of Helmer in Latah County.

Rinodina trevisanii (Hepp) Körber - VAME (1), 848 m in TSHE/CLUN2-CLUN2 habitat type, *Pseudotsuga* dominated, with a stand age of 129 years, from a north-facing slope above Breakfast Creek in the North Fork of the Clearwater drainage. This is one of three collections of this species recently reported from Clearwater County as new to Idaho, all identified by Sheard (Haldeman 2018; Sheard 2018).

Sarea resinae (Fr.) Kuntze – PSME (1) at 785 m in THPL/CLUN2-CLUN2 habitat type with stand age of 125 years. This nonlichenized fungus was found once on resin on *Pseudotsuga menziesii* bark in the northwestern corner of Clearwater County in a *Thuja* forest along Cedar Creek.

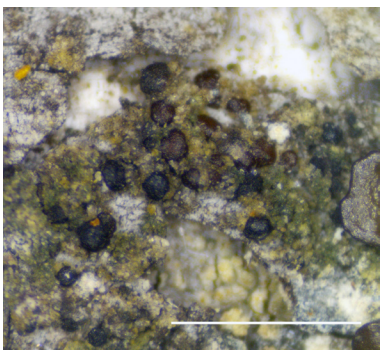
Schaereria dolodes (Nyl.) Schmull & T. Sprib. – PSME (3) from 626, 782 and 919 m from habitat types in the PSME, ABGR and TSHE series. All three plots were dominated by *Pseudotsuga menziesii* with stand ages of 59, 69 and 90 years. Two collections are from western Clearwater County and one from the North Fork of the Coeur d'Alene in Shoshone County. This species prefers *Pseudotsuga* bark in low-elevation forests (Schmull and Spribille 2005). It can look like *Lopadium disciforme* in the field, but the spores are very different.

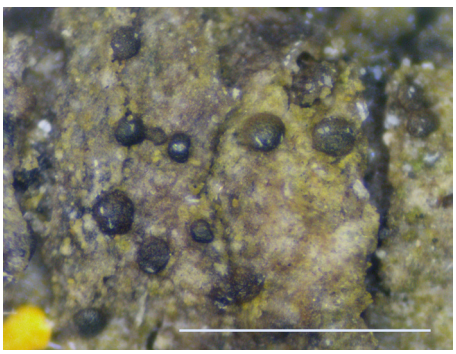




Schaereria dolodes. Top: spores of *Schaereria dolodes* are uniseriate, small and spherical, 1448. *Lopadium disciforme* has a similar thallus and substipitate apothecia, but only one enormous muriform spore per ascus. Left: on bark of a large *Pseudotsuga menziesii*, *1448*. Above: this *Schaereria dolodes* from *Pseudotsuga menziesii* bark has a greenish thallus and the apothecia margins have a bluish tone, *1800A.*

Scoliciosporum umbrinum (Ach.) Arnold – ABGR (2), AMAL2 (1), HODI (3), PSME (1). Elevations range from 618 to 1019 m in a variety of habitat and forest types. Three of the collections are from different phorophytes on the same plot on the edge of Bonners Ferry. The other collections are also relatively close to towns or major roads; stand ages range from 35 to 59 years. One record from Bonner County was on needles as well as twigs of *Abies grandis*. Lichens in this genus are tiny and easily overlooked, and most of these specimens were first noticed under the dissecting scope in collections of other species.



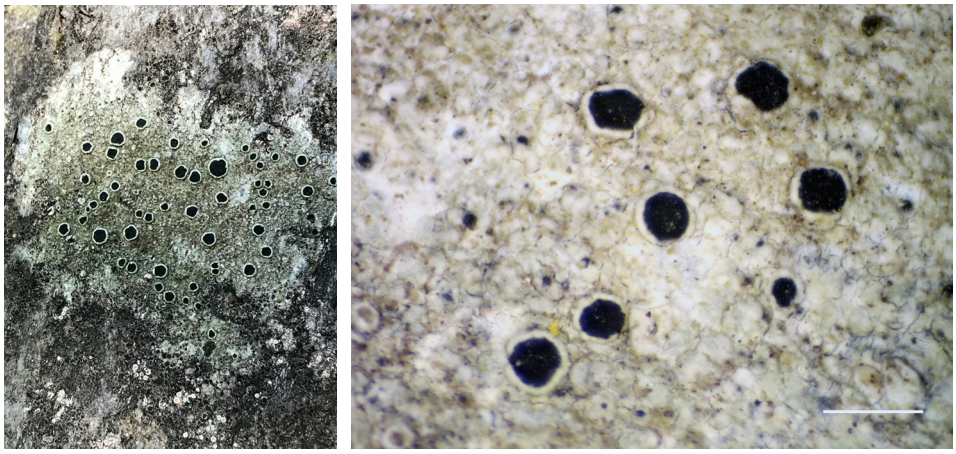


Scoliciosporum umbrinum. Left: on *Holodiscus discolor* bark, Benewah County, *661*. Center: coiled, septate spore, *661*. Right: on *Holodiscus discolor* twig, Clearwater County, *1798*.

Stenocybe major Nyl. ex Körber – ABGR (15), ABLA (2) from 782 to 1497 m, with three collections from the ABGR series and all others from THPL or TSHE series habitats. Stand ages were evenly distributed between 18 and 101 years with one collection from a 171-year-old stand. In northern Idaho this common nonlichenized fungus is strongly tied to *Abies grandis*. The few collections I made from *Abies lasiocarpa* consisted of only a few stalks with spores difficult to find. The small, well-spaced stalks were almost always noticed under the dissecting scope while looking over other crusts on smooth *Abies* bark. Selva and Tibell (1999) mentioned *S. major* "occurs on *Abies*, rarely *Thuja*." In Sanders County, Montana, only 2 km from the Idaho border *S. major* was reported from *Pinus monticola* (Hauck and Spribille 2002). In southern Washington it was reported from *Pseudotsuga*, *Thuja* and *Tsuga heterophylla,* as well as all four *Abies* species found there (Hardman et al. 2017).

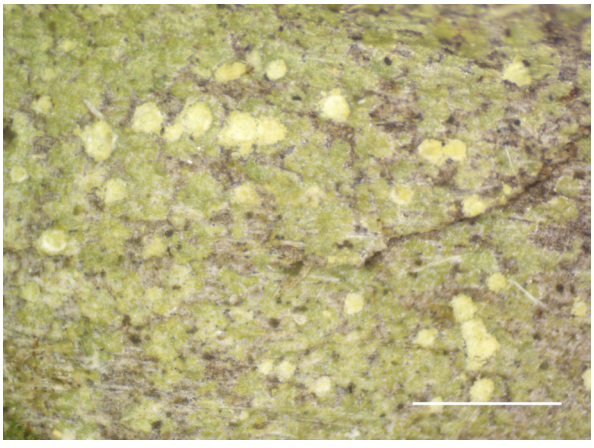
Stenocybe pullatula (Ach.) Stein – ALINT (5), 841 to 1043 m, in riparian areas within THPL series habitats. Like the preceding species *S. pullatula* is nonlichenized. The tiny branched stalks can be found by scanning twigs of *Alnus* with a hand lens. I have noticed this fungus only on *Alnus incana* in northern Idaho, but have seen it on *Alnus rubra* in western Washington. Hardman et al. (2017) reported it from *Alnus rubra* and *A. viridis* twigs in southern Washington. In northeastern North America Selva (2014) reported it from *Alnus incana* and *Sorbus americana.*

Tephromela sp. – ACGL (1), 1143 m, ABGR/CLUN2-PHMA5 habitat type, dominated by *Pseudotsuga*, with a stand age of 51 years. This plot is on the north side of the St. Joe River above Calder. This species has also been found off-plot at other locations in the Mud Cabin Creek area, as well as Hammond Creek farther up the St. Joe. All Idaho records are from the bark of *Acer glabrum*, particularly many-stemmed clumps with a few stems over 10 cm diameter. It looks very much like *Tephromela pacifica* from the west side of the Cascades but lacks violet in the hymenium.



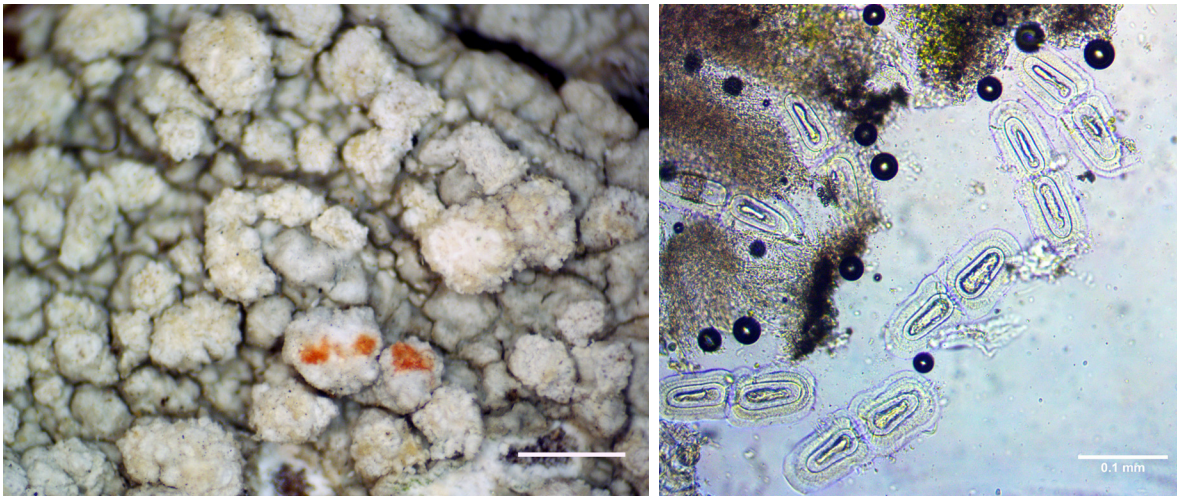
Tephromela sp. Left: on *Acer glabrum*, Shoshone County, *2399*. Right: on *Acer glabrum*, *2400*.

Trapelia corticola Coppins & P. James – THPL (1), 647 m, in the THPL/ATFI-ADAL habitat type and dominated by *Thuja*, with a stand age of 137 years. The plot is in Isabella Creek near the North Fork of the Clearwater. This species has only recently been reported from Idaho by Orange (2018).



Trapelia corticola on *Thuja plicata* bark, *2036A*.

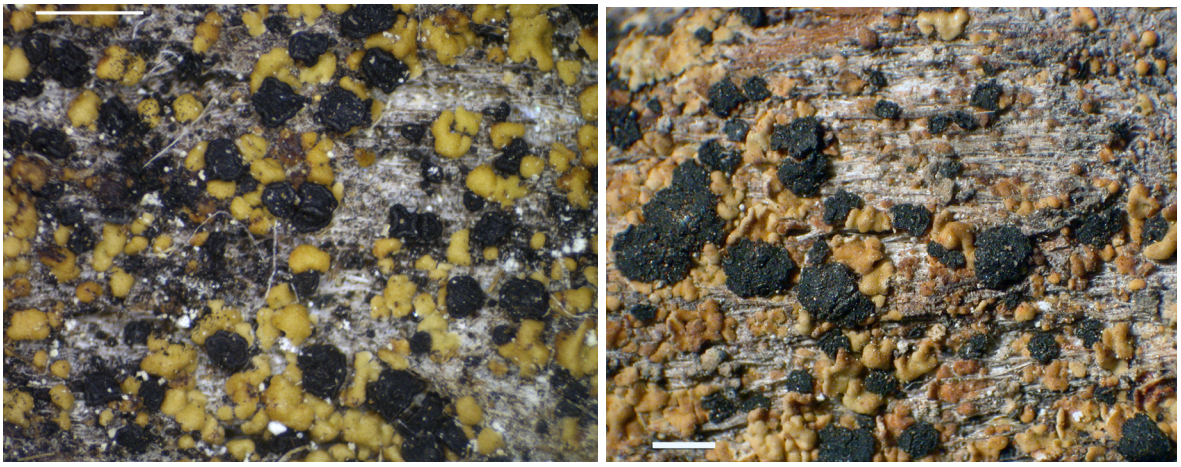
Varicellaria rhodocarpa (Körber) Th. Fr. – ABGR (3), ABLA (2), AMAL2 (1), BEPA (1), THPL (3) evenly distributed from 817 to 1571 m from a variety of habitat types, with stand ages from 44 to 164 years. The enormous two-celled spores routinely fragment and appear as large single-celled spores. The photo shows them before they break. In the field the pale thallus and soredia-covered apothecia can look like a *Lepra*, *Pertusaria* or *Phlyctis*, but the C+R apothecia, UV+Y thallus and the unique spores easily separate this species.



Varicellaria rhodocarpa. Left: from bark of twig of a 10-cm-diameter *Abies grandis*, *2059*. The red spot is from a tiny drop of bleach reacting with lecanoric acid (C+R). Right: large 2-celled spores of *Varicellaria rhodocarpa* in KOH, from *Amelanchier* bark, *1619*. These spores usually fragment at the septum but in this photo are all intact.

Violella fucata (Stirton) T. Sprib. – ACGL (1), 1098 m, in the TSHE/CLUN2-CLUN2 habitat type, dominated by *Pseudotsuga*, with a stand age of 66 years. This plot is north of Avery in the St. Joe River drainage, Shoshone County. This was a particularly brushy plot in which many of the overstory trees had fallen due to root disease. See also *Buellia griseovirens*. This is the first record of *Violella fucata* for the Rocky Mountains and Idaho.

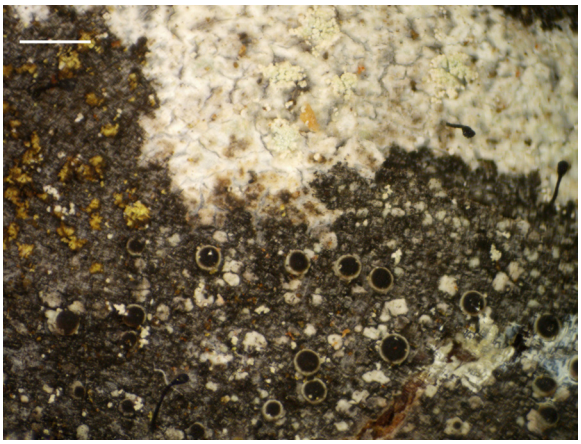
Xylopsora friesii (Ach.) Bendiksby & Timdal – THPL (1) with a 102-cm diameter, TSHE (1) with a 94-cm diameter, from 893 and 1102 m, respectively. Both habitat types were in the TSHE series and both were dominated by *Tsuga heterophylla*. Stand ages were 107 and 117 years. This species is common on the bark of large *Thuja plicata*. It is often associated with *Cyphelium inquinans* and *Hypocenomyce scalaris*.



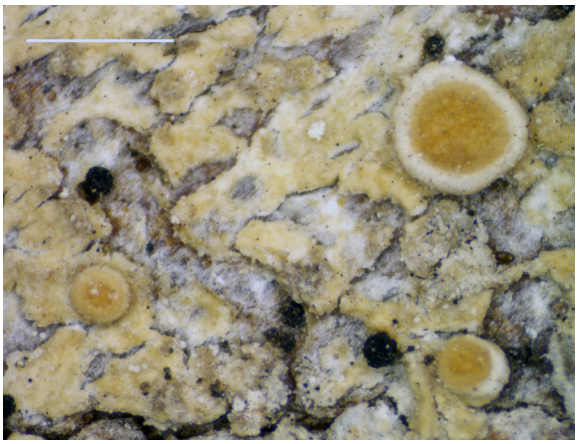
Xylopsora friesii. Left: on bark of a large *Thuja plicata*, *558.* Right: on *Thuja* bark, Idaho County, *McCune 17002a,* photo by Bruce McCune.

Section 3 – Phorophyte Species

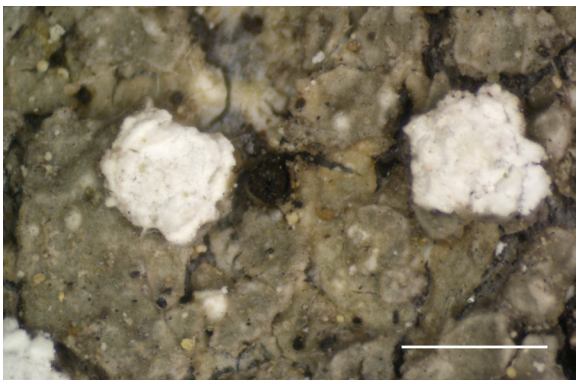
Abies grandis (Douglas ex D. Don) Lindl., **Grand fir**, **ABGR** – 49 species: *Bacidia idahoensis* (3), *Bacidina ramea* (1), *Biatora globulosa* (1), *Biatora rufidula* (4), *Buellia griseovirens* (4), *Buellia penichra* (5), *Calicium adaequatum* (1), *Calicium glaucellum* (2), *Calicium viride* (2), *Caloplaca atrosanguinea* (1), *Candelariella lutella* (1), *Chaenotheca chrysocephala* (2), *Cliostomum flavidulum* (2), *Cliostomum spribillei* (1), *Cyphelium inquinans* (1), *Japewia subaurifera* (2), *Japewia tornoënsis* (3), *Lecanora carpinea* (2), *Lecanora circumborealis* (4), *Lecanora confusa* (1), *Lecanora fuscescens* (2), *Lecanora laxa* (2), *Lecanora pulicaris* (2), *Lecanora symmicta* (1), *Lecidella elaeochroma/euphoria* (5), *Lepra ophthalmiza* (4), *Lepraria jackii* (1), *Lopadium disciforme* (3), *Mycoblastus sanguinarius* (1), *Mycocalicium subtile* (1), *Ochrolechia gowardii* (7), *Ochrolechia juvenalis* (10), *Ochrolechia montana* (17), *Ochrolechia szatalaënsis* (2), *Palicella schizochromatica* (3), *Pertusaria carneopallida* (3), *Pertusaria stenhammarii* (3), *Pertusaria subambigens* (2), *Phlyctis argena* (2), *Phlyctis speirea* (2), *Protoparmelia ochrococca* (1), *Ramboldia cinnabarina* (2), *Ramboldia gowardiana* (1), *Rinodina capensis* (2), *Rinodina disjuncta* (6), *Rinodina freyi* (2), *Scoliciosporum umbrinum* (2), *Stenocybe major* (15), *Varicellaria rhodocarpa* (3). This is possibly the most common tree in northern Idaho and this likely accounts for the diversity of lichens. However, this species is also an excellent substrate for crustose lichens, and the smooth bark is often covered in a mosaic of species. Particularly well-developed crustose lichen communities can be found on slow-growing (and therefore very stable), suppressed *Abies grandis* saplings in the understory of old-growth *Thuja* and *Tsuga* forests. When viewing *Abies grandis* bark under the dissecting scope it is usually easy to find at least a few *Stenocybe major* stalks. One is also likely to find the bark fungus *Pseudotryblidium neesii*, especially when it is growing through pale thalli of *Ochrolechia* or *Pertusaria* lichens (see Suija et al. 2020 for more *Pseudotryblidium* photos and details).



This patch of *Abies grandis* bark is from Ferry County, Washington, but has the same crusts that one might find in Idaho. Clockwise from the upper left are *Japewia subaurifera*, *Ochrolechia gowardii* (the white one) and *Rinodina capensis* on the bottom. Note the stalks of *Stenocybe major* on the center right and lower left, *3313*.

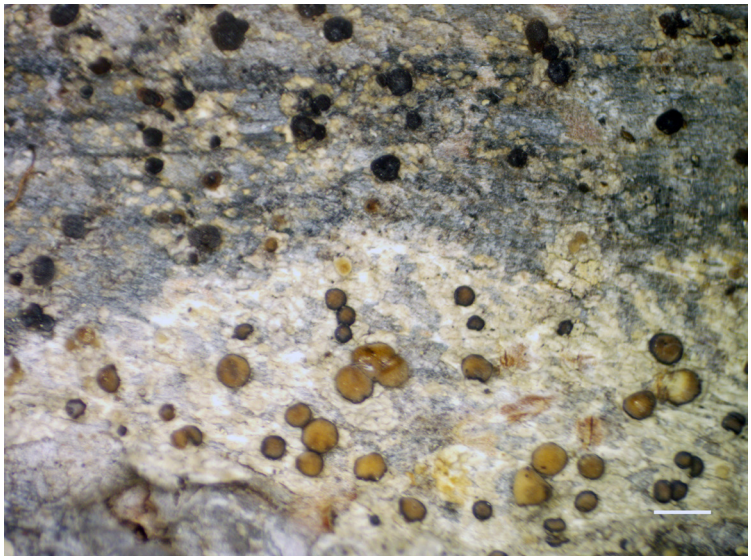


Abies grandis bark with *Ochrolechia montana* and two dark brown apothecia of *Pseudotryblidium neesii* poking through, *1060*.



An apothecium of *Pseudotryblidium neesii* can be seen between the two apothecial verrucae of *Lepra ophthalmiza* on this patch of *Abies grandis* bark, *1478*.

Abies lasiocarpa (Hook.) Nutt., Syn. *Abies bifolia* A. Murray (Hunt 1993), **Subalpine fir**, **ABLA** – 29 species: *Biatora flavopunctata* (3), *Biatora meiocarpa var. tacomensis* (3), *Buellia penichra* (2), *Calicium viride* (1), *Caloplaca oregona* (1), *Caloplaca sorocarpa* (2), *Cliostomum spribillei* (2), *Cyphelium inquinans* (3), *Lecanora boligera* (1), *Lecanora circumborealis* (4), *Lecanora fuscescens* (5), *Lecanora laxa* (2), *Lecanora pulicaris* (1), *Lecidea rubrocastanea* (1), *Lepra ophthalmiza* (1), *Myochroidea porphyrospoda* (2), *Myochroidea rufofusca* (1), *Ochrolechia gowardii* (3), *Ochrolechia juvenalis* (1), *Ochrolechia montana* (3), *Palicella schizochromatica* (4), *Pertusaria carneopallida* (1), *Pertusaria stenhammarii* (2), *Phlyctis speirea* (1), *Protoparmelia ochrococca* (1), *Ramboldia cinnabarina* (7), *Rinodina orculata* (1), *Stenocybe major* (2), *Varicellaria rhodocarpa* (2). In open subalpine forests the boles of this tree are often covered in the dark dots of *Lecanora fuscescens* apothecia. It can also be covered in large, white, thin thalli with scattered soralia. A close inspection of these white thalli should soon reveal a few of the bright red apothecia of *Ramboldia cinnabarina,* which can dominate the smooth bark of ABLA boles.



Bark of *Abies lasiocarpa* bole with *Lecanora fuscescens* above and *Palicella schizochromatica* below, *878*.

Acer glabrum Torr., **Rocky Mountain maple**, **ACGL** – 35 species: *Absconditella lignicola* (1), *Biatora flavopunctata* (1), *Biatora rufidula* (2), *Buellia griseovirens* (2), *Buellia penichra* (1), *Buellia punctata* (2), *Caloplaca atrosanguinea* (5), *Caloplaca cerina* (1), *Caloplaca flavorubescens* (1), *Caloplaca pyracea* (1), *Caloplaca sorocarpa* (1), *Candelariella lutella* (2), *Japewia tornoënsis* (1), *Lecanora carpinea* (4), *Lecanora circumborealis* (2), *Lecanora confusa* (2), *Lecanora excludens* (1), *Lecanora intumescens* (1), *Lecanora laxa* (2), *Lecanora pulicaris* (1), *Lecanora salicicola* (2), *Lecidella elaeochroma/euphoria* (6), *Lepra ophthalmiza* (3), *Ochrolechia gowardii* (2), *Ochrolechia juvenalis* (2), *Ochrolechia montana* (12), *Ochrolechia szatalaënsis* (8), *Pertusaria stenhammarii* (3), *Phlyctis argena* (6), *Phlyctis speirea* (1), *Rinodina capensis* (3), *Rinodina disjuncta* (3), *Rinodina orculata* (4), *Tephromela* sp. (1), *Violella fucata* (1). This abundant, multistemmed tall shrub (often over 15 m) is an excellent substrate for crustose lichens and is often covered with a patchwork of species. This is an especially good phorophyte on which to search for *Ochrolechia szatalaënsis* and *Rinodina disjuncta* and is the only species on which the new *Tephromela* species has been found in Idaho.

Alnus incana (L.) Moench **ssp. *tenuifolia*** (Nutt.) Breitung, **Thinleaf alder**, **ALINT** – 9 species: *Caloplaca atrosanguinea* (1), *Lecanora intumescens* (2), *Lecanora laxa* (1), *Lepra ophthalmiza* (1), *Ochrolechia montana* (3), *Ochrolechia szatalaënsis* (1), *Phlyctis speirea* (1), *Rinodina orculata* (2), *Stenocybe pullatula* (5). This is another excellent tall shrub/small tree substrate for crustose lichens, but it is restricted to creek edges and marshy areas and was not well-represented on the FIA plots I visited. *Stenocybe pullatula* is common on the twigs, and *Lecanora intumescens*, which so far seems rare in North America, may be fairly common on *Alnus incana* bark in the region.

Alnus viridis (Chaix) DC. **ssp. *sinuata*** (Regel) Á. Löve & D. Löve, **Sitka alder**, **ALVIS** – 10 species: *Arthopyrenia plumbaria* (1), *Biatora flavopunctata* (2), *Biatora meiocarpa* var. *tacomensis* (2), *Biatora vacciniicola* (2), *Caloplaca cerina* (2), *Caloplaca sorocarpa* (3), *Lecanora salicicola* (2), *Pertusaria carneopallida* (1), *Phaeocalicium compressulum* (7),

Rinodina orculata (1). The tiny stalks of the nonlichenized fungus *Phaeocalicium compressulum* can almost always be found by scanning small twigs of this phorophyte with a hand lens. I did not learn this until late in this study and so there are not that many collections of this calicioid fungus. Sometimes this shrub is almost bare of lichen cover. In other cases it can have extensive colonies of *Pertusaria carneopallida* or patchy cover of *Lecanora salicicola* (two species that can bear a superficial resemblance). The lichens that specialize on ericaceous shrubs occasionally occur on the horizontal stems of this shrub but are not nearly as common as they are on *Vaccinium* and *Menziesia*, even when growing intertwined.

Amelanchier alnifolia (Nutt.) Nutt. ex M. Roem., **Saskatoon serviceberry**, **AMAL2** – 19 species: *Bacidia idahoensis* (2), *Buellia griseovirens* (2), *Candelariella lutella* (1), *Japewia tornoënsis* (1), *Lecanora carpinea* (1), *Lecanora circumborealis* (1), *Lecanora laxa* (2), *Lecanora pulicaris* (1), *Lecidella elaeochroma/euphoria* (4), *Ochrolechia montana* (6), *Ochrolechia szatalaënsis* (1), *Palicella schizochromatica* (1), *Phlyctis argena* (2), *Rinodina capensis* (2), *Rinodina disjuncta* (2), *Rinodina freyi* (1), *Rinodina orculata* (1), *Scoliciosporum umbrinum* (1), *Varicellaria rhodocarpa* (1). The smooth bark of this common tall shrub is another great substrate for crustose lichens, but it is not often as large or as dominant as *Acer glabrum*.

Betula papyrifera Marshall, **Paper birch, BEPA** – 5 species: *Buellia penichra* (1), *Chrysothrix candelaris* (1), *Japewia subaurifera* (1), *Lecanora carpinea* (1), *Varicellaria rhodocarpa* (1). This species was not found on many of the FIA plots that I visited. It is much more common in Bonner and Boundary Counties than farther south.

Ceanothus sanguineus Pursh, **Redstem ceanothus**, **CESA** – 3 species: *Lecanora pulicaris* (1), *Lecidella elaeochroma/euphoria* (1), *Rinodina laevigata* (1).

Crataegus douglasii Lindl., **Black hawthorn**, **CRDO2** – 6 species: *Bacidia idahoensis* (1), *Bacidina ramea* (1), *Calicium adaequatum* (1), *Lecanora carpinea* (1), *Lecanora confusa* (1), *Rinodina freyi* (1). This common phorophyte of lowland riparian areas was found on only two of the forest inventory plots I visited during this time. The flaky bark does not provide a stable substrate. This may impede the development of slow-growing epiphytes such as crustose lichens.

Frangula purshiana (DC.) A. Gray, **Cascara buckthorn**, **FRPU7** – 7 species: *Biatora rufidula* (1), *Caloplaca atrosanguinea* (2), *Caloplaca pyracea* (1), *Lecanora intumescens* (1), *Lepra ophthalmiza* (1), *Mycoblastus sanguinarius* (1), *Ochrolechia montana* (1). This is another smooth-barked tall shrub that provides an excellent substrate for crustose lichens. However, it is not as common as *Amelanchier alnifolia* and *Holodiscus discolor*.

Holodiscus discolor (Pursh) Maxim., **Oceanspray**, **HODI** – 18 species: *Bacidia idahoensis* (1), *Biatora rufidula* (1), *Buellia griseovirens* (2), *Caloplaca atrosanguinea* (1), *Candelariella lutella* (1), *Lecanora carpinea* (2), *Lecanora circumborealis* (1), *Lecanora confusa* (1), *Lecanora laxa* (1), *Lecanora pulicaris* (1), *Lecidea albofuscescens* (1), *Lecidella elaeochroma/euphoria* (2), *Ochrolechia szatalaënsis* (1), *Phlyctis argena* (1), *Rinodina capensis* (4), *Rinodina freyi* (1), *Rinodina orculata* (2), *Scoliciosporum umbrinum* (3). The smooth bark of this common tall shrub is often covered with a mix of crustose lichens.

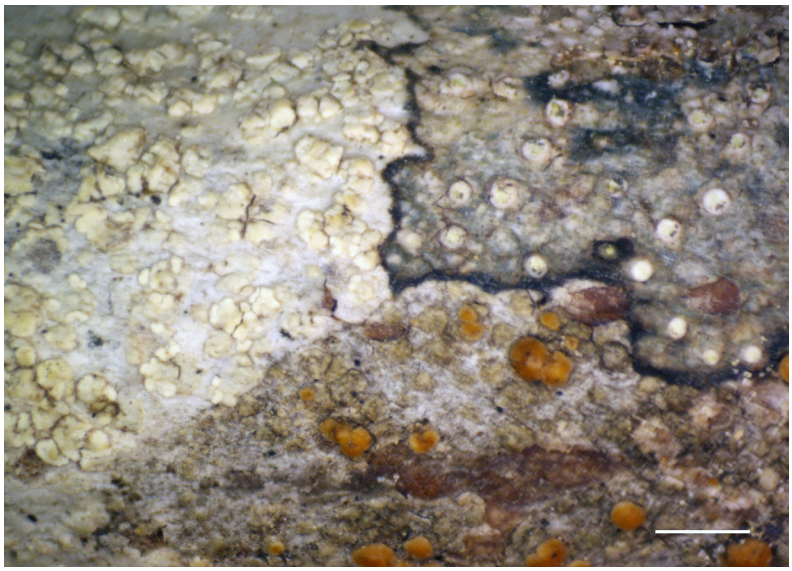
Larix occidentalis Nutt., **Western larch**, **LAOC** – 6 species: *Hypocenomyce scalaris* (1), *Japewia tornoënsis* (2), *Lecanora fuscescens* (1), *Lecanora laxa* (1), *Lepraria jackii* (2), *Ochrolechia juvenalis* (2). The flaky bark of this species is not as conducive to lichen growth as more stable bark on other trees. In addition, this species is not as common as some of the other conifers mentioned here. It is not rare but seldom dominant.

Ledum glandulosum Nutt., Syn. *Rhododendron columbianum* (Piper) Harmaja (Judd and Kron 2009), **Western Labrador tea**, **LEGL** – 2 species: *Biatora flavopunctata* (2), *Caloplaca sorocarpa* (1). This shrub is more common in wet environments and was not often encountered on FIA plots.

Mahonia aquifolium (Pursh) Nutt., **Hollyleaved barberry**, **MAAQ2** – 2 species: *Biatora meiocarpa* var. *tacomensis* (1), *Rinodina orculata* (1). I collected lichens from this shrub on only one plot, in Bonner County.

Menziesia ferruginea Sm., Syn. *Rhododendron menziesii* Craven (Craven 2011), **Rusty menziesia, MEFE** – 13 species: *Arthonia apatetica* (1), *Arthopyrenia plumbaria* (2), *Biatora flavopunctata* (6), *Biatora meiocarpa* var. *tacomensis* (5), *Biatora vacciniicola* (1), *Caloplaca sorocarpa* (6), *Lecidea betulicola* f. *endamylea* (1), *Myochroidea rufofusca* (1), *Ochrolechia montana* (1), *Pertusaria carneopallida* (1), *Pertusaria mccroryae* (1), *Pertusaria sommerfeltii* (2), *Rinodina disjuncta* (1). This shrub carpets the understory in many subalpine forests in northern Idaho. The dense stands are difficult to push through, and you will often hear Forest Service employees using the word "mee-fee" with a heavy sigh since it conjures up memories of bushwhacking nightmares. But if you want to learn a few common crustose lichens this is a great place. The bases of *Menziesia* in these habitats are often covered with the pale green thalli of *Biatora flavopunctata*. This continuous crust usually has soralia of the same pale green color and pale beige apothecia scattered throughout. Within this pale green cover you can easily find some darker green, smaller thalli of

Biatora meiocarpa var. *tacomensis*. This species does not produce soredia and has abundant pale beige to orangish brown apothecia. You should also be able to find *Caloplaca sorocarpa,* which is usually sterile, but the clusters of small, discrete, elevated soralia with a thin white rim (like tiny volcanoes) are distinctive. These are the most common crustose components of the *Menziesia* thickets. Many other crusts could also be found here, but beyond the three mentioned, *Arthopyrenia plumbaria* (not a lichen), *Biatora vacciniicola*, *Myochroidea* species, and *Pertusaria carneopallida* are also likely. I did not find *Lecidea albohyalina* or *Bacidina contecta,* but these cryptic species should also be sought in this niche.



Bark of *Menziesia ferruginea* with a typical assortment of lichens. Clockwise from the top left are *Biatora flavopunctata*, *Caloplaca sorocarpa* and *Biatora meiocarpa* var. *tacomensis*, *993B*. The pale green thalli of *Biatora flavopunctata* often dominate the stems at the base of this common subalpine shrub.

Oplopanax horridus (Sm.) Miq., **Devilsclub**, **OPHO** – 1 species: *Biatora flavopunctata* (1). See also *Biatora flavopunctata* in Section 2.

Paxistima myrsinites (Pursh) Raf., **Oregon boxleaf**, **PAMY** – 7 species: *Arthonia apatetica* (2), *Biatora flavopunctata* (3), *Biatora meiocarpa* var. *tacomensis* (1), *Biatora vacciniicola* (3), *Caloplaca sorocarpa* (3, with 1 fertile), *Pertusaria carneopallida* (1), *Rinodina orculata* (1). This small shrub did not often have well-developed lichen communities.

Philadelphus lewisii Pursh, **Lewis' mock orange**, **PHLE4** – 2 species: *Caloplaca atrosanguinea* (1), *Pertusaria nigristella* (1). Both records are from one plot on the east side of the North Fork of the Clearwater River near Washington Creek, 782 m.

Physocarpus capitatus (Pursh) Kuntze, **Pacific ninebark**, **PHCA11** – 3 species: *Bryobilimbia hypnorum* (1), *Ochrolechia szatalaënsis* (1), *Phlyctis argena* (1). This phorophyte, with a limited range in Idaho (Patterson et al. 1985), occurred on one plot along a small shaded creek (Cedar Creek) in the northwest corner of Clearwater County, 785 m. The *Bryobilimbia* collection was over moss and onto the bark and wood of a branch hanging low over the creek.

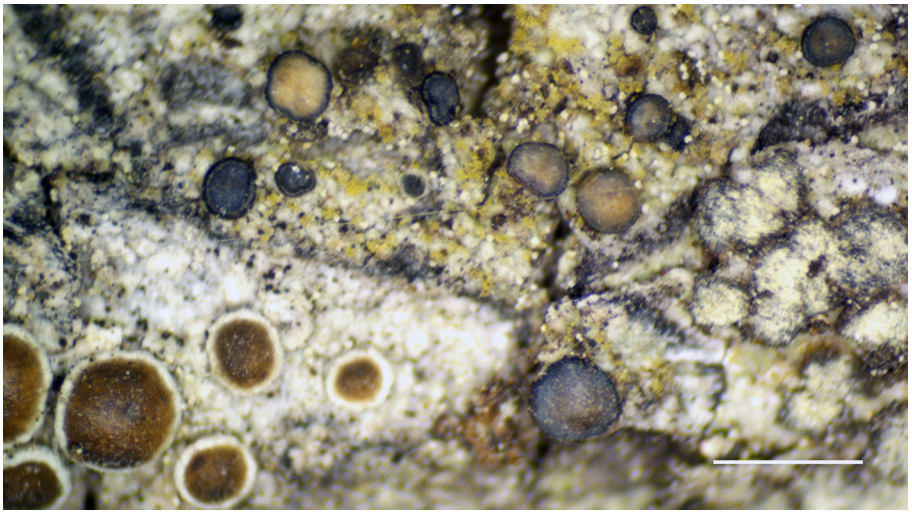
Physocarpus malvaceus (Greene) Kuntze, **Mallow ninebark, PHMA5** – 4 species: *Arthonia apatetica* (1), *Lecanora carpinea* (1), *Lecanora laxa* (1), *Rinodina pyrina* (1). The exfoliating bark of this and the previous species makes it difficult for crustose lichens to develop. The four species listed here were collected from the same shrub on a flat, open Latah County plot.

Picea engelmannii Parry ex Engelm., **Engelmann spruce**, **PIEN** – 12 species: *Biatora rufidula* (1), *Buellia punctata* (1), *Calicium viride* (1), *Candelariella lutella* (1), *Chaenotheca brunneola* (1), *Lecanora circumborealis* (1), *Lecanora fuscescens* (2), *Lecanora laxa* (1), *Ochrolechia juvenalis* (1), *Palicella schizochromatica* (1), *Pertusaria stenhammarii* (1), *Rinodina freyi* (1). The flaky bark of the boles of this tree hinders the development of crustose lichen communities, but there are still lichens to be found on the boles and especially twigs.

Pinus contorta Douglas ex Loudon, **Lodgepole pine**, **PICO** – 6 species: *Japewia subaurifera* (1), *Lecanora laxa* (1), *Lecanora pulicaris* (1), *Ochrolechia gowardii* (1), *Palicella schizochromatica* (1), *Ramboldia gowardiana* (1).

Pinus monticola Douglas ex D. Don, **Western white pine**, **PIMO3** – 14 species: *Biatora rufidula* (1), *Buellia griseovirens* (1), *Buellia penichra* (2), *Japewia subaurifera* (1), *Lecanora circumborealis* (1), *Lecanora laxa* (1), *Lecanora pulicaris* (1), *Lecidella elaeochroma/euphoria* (1), *Lepra ophthalmiza* (1), *Ochrolechia gowardii* (2), *Ochrolechia juvenalis* (1), *Ochrolechia montana* (2), *Pertusaria stenhammarii* (2), *Rinodina disjuncta* (1).

Pinus ponderosa Lawson & C. Lawson, **Ponderosa pine**, **PIPO** – 11 species: *Buellia griseovirens* (1), *Buellia penichra* (1), *Candelariella lutella* (1), *Hypocenomyce scalaris* (1), *Lecanora boligera* (1), *Lecanora circumborealis* (2), *Lecanora laxa* (1), *Ochrolechia gowardii* (1), *Ochrolechia juvenalis* (1), *Palicella schizochromatica* (1), *Ramboldia gowardiana* (1). *Buellia penichra*, *Lecanora circumborealis* and *Palicella schizochromatica* are particularly common on this species.



Bark of a *Pinus ponderosa* twig with a typical assortment of crustose lichens. Clockwise from the top *Palicella schizochromatica*, *Buellia griseovirens* and *Lecanora circumborealis*, *2617*.

Populus balsamifera L. **ssp. *trichocarpa*** (Torr. & A. Gray ex Hook.) Brayshaw, Syn. *Populus trichocarpa* Torr. & A. Gray (Eckenwalder 2010), **Black cottonwood**, **POBAT** – 1 species: *Phaeocalicium populneum* (1). Although cottonwood groves are abundant in northern Idaho, their linear distribution is easy to miss with the random FIA plot layout. Only one of my plots, in a patchily forested pasture, had cottonwoods. These trees were bare, but, as usual with this species, a search of twigs with a hand lens revealed stalks of *Phaeocalicium populneum*. Had there been a few more plots with cottonwoods this study would likely have at least several more species to report, since many crustose lichens seem to prefer this substrate, including *Lecanora hagenii*, *Lecidea albohyalina*, *Megaspora verrucosa* var. *mutabilis* and *Rinodina oregana*.

Populus tremuloides Michx., **Quaking aspen**, **POTR5** – 4 species: *Caloplaca pyracea* (1), *Lecania dubitans* (2), *Lecania naegelii* (1), *Lecanora carpinea* (1). This is a very common tree in most of the Rockies where it often forms extensive stands. But in northern Idaho aspen rarely forms exclusive stands and is often encountered singly or in small patches. It is still an easy tree to find in the area, but it did not occur on many of my FIA plots and then only a few scattered trees. As with the other local *Populus* species, some lichens seem to prefer this tree over others. *Lecania dubitans* is one of these. Another that would likely be found with more aspen coverage is *Arthonia patellulata*.

Prunus emarginata (Douglas ex Hook.) D. Dietr., **Bitter cherry**, **PREM** – 4 species: *Calicium adaequatum* (1), *Candelariella lutella* (1), *Lecidella elaeochroma/euphoria* (1), *Ochrolechia montana* (1). This is a common tall shrub in northern Idaho and often has dense cover of crustose lichens, but not many were collected for this project. This species is much more common than *P. virginiana* on the plots I visited.

Prunus virginiana L., **Chokecherry**, **PRVI** – 4 species: *Lecidella elaeochroma/euphoria* (1), *Ochrolechia gowardii* (1), *Ochrolechia montana* (1), *Rinodina disjuncta* (1). These are all from the same Benewah County plot on the south side of St. Maries, THPL/ASCA2-ASCA2 habitat type, 853 m. This tall shrub is not as common as *P. emarginata*. It is easiest to find on drier low-elevation sites and I did not survey many plots in these habitats. See also *Ochrolechia gowardii* in Section 2.

Pseudotsuga menziesii (Mirb.) Franco, **Douglas-fir**, **PSME** – 31 species: *Biatora rufidula* (1), *Bryobilimbia hypnorum* (1), *Buellia penichra* (3), *Calicium adaequatum* (1), *Calicium viride* (1), *Caloplaca sorocarpa* (1), *Cliostomum spribillei* (1), *Hypocenomyce scalaris* (2), *Japewia subaurifera* (7), *Japewia tornoënsis* (6), *Lecanora circumborealis* (2), *Lecanora fuscescens* (6), *Lecanora laxa* (1), *Lecanora pulicaris* (1), *Lecanora salicicola* (1), *Lecidella elaeochroma/euphoria* (1), *Lepra ophthalmiza* (1), *Lopadium disciforme* (3), *Mycoblastus sanguinarius* (2), *Ochrolechia gowardii* (4), *Ochrolechia juvenalis* (10), *Ochrolechia montana* (3), *Ophioparma rubricosa* (4), *Phlyctis argena* (1), *Protoparmelia ochrococca* (2), *Ramboldia cinnabarina* (1), *Ramboldia gowardiana* (2), *Rinodina orculata* (1), *Sarea resinae* (1, on resin on PSME), *Schaereria dolodes* (3), *Scoliciosporum umbrinum* (1). *Pseudotsuga* has rougher bark than the *Abies* species. It is a particularly good substrate to find both *Japewia* species as well as *Ochrolechia juvenalis* and *Schaereria dolodes*.

Rhododendron albiflorum Hook., **White rhododendron**, **RHAL2** – 1 species: *Biatora flavopunctata* (1). This Boundary County collection of *Biatora flavopunctata* has a small cluster of the black ascomata of *Lichenopeltella biatorae*. It seems likely that this shrub would have similar lichens to *Menziesia*. However, *Rhododendron albiflorum* is not found in Shoshone and Clearwater Counties, so I encountered it only once on plot while collecting for this project.

Salix scouleriana Barratt ex Hook., **Scouler's willow**, **SASC** – 5 species: *Candelariella lutella* (1), *Lecanora carpinea* (1), *Lecanora laxa* (1), *Lecanora pulicaris* (1), *Lecidella elaeochroma/euphoria* (1). This common shrub seems to harbor far less crustose lichen coverage than other tall, smooth-barked, upland shrubs such as *Acer glabrum*, *Amelanchier alnifolia*, and *Holodiscus discolor*.

Salix scouleriana is often relatively devoid of crustose lichens, but this one is covered in a patchwork of *Lecanora carpinea* with pruinose disks and *Lecanora pulicaris* with reddish-brown disks. The black apothecia of *Lecidella elaeochroma* or *L. euphorea* can be seen on the top left, *2611*. Photo by Richard Droker.

Sambucus racemosa L., **Red elderberry, SARA2 –** 1 species: *Calicium adaequatum* (1). This shrub does not seem to be a great substrate for lichens, but I have not thoroughly checked many of them. The *Calicium* was found on small twigs.

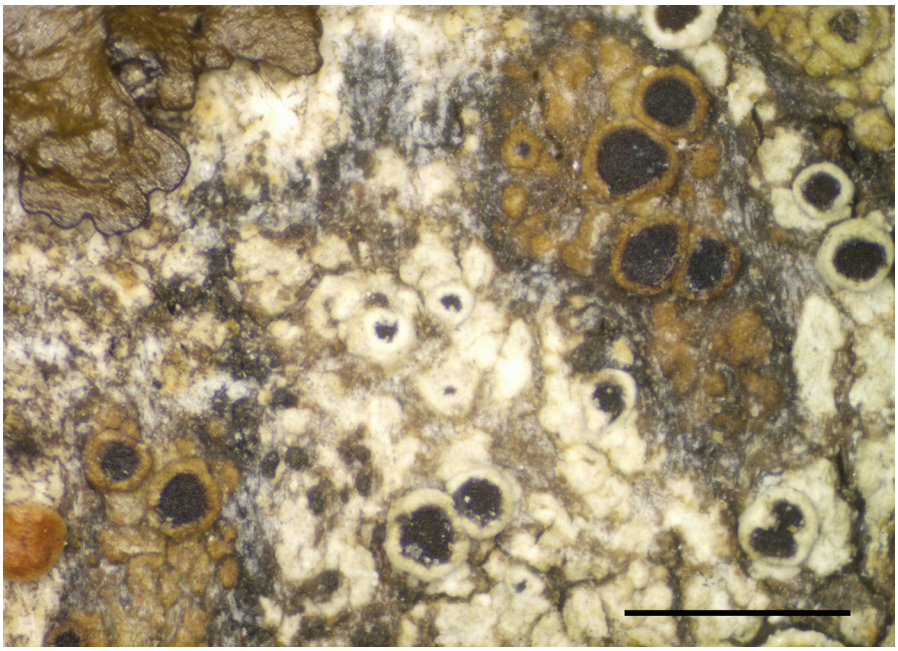
Shepherdia canadensis (L.) Nutt., **Russet buffaloberry, SHCA** – 2 species: *Lecanora pulicaris* (1), *Rinodina freyi* (1). This shrub is not common in most of northern Idaho but found regularly in Bonner and Boundary Counties. These two collections are from the same small patch of bark at the shrub's base on a plot near Elmira in Bonner County, 695 m.

Sorbus scopulina Greene, **Greene's mountain ash**, **SOSC2** – 10 species: *Arthopyrenia plumbaria* (3), *Biatora flavopunctata* (1), *Caloplaca atrosanguinea* (1), *Caloplaca sorocarpa* (1), *Lecanora pulicaris* (1), *Lecidella elaeochroma/L. euphoria* (1), *Pertusaria leioplaca* (1), *Pertusaria stenhammarii* (1), *Phaeocalicium cf. interruptum* (3), *Rinodina orculata* (1).

Symphoricarpos albus (L.) S. F. Blake, **Common snowberry**, **SYAL** – 2 species: *Caloplaca atrosanguinea* (1), *Rinodina orculata* (1). This midsize shrub is very common in northern Idaho, but its small stems are usually bare or the few lichens are not very well developed. I did not often take the time to search this common substrate. These two collections are from the same Clearwater County plot, 797 m.

Taxus brevifolia Nutt., **Pacific yew**, **TABR2** – 4 species: *Biatora flavopunctata* (2), *Cliostomum griffithii* (1), *Pertusaria carneopallida* (1), *Phlyctis argena* (1). The flaky bark of this species inhibits crustose lichen development.

Thuja plicata Donn ex D. Don, **Western redcedar**, **THPL** – 46 species: *Bacidia idahoensis* (3), *Biatora flavopunctata* (1), *Biatora rufidula* (5), *Biatora vacciniicola* (1), *Brigantiaea praetermissa* (3), *Bryobilimbia hypnorum* (1), *Buellia griseovirens* (4), *Buellia penichra* (1), *Calicium viride* (2), *Caloplaca atrosanguinea* (3), *Chaenotheca trichialis* (1), *Chaenothecopsis nana* (1), *Chaenothecopsis tasmanica* (1), *Cliostomum corrugatum* (1), *Cliostomum spribillei* (1), *Coenogonium pineti* (1), *Cyphelium inquinans* (2), *Hypocenomyce scalaris* (1), *Icmadophila ericetorum* (1), *Japewia subaurifera* (2), *Japewia tornoënsis* (4), *Lecanora pulicaris* (1), *Lecidella elaeochroma/euphoria* (1), *Lepra ophthalmiza* (8), *Lepraria elobata* (1), *Lepraria jackii* (2), *Lepraria pacifica* (2), *Lopadium disciforme* (5), *Micarea denigrata* (1), *Micarea peliocarpa* (1), *Micarea synotheoides* (2), *Mycoblastus sanguinarius* (3), *Ochrolechia gowardii* (2), *Ochrolechia juvenalis* (7), *Ochrolechia montana* (6), *Ochrolechia szatalaënsis* (2), *Pertusaria stenhammarii* (2), *Phlyctis argena* (2), *Phlyctis speirea* (1), *Protoparmelia ochrococca* (2), *Rinodina capensis* (4, all with pannarin in the epithecium), *Rinodina freyi* (1), *Rinodina laevigata* (1), *Trapelia corticola* (1), *Varicellaria rhodocarpa* (3), *Xylopsora friesii* (1). The bark of large remnant *Thuja* is a great substrate to find species that may otherwise be difficult to find. These include several members of *Lepraria* and *Micarea* as well as many calicioid species. These large trees also harbor some species that usually prefer wood, such as *Cyphelium inquinans*, *Hypocenomyce scalaris* and *Icmadophila ericetorum*. In addition, the smooth surface of persistent fine twigs of this tree are often home to a mix of species more common on tall shrubs.



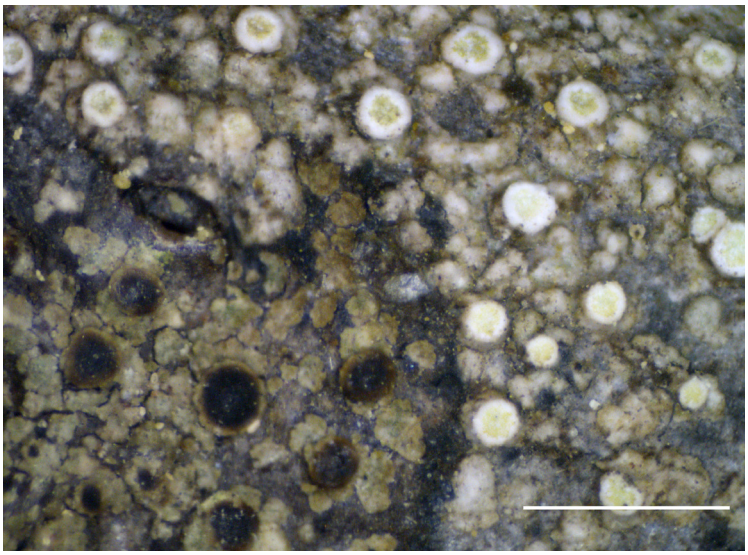
Thuja plicata twig with pale thalli of *Rinodina capensis* and brown thalli of *Rinodina freyi*, *911*. A single apothecium of *Biatora rufidula* is in the lower left corner.

Tsuga heterophylla (Raf.) Sarg., **Western hemlock**, **TSHE** – 12 species: *Biatora flavopunctata* (1), *Calicium viride* (1), *Cyphelium inquinans* (1), *Hypocenomyce scalaris* (1), *Japewia tornoënsis* (1), *Lecanora circumborealis* (1), *Lepra*

ophthalmiza (1), *Lepraria pacifica* (1), *Lepraria torii* (1), *Micarea synotheoides* (1), *Ochrolechia juvenalis* (2), *Xylopsora friesii* (1).

Tsuga mertensiana (Bong.) Carrière, **Mountain hemlock**, **TSME** – 7 species: *Lecanora circumborealis* (1), *Lecanora fuscescens* (1), *Myochroidea porphyrospoda* (3), *Myochroidea rufofusca* (1), *Palicella schizochromatica* (3), *Pertusaria stenhammarii* (1), *Ramboldia cinnabarina* (1).

Vaccinium membranaceum Douglas ex Torr., **Thinleaf huckleberry**, **VAME** – 19 species: *Arthonia apatetica* (2), *Arthopyrenia plumbaria* (2), *Bacidia circumspecta* (1), *Biatora flavopunctata* (7), *Biatora meiocarpa* var. *tacomensis* (7), *Biatora vacciniicola* (7), *Buellia griseovirens* (1), *Caloplaca sorocarpa* (6), *Lecanora salicicola* (1), *Lecidella elaeochroma/euphorea* (1), *Myochroidea rufofusca* (1), *Pertusaria carneopallida* (3), *Pertusaria sommerfeltii* (2), *Phlyctis argena* (1), *Pseudosagedia aenea* (2), *Rinodina capensis* (1), *Rinodina disjuncta* (1), *Rinodina orculata* (2), *Rinodina trevisanii* (1). Several of these species were only found on *Vaccinium membranaceum* on one particular plot. The plot was along Cedar Creek in the northwestern corner of Clearwater County, at 785 m in a *Thuja plicata* forest with a stand age of 125 years. At this spot I identified this project's only *V. membranaceum* records of *Buellia griseovirens*, *Lecidella elaeochroma/euphorea*, *Phlyctis argena*, *Rinodina capensis* and *Rinodina disjuncta* and one of only two *V. membranaceum* records for *Pertusaria sommerfeltii* and *Pseudosagedia aenea*. In subalpine habitats *V. membranaceum* grows alongside *Menziesia* and shares the same lichen communities on its nearly horizontal base stems. *Biatora vacciniicola* is most likely to be found on this phorophyte at midelevations.

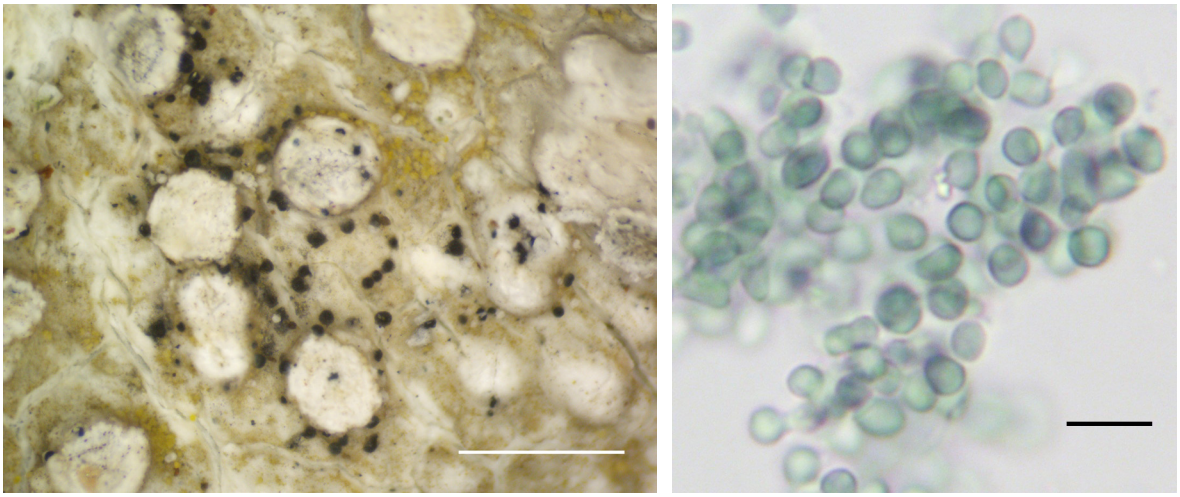


Vaccinium membranaceum branch with *Rinodina orculata* (lower left) and *Caloplaca sorocarpa*, *1731*.

Vaccinium myrtillus L., **Whortleberry**, **VAMY2** – 3 species: *Biatora flavopunctata* (1), *Biatora meiocarpa* var. *tacomensis* (1), *Caloplaca sorocarpa* (1). These are all from the same plot in southeastern Shoshone County in the headwaters of the North Fork of the Clearwater River, 1613 m, TSME/CLUN2-MEFE habitat type.

Vaccinium membranaceum twig covered in a patchwork of *Biatora flavopunctata, Caloplaca sorocarpa* and *Rinodina orculata*, *1617*. Photo by Richard Droker.

Caeruleoconidia ochrolechiae Zhurb. & Diederich – This fungus was found twice on *Lepra ophthalmiza*. One collection is from *Pseudotsuga* at 817 m in ABGR/PHMA5-PHMA5 in Shoshone County; the other is from *Thuja* at 1040 m in THPL/CLUN2-CLUN2 in Clearwater County. This species was only recently reported from North America north of Mexico (Haldeman 2018). In the field the dark brown spots on *Lepra ophthalmiza* are inconspicuous, but under a light microscope the green conidia are unmistakable.

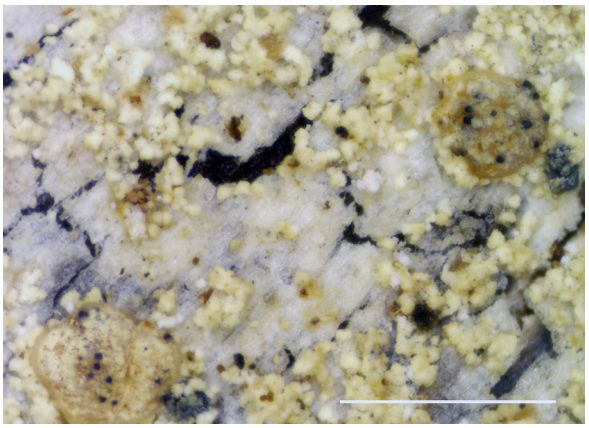


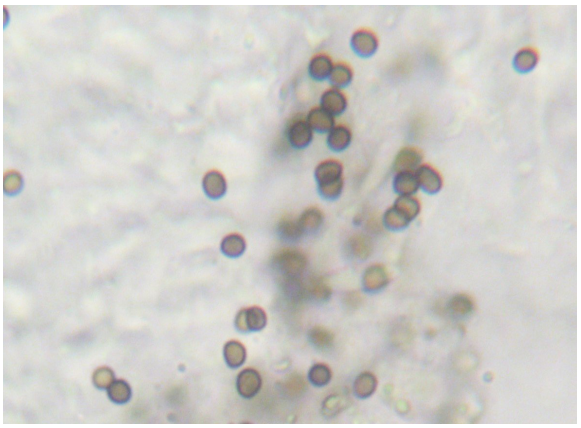
Caeruleoconidia ochrolechiae on *Lepra ophthalmiza*, *3016*. Left: a close look at small dark pycnidia can often reveal a greenish cast to the pycnidia that is not seen on other local lichenicolous fungi. Right: conidia of *Caeruleoconidia ochrolechiae* are green in water but turn a brighter green with the application of KOH (as seen here).

Everniicola flexispora D. Hawksw. – This species was found three times in the apothecia of *Lecanora*. Two of the specimens were found on *Lecanora circumborealis*, on *Abies grandis* and *Pseudotsuga*. The other was on an unidentified member of the *Lecanora subfusca* group on *Amelanchier alnifolia*. The habitat types were one each in the ABGR, ABLA and PSME series with elevations from 618 to 1448 m. Diederich et al. (2018) listed the hosts of this fungus as *Evernia* and *Nephroma arcticum*. Kocourková and van den Boom (2005) reported *Aspicilia cinerea*, *Dimelaena oreina*, *Pertusaria lactea*, *Usnea subfloridana* and *Xanthoparmelia conspersa* as additional hosts, but they mentioned that the conidia of some of these specimens were smaller. The conidia sizes on the specimens I examined on *Lecanora* were about 7.5-8 × 1.5-2 µm, consistent with those found on *Evernia* and *Nephroma arcticum* (Alstrup and Hawksworth 1990). Alstrup et al. (2009) added *Melanelia hepatizon* and Rettig (2016) added *Strangospora pinicola* as hosts reported for this fungus. Diederich and Coppins (2014) found this, as of now, monotypic genus on *Lecanora symmicta*. In their paper they chose to call it *Everniicola* sp. This conservative approach implies more work needs to be done. The pycnidial walls of the specimens reported here were K+violet as expected (Diederich et al. 2012). This species was first reported for North America from Alaska and eastern Canada by Alstrup and Hawksworth (1990). I know of no reports from the Lower 48.

cf. ***Laeviomyces pertusariicola*** (Nyl.) D. Hawksw. – Found twice on *Buellia*. One specimen was on the edge of a soralium of *Buellia griseovirens* on *Acer glabrum* in Shoshone County, east of Murray, Butte Gulch, 1026 m. The other was on *Buellia penichra* on *Abies grandis* in Clearwater County, near Washington Creek in the watershed of the North Fork of the Clearwater, 782 m. This species is known from *Pertusaria*, but Hawksworth (1981) also reported it on *Buellia disciformis* from Nova Scotia, Canada. He also mentioned that the Canadian specimen had longer conidia, but that was not observed in the specimens reported here. Paul Diederich has seen the second specimen listed here; he suggested this provisional identification, but further work needs to be done. Confusion about this species placement on the North American list was clarified by Seaward et al. (2017).

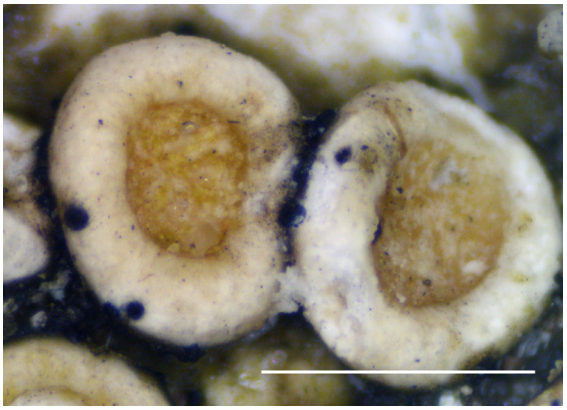
Lichenoconium lecanorae (Jaap) D. Hawksw. – Found once on apothecial disks of *Lecanora carpinea* on *Physocarpus malvaceus* in PSME/PHMA5-PHMA5 forest of *Pinus contorta* and *P. ponderosa* south of Helmer in Latah County at 899 m. Other *Lichenoconium* specimens were encountered but species identification in this genus is often difficult and time-consuming. Measurements of conidiogenous cells are necessary to verify most species. Specific epithets can mislead in this genus because *L. lecanorae* and *L. usneae* occur on a wide range of host genera (Diederich 2004b).





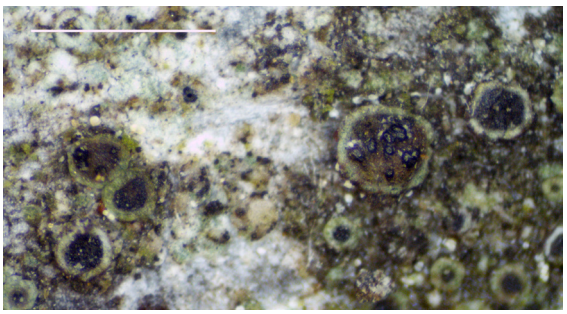
Lichenoconium erodens (not found as part of this project but looks similar to *L. lecanorae*). Left: pycnidia on *Cliostomum spribillei*, *882*. Right: conidia. This species could occur on any of the lichens covered here, especially individuals already infected by other lichenicolous fungi. *Lichenoconium erodens* has smaller pycnidia and slightly smaller conidia than other members of the genus (Diederich 2004b).

Lichenodiplis anomala Etayo & Pérez-Vargas – Found once on plot on *Ochrolechia szatalaënsis* on *Physocarpus capitatus* at Cedar Creek in the northwestern corner of Clearwater County, 785 m, THPL/CLUN2-TABR2 habitat type with a stand age of 125 years and dominated by *Thuja plicata*. Described from Chile, Spain and the Canary Islands by Pérez-Vargas et al. (2013), the species was first reported for North America as two specimens from the low-elevation forests of the North Fork of the Clearwater, Idaho (Haldeman 2018). I have found this species four times so far and all have been in western Clearwater County on *Ochrolechia*. This lichenicolous fungus is very similar, at least superficially, to *Minutoexcipula mariana.* A close inspection of the conidiogenous cells is the only reliable way to differentiate the two species (Diederich pers. comm. 2017).



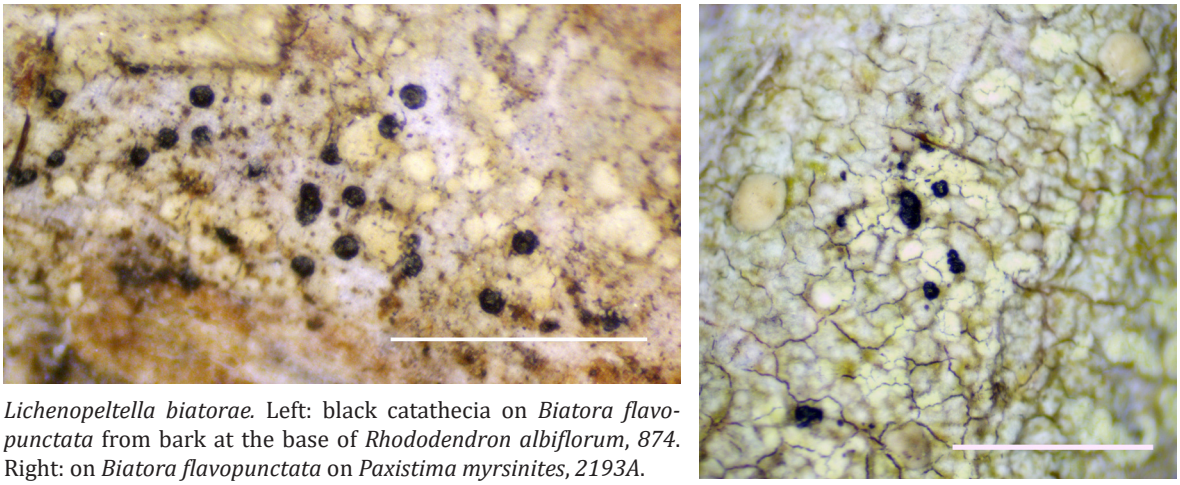
Lichenodiplis anomala pycnidia on *Ochrolechia szatalaënsis* apothecial margins, *2495A.*

Lichenodiplis lichenicola Dyko & D. Hawksw. – Found twice in the hymenium of *Rinodina freyi*. One collection is from the bark of a small twig of *Crataegus douglasii* in a flat pasture with patches of *Crataegus*, cottonwoods and conifers in southeastern Benewah County, 855 m. The other was in Shoshone County, above the East Fork of Gold Creek near Gold Pass on the Montana border, on *Amelanchier alnifolia*, 1367 m. Small black bumps on the apothecial disks of *Rinodina* are likely to be this species.



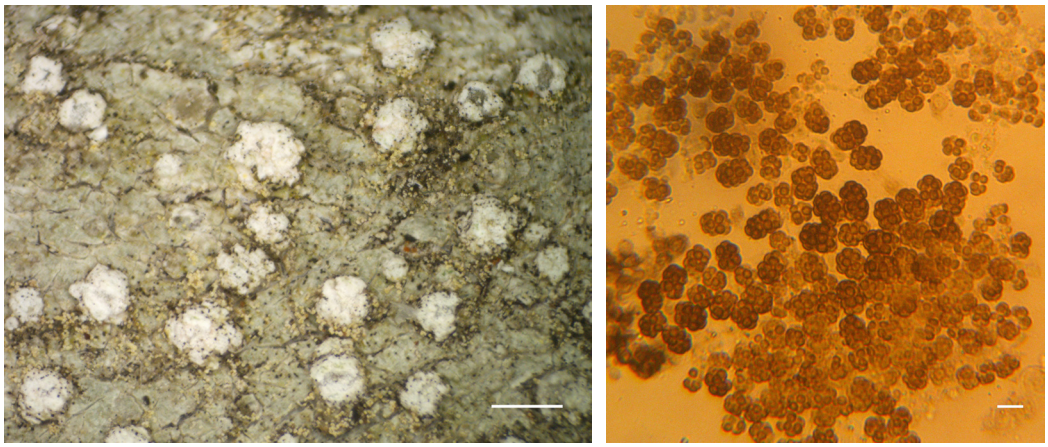
Lichenodiplis lichenicola. Left: conidia in KOH, *2149B*. Right: pycnidia protruding from the apothecia of a K- *Rinodina* sp. (too infected to identify) from *Holodiscus discolor* bark, *3306A*.

Lichenopeltella biatorae Pérez-Ortega & T. Sprib. – Found three times on its obligate host, *Biatora flavopunctata*. One collection was on *Paxistima myrsinites* at 1102 m in TSHE/GYDR in the upper North Fork of the Coeur d'Alene in Shoshone County; one on *Rhododendron albiflorum* at 1744 m in the Selkirk Mountains, Boundary County, close to the type locality on the other side of the international border (Pérez-Ortega and Spribille 2009); and one from *Vaccinium membranaceum*, 1315 m in Clearwater County, along Tamarack Creek, 3 km north of Sylvan Saddle.



Lichenopeltella biatorae. Left: black catathecia on *Biatora flavopunctata* from bark at the base of *Rhododendron albiflorum*, *874*. Right: on *Biatora flavopunctata* on *Paxistima myrsinites*, *2193A*.

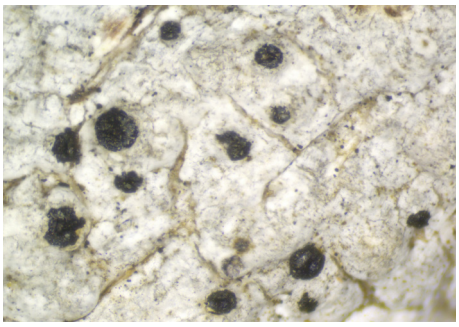
Lichenostigma alpinum (R. Sant., Alstrup & D. Hawksw.) Ertz & Diederich – Found five times: twice from *Lepra ophthalmiza*, twice from *Ochrolechia montana* and once from *Pertusaria carneopallida*. All were found in TPHL or TSHE habitat types and from 819 to 1147 m.



Lichenostigma alpinum. Left: on *Lepra ophthalmiza* from *Acer glabrum* bark, *2637*. Right: conidia from a *Lepra ophthalmiza* thallus, in KOH, *2967*.

Lichenostigma chlaroterae (F. Berger & Brackel) Ertz & Diederich – Found on *Lecanora circumborealis* on *Amelanchier alnifolia*, 1311 m, ABLA/CLUN2-XETE habitat type. The plot is above Spruce Tree Campground at the end of the road up the St. Joe River.

Llimoniella pertusariae Diederich & Etayo – Found four times on plots, all on *Lepra ophthalmiza.* Three sites are in THPL or TSHE habitat types and one in ABGR/ASCA2-ASCA2. Two were on *Abies grandis* in Latah County at 841 and 1077 m and one was on *Acer glabrum* in Clearwater County at 1083 m. The other, on a *Thuja plicata* twig east of Elk River in Clearwater County, 1147 m, appeared at first to



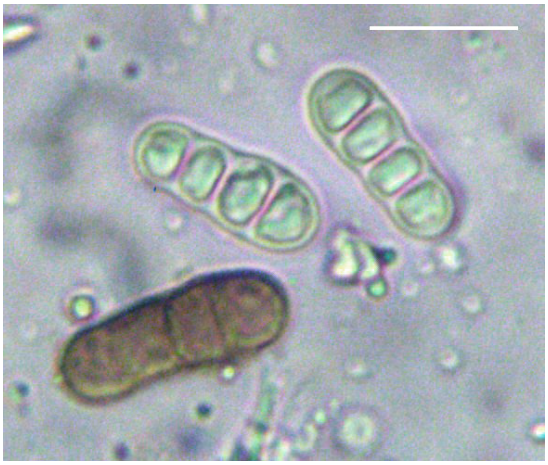
Llimoniella pertusariae on *Lepra ophthalmiza* on a *Thuja plicata* twig, *2105B*. This specimen had only a few apothecia of *Lepra ophthalmiza* and had many of the small black ascomata of *Llimoniella pertusariae*.

be an independent lichen with a white thallus and only *Llimoniella pertusariae* ascomata. Close inspection revealed a small cluster of *Lepra ophthalmiza* apothecia near the center of the thallus. Without finding the *Lepra ophthalmiza* apothecia this could be a very confusing lichen identification, since the *Llimoniella* ascomata seemed to belong to the pale thallus.

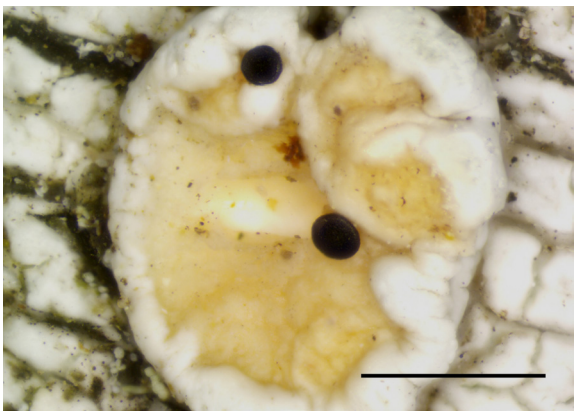
Opegrapha anomea Nyl. – Found five times on *Ochrolechia montana* and once on *Ochrolechia gowardii*. The *Ochrolechia montana* collections were all from *Abies grandis* except one from *Amelanchier* and one from *Acer glabrum* and all from 773 to 1228 m. The collection from *Ochrolechia gowardii* was on *Pseudotsuga* at 1426 m.

Rhymbocarpus neglectus (Vainio) Diederich & Etayo – Found once on *Lepraria jackii* on *Thuja plicata* at 785 m in the THPL/CLUN2-TABR2 habitat type. *Thuja* was dominant, with a stand age 125 years. This species was also found once on *Lepraria jackii* on a rotted conifer stump (not bark) in the TSHE/GYDR habitat type, with *Tsuga heterophylla* dominant and a stand age of 117 years.

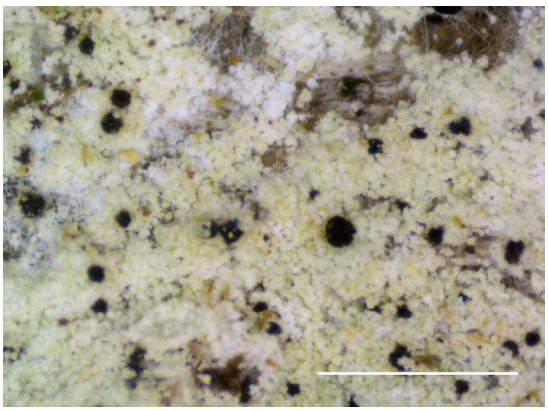
Sclerococcum parasiticum (Flörke) Ertz & Diederich – This species was found once, on *Lepra ophthalmiza* on *Thuja plicata*. The plot was in Idaho County southeast of Weippe at an elevation of 1058 m. It had a stand age of 179 years and a habitat type of THPL/ASCA2-ASCA2. This species was known as *Dactylospora parasitica*, but Diederich et al. (2018) found *Dactylospora* to be synonymous with *Sclerococcum*.



Opegrapha anomea ascospores in K showing two younger hyaline spores and a mature brown spore, *1415*.

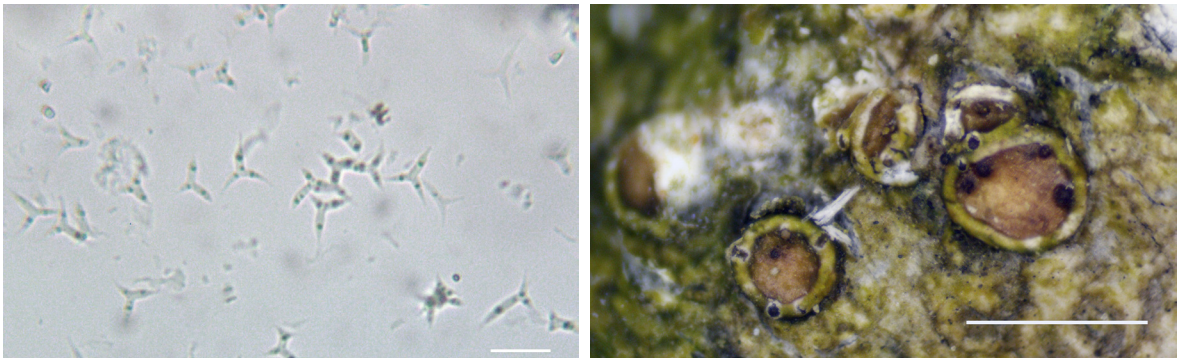


Dark *Sclerococcum parasiticum* apothecia on an apothecium of *Ochrolechia laevigata*, Clallam County, Washington, *3006*.

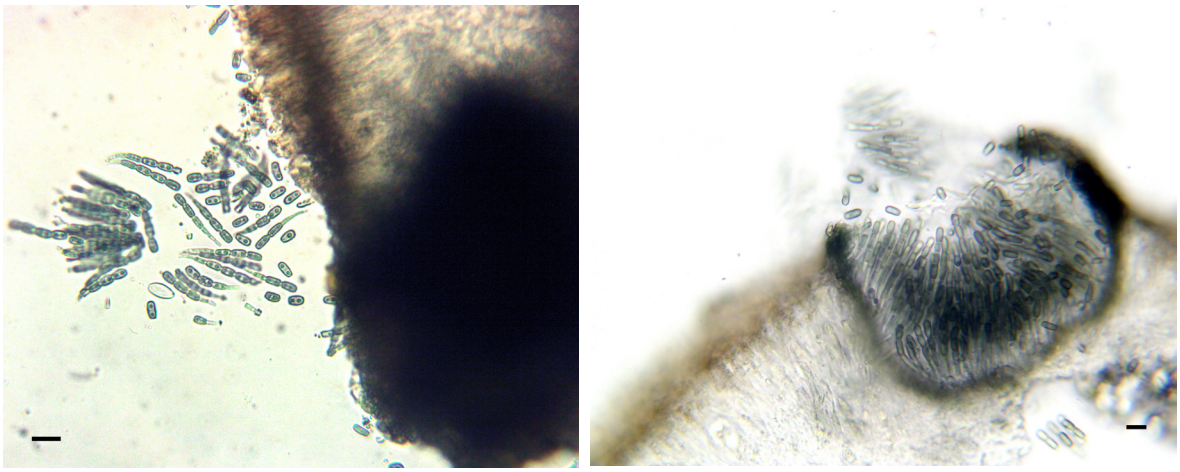


Rhymbocarpus neglectus apothecia on the thallus of *Lepraria jackii*, *2199B,* from the East Fork of Steamboat Creek, Shoshone County. This collection is from a rotted conifer stump.

Spirographa lichenicola (D. Hawksw. & B. Sutton) Flakus, Etayo & Miadlikowska – Found in the apothecia of one *Lecanora circumborealis* on *Pseudotsuga*, 1309 m, ABGR/ASCA2-ASCA2 habitat type. The plot was in southwestern Shoshone County near the summit of Telephone Booth Hill. The same *Lecanora* also harbored *Everniicola flexispora* and a *Lichenoconium* species. Until recently *Spirographa lichenicola* was known as *Cornutispora lichenicola,* but Flakus et al. (2019) showed that *Cornutispora* was the anamorphic pair to *Spirographa* teleomorphs. They also showed that this genus has strong host specificity and suggest that since *Cornutispora lichenicola* was described from *Parmelia sulcata,* occurrences on other hosts may be undescribed cryptic species. The anamorphic states of "*Cornutispora*" are treated by Punithalingam (2003) and Diederich et al. (2019). This report and the one from the photo are the first from the western United States, but there is a report from Baja California Sur, Mexico, on *Lecanora caesiorubella* (Diederich 2004a).

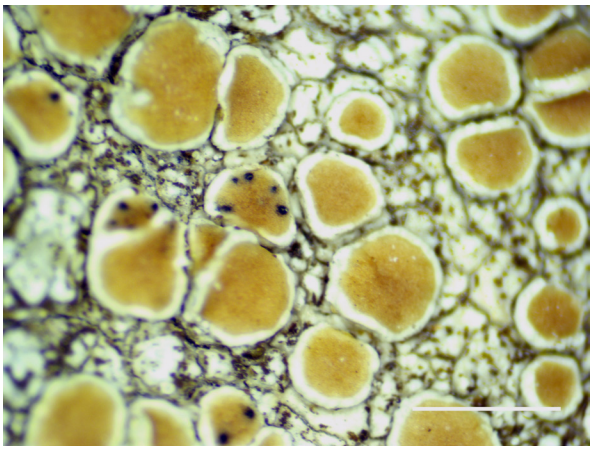


Spirographa lichenicola. Left: conidia from a *Lecanora circumborealis* apothecium, Shoshone County, *2447*. Right: on apothecia of *Lecanora pulicaris* from a fallen *Alnus rubra* branch on the south edge of Bellingham, Whatcom County, Washington, *3433*.



Vouauxiella lichenicola. Left: conidia emerging from a dark pycnidium within the hymenium of a *Lecanora circumborealis* apothecium, *684*. Right: pycnidium section in the hymenium of *Lecanora pulicaris*, *783*.

Vouauxiella lichenicola (Lindsay) Petrak & Sydow – Found ten times in the hymenia of members of the *Lecanora subfusca* group. It was found four times each on *L. circumborealis* and *L. pulicaris*, once on *L. salicicola* and once on an unidentified lichen of the *L. subfusca* group. This species shows up as black dots on the apothecial disks of the host, usually near the edge of the apothecial disk adjacent to the margin. They were found from a wide range of elevations (618 to 1656 m) and habitats (ABLA, PSME, TSHE and TSME series habitat types). As seen in the photos, the black dot is a pycnidium that releases catenate (chain-forming) conidia. The conidia often appear 1-septate but there is no septum; they are biguttulate. This lichenicolous fungus seems to account for the majority of the black dots that are often visible on paler apothecia of the *Lecanora subfusca*-group in northern Idaho.



Vouauxiella lichenicola pycnidia are often found on the edge of the disk, as seen on some of these *Lecanora salicicola* apothecia, *863*.

Appendix I. Species by county

The following is a list of species recorded by this project for each county. This is not a full accounting of records for these counties, nor is it meant to compare diversity between counties. It is simply a compilation of the lichens, lichen allies and lichenicolous fungi that were verified in each county by this project. It is meant as an aid to any future projects concerned with compiling species lists for any of the counties or states involved.

Benewah County –37 species: *Bacidina ramea, Biatora rufidula, Buellia griseovirens, Buellia penichra, Calicium adaequatum, Caloplaca atrosanguinea, Candelariella lutella, Hypocenomyce scalaris, Japewia subaurifera, Japewia tornoënsis, Lecania dubitans, Lecanora boligera, Lecanora carpinea, Lecanora circumborealis, Lecanora confusa, Lecanora laxa, Lecanora pulicaris*, *Lecidella elaeochroma/euphoria, Lepra ophthalmiza*, *Lepraria jackii, Lichenodiplis lichenicola, Lichenostigma alpinum*, *Ochrolechia gowardii, Ochrolechia juvenalis, Ochrolechia montana, Ochrolechia szatalaënsis, Palicella schizochromatica, Pertusaria leioplaca, Pertusaria stenhammarii, Phaeocalicium populneum, Phlyctis argena, Phlyctis speirea, Ramboldia gowardiana, Rinodina capensis, Rinodina disjuncta, Rinodina freyi, Scoliciosporum umbrinum.*

Bonner County – 26 species: *Bacidia idahoensis*, *Biatora meiocarpa* var. *tacomensis, Biatora rufidula, Calicium viride, Chaenotheca brunneola, Chaenothecopsis nana, Lecania naegelii, Lecanora carpinea, Lecanora circumborealis, Lecanora fuscescens, Lecanora intumescens*, *Lecanora pulicaris, Lepra ophthalmiza*, *Lichenostigma alpinum, Mycoblastus sanguinarius, Ochrolechia montana, Palicella schizochromatica, Pertusaria stenhammarii, Protoparmelia ochrococca, Ramboldia cinnabarina, Rinodina disjuncta, Rinodina freyi*, *Rinodina orculata, Scoliciosporum umbrinum*, *Stenocybe pullatula, Vouauxiella lichenicola.*

Boundary County – 34 species: *Biatora flavopunctata, Biatora meiocarpa* var. *tacomensis, Biatora vacciniicola, Buellia penichra, Caloplaca cerina, Caloplaca sorocarpa, Candelariella lutella, Chrysothrix candelaris, Cliostomum spribillei*, *Cyphelium inquinans, Everniicola flexispora*, *Hypocenomyce scalaris, Japewia subaurifera, Lecanora carpinea, Lecanora circumborealis, Lecanora confusa, Lecanora excludens*, *Lecanora fuscescens, Lecanora laxa, Lecanora pulicaris, Lecanora salicicola, Lecidella elaeochroma/euphoria, Lichenopeltella biatorae, Mycoblastus sanguinarius, Ochrolechia juvenalis, Ochrolechia montana, Palicella schizochromatica, Phlyctis argena, Ramboldia cinnabarina, Rinodina capensis, Rinodina freyi, Scoliciosporum umbrinum, Varicellaria rhodocarpa, Vouauxiella lichenicola.*

Clearwater County – 90 species: *Arthonia apatetica*, *Arthopyrenia plumbaria*, *Bacidia idahoensis, Biatora flavopunctata, Biatora meiocarpa* var. *tacomensis, Biatora rufidula, Biatora vacciniicola, Brigantiaea praetermissa, Bryobilimbia hypnorum, Buellia griseovirens, Buellia penichra, Buellia punctata, Caeruleoconidia ochrolechiae, Calicium adaequatum, Calicium glaucellum, Calicium viride, Caloplaca atrosanguinea, Caloplaca cerina*, *Caloplaca pyracea*, *Caloplaca sorocarpa, Candelariella lutella, Chaenotheca chrysocephala*, *Chaenotheca trichialis*, *Chaenothecopsis tasmanica*, *Cliostomum corrugatum, Cliostomum griffithii, Cyphelium inquinans, Icmadophila ericetorum, Japewia subaurifera, Japewia tornoënsis, Lecania dubitans, Lecanora carpinea, Lecanora circumborealis, Lecanora confusa*, *Lecanora fuscescens, Lecanora intumescens*, *Lecanora laxa, Lecanora salicicola*, *Lecidea albofuscescens, Lecidea betulicola* f. *endamylea*, *Lecidella elaeochroma/euphoria, Lepra ophthalmiza*, *Lepraria elobata, Lepraria jackii*, *Lepraria pacifica, Lichenodiplis anomala, Lichenodiplis* cf. *pertusariicola, Lichenopeltella biatorae, Lichenostigma alpinum, Llimoniella pertusariae*, *Lopadium disciforme, Micarea denigrata*, *Micarea peliocarpa*, *Micarea synotheoides, Mycoblastus sanguinarius, Mycocalicium subtile, Ochrolechia gowardii, Ochrolechia juvenalis, Ochrolechia montana, Ochrolechia szatalaënsis, Opegrapha anomea, Palicella schizochromatica, Pertusaria carneopallida, Pertusaria mccroryae*, *Pertusaria nigristella, Pertusaria sommerfeltii, Pertusaria stenhammarii, Pertusaria subambigens, Phaeocalicium compressulum*, *Phaeocalicium* cf. *interruptum*, *Phlyctis argena, Phlyctis speirea, Protoparmelia ochrococca*, *Pseudosagedia aenea, Ramboldia cinnabarina, Ramboldia gowardiana, Rhymbocarpus neglectus*, *Rinodina capensis, Rinodina disjuncta, Rinodina freyi*, *Rinodina laevigata, Rinodina orculata, Rinodina trevisanii, Sarea resinae*, *Schaereria dolodes, Scoliciosporum umbrinum, Stenocybe major*, *Stenocybe pullatula*, *Trapelia corticola*, *Varicellaria rhodocarpa.*

Idaho County – 17 species: *Arthopyrenia plumbaria, Bacidia circumspecta, Biatora flavopunctata, Biatora rufidula, Brigantiaea praetermissa*, *Caloplaca sorocarpa, Chaenotheca chrysocephala*, *Everniicola flexispora*, *Lecanora circumborealis, Lepra ophthalmiza*, *Myochroidea porphyrospoda, Ochrolechia montana, Palicella schizochromatica, Pertusaria carneopallida, Ramboldia gowardiana, Rinodina orculata, Sclerococcum parasiticum.*

Kootenai County – 23 species: *Biatora meiocarpa* var. *tacomensis, Biatora rufidula, Buellia penichra, Hypocenomyce scalaris*, *Lecanora carpinea, Lecanora circumborealis, Lecanora fuscescens, Lecanora laxa, Lecanora pulicaris*, *Lecidella elaeochroma/euphoria, Lopadium disciforme, Ochrolechia gowardii, Ochrolechia juvenalis, Ochrolechia montana, Palicella schizochromatica, Pertusaria carneopallida, Protoparmelia ochrococca, Rinodina capensis, Rinodina disjuncta, Rinodina orculata, Scoliciosporum umbrinum, Stenocybe major, Vouauxiella lichenicola.*

Latah County – 36 species: *Arthonia apatetica, Bacidia idahoensis*, *Bacidina ramea*, *Biatora meiocarpa* var. *tacomensis, Biatora rufidula, Biatora vacciniicola, Buellia griseovirens, Buellia penichra, Calicium adaequatum, Caloplaca flavorubescens*, *Candelariella lutella, Japewia subaurifera, Lecanora carpinea, Lecanora circumborealis, Lecanora laxa, Lecanora pulicaris*, *Lecidella elaeochroma/euphoria, Lepra ophthalmiza*, *Lepraria jackii*, *Lichenoconium lecanorae, Llimoniella pertusariae, Ochrolechia gowardii, Ochrolechia juvenalis, Ochrolechia montana, Ochrolechia szatalaënsis, Palicella schizochromatica, Pertusaria stenhammarii, Phlyctis argena, Rinodina capensis, Rinodina disjuncta, Rinodina freyi, Rinodina laevigata*, *Rinodina pyrina, Stenocybe major*, *Stenocybe pullatula*, *Varicellaria rhodocarpa.*

Shoshone County – 80 species: *Absconditella lignicola*, *Arthonia apatetica, Arthopyrenia plumbaria, Bacidia idahoensis, Biatora flavopunctata, Biatora globulosa*, *Biatora meiocarpa* var. *tacomensis, Biatora rufidula, Biatora vacciniicola, Brigantiaea praetermissa, Buellia griseovirens, Buellia penichra, Buellia punctata, Caeruleoconidia ochrolechiae, Calicium viride, Caloplaca atrosanguinea, Caloplaca cerina, Caloplaca oregona, Caloplaca pyracea, Caloplaca sorocarpa, Candelariella lutella, Cliostomum flavidulum*, *Cliostomum spribillei, Coenogonium pineti*, *Cyphelium inquinans, Everniicola flexispora*, *Hypocenomyce scalaris, Japewia subaurifera, Japewia tornoënsis, Lecanora boligera, Lecanora carpinea, Lecanora circumborealis*, *Lecanora fuscescens*, *Lecanora intumescens*, *Lecanora laxa, Lecanora pulicaris*, *Lecanora salicicola, Lecanora symmicta, Lecidea rubrocastanea, Lecidella elaeochroma/euphorea, Lepra ophthalmiza*, *Lepraria pacifica, Lepraria torii, Lichenodiplis lichenicola, Lichenodiplis* cf. *pertusariicola, Lichenopeltella biatorae, Lichenostigma chlaroterae*, *Lopadium disciforme, Micarea synotheoides, Mycoblastus sanguinarius, Myochroidea porphyrospoda, Myochroidea rufofusca*, *Ochrolechia gowardii, Ochrolechia juvenalis, Ochrolechia montana, Ochrolechia szatalaënsis, Opegrapha anomea, Ophioparma rubricosa, Palicella schizochromatica, Pertusaria carneopallida, Pertusaria stenhammarii, Phaeocalicium compressulum, Phaeocalicium* cf. *interruptum, Phlyctis argena, Phlyctis speirea, Protoparmelia ochrococca, Ramboldia cinnabarina, Rinodina capensis, Rinodina disjuncta, Rinodina freyi, Rinodina orculata, Schaereria dolodes, Spirographa lichenicola, Stenocybe major, Stenocybe pullatula, Tephromela* sp., *Varicellaria rhodocarpa, Violella fucata, Vouauxiella lichenicola, Xylopsora friesii.*

Pend Oreille County, Washington –15 species: *Biatora rufidula, Buellia griseovirens, Buellia penichra, Caloplaca atrosanguinea*, *Japewia subaurifera, Lecanora pulicaris, Lepra ophthalmiza*, *Ochrolechia gowardii, Ochrolechia montana, Ochrolechia szatalaënsis, Pertusaria stenhammarii, Rinodina capensis, Rinodina orculata, Varicellaria rhodocarpa, Vouauxiella lichenicola.*

Appendix II. Photo Data Table

Collection data for specimens of lichens and lichenicolous fungi in photos. Not all species entries have a corresponding photo entry here. Coll # = collection number; Herb = herbarium; -- = not recorded; CANL = Canadian National Herbarium Ottawa; Hald = Haldeman personal herbarium; NY = NY Botanical Garden; OSC = herbarium at Oregon State University; SASK = University of Saskatchewan; WTU = University of Washington, Seattle; WWB = Western Washington University. Specimen numbers are Haldeman's unless otherwise indicated.

Species	Coll #	State	County	Elev (m)	Substrate species	Substrate position	Herb.
Arthonia apatetica	1757	ID	Latah	864	*Alnus incana*	bark	Hald
Arthopyrenia plumbaria	993C	ID	Shoshone	1571	*Menziesia ferruginea*	bark at base	OSC
Arthopyrenia plumbaria	2184	ID	Shoshone	1102	*Sorbus scopulina*	twig bark	Hald
Bacidia circumspecta	1731	ID	Idaho	1429	*Vaccinium membranaceum*	bark	Hald
Bacidia idahoensis	590A	ID	Bonner	761	*Abies grandis*	bark	Hald
Bacidia idahoensis	McCune 29055	MT	Flathead	922	*Acer glabrum*	bark of stem	OSC
Bacidina ramea	1780	ID	Benewah	855	*Abies grandis*	bark of branch	OSC
Bacidina ramea	2010	ID	Latah	841	*Crataegus douglasii*	bark flake	Hald
Biatora flavopunctata	874	ID	Boundary	1744	*Rhododendron albiflorum*	bark at base	Hald
Biatora flavopunctata	993B	ID	Shoshone	1571	*Menziesia ferruginea*	bark at base	Hald
Biatora flavopunctata	1054	ID	Shoshone	1244	*Vaccinium membranaceum*	bark of horizontal stem	Hald
Biatora flavopunctata	1316	ID	Shoshone	1716	rotted log	bark shell of rotted log	Hald
Biatora flavopunctata	1334	ID	Clearwater	1311	*Ledum glandulosum*	bark	Hald
Biatora flavopunctata	1861A	WA	Whatcom	1064	*Vaccinium membranaceum*	bark	Hald
Biatora flavopunctata	2193A	ID	Shoshone	1102	*Paxistima myrsinites*	bark	Hald
Biatora flavopunctata	1617	ID	Shosone	817	*Vaccinium membranaceum*	bark	Hald
Biatora globulosa	2090	ID	Shoshone	902	*Abies grandis*	bark of 30 cm dia. bole	Hald
Biatora meiocarpa	993B	ID	Shoshone	1571	*Menziesia ferruginea*	bark at base	Hald
Biatora meiocarpa	1054	ID	Shoshone	1244	*Vaccinium membranaceum*	bark of horizontal stem	Hald
Biatora rufidula	911	ID	Latah	984	*Thuja plicata*	twig bark	Hald
Biatora rufidula	McCune 28827	OR	Wallowa	1568	conifer	twig	OSC
Biatora vacciniicola	1425	ID	Clearwater	1207	*Menziesia ferruginea*	bark at base	Hald
Biatora vacciniicola	2091	ID	Shoshone	902	*Alnus viridis*	twig bark	Hald
Brigantiaea praetermissa	1015A	ID	Latah	929	*Thuja plicata*	bark of bole	Hald
Buellia griseovirens	2472	ID	Shoshone	1026	*Acer glabrum*	bark	Hald
Buellia griseovirens	2617	ID	Latah	891	*Pinus ponderosa*	twig bark	Hald
Buellia penichra	1000B	ID	Shoshone	1553	*Pseudotsuga menziesii*	bark of bole	Hald
Buellia punctata	932	ID	Shoshone	1143	*Acer glabrum*	bark	Hald
Caeruleoconida ochrolechiae	3016	WA	Clallam	20	*Lepra ophthalmiza*	--	Hald
Caloplaca atrosanguinea	1416	ID	Clearwater	992	*Thuja plicata*	twig bark	Hald
Caloplaca cerina	864	ID	Boundary	1291	*Acer glabrum*	bark	Hald
Caloplaca sorocarpa	993B	ID	Shoshone	1571	*Menziesia ferruginea*	bark at base	Hald
Caloplaca sorocarpa	1614	ID	Shoshone	817	*Paxistima myrsinites*	bark near ground	Hald
Caloplaca sorocarpa	1731	ID	Idaho	1429	*Vaccinium membranaceum*	bark	Hald
Caloplaca sorocarpa	1617	ID	Shoshone	817	*Vaccinium membranaceum*	bark	Hald
Candelariella lutella	934	ID	Shoshone	1143	*Acer glabrum*	bark	Hald

Species	Coll #	State	County	Elev (m)	Substrate species	Substrate position	Herb.
Chaenotheca chrysocephala	3407	WA	Whatcom	760	*Pseudotsuga menziesii*	bark of bole	Hald
Chaenothecopsis consociata	3407	WA	Whatcom	760	*Chaenotheca chrysocephala*	thallus	Hald
Cliostomum corrugatum	2181	ID	Clearwater	1042	*Thuja plicata*	bark of 68 cm diam. bole	Hald
Cliostomum flavidulum	2473	ID	Shoshone	1026	*Abies grandis*	bark of sapling	Hald
Cliostomum griffithii	2500	ID	Clearwater	785	*Taxus brevifolia*	bark	Hald
Cliostomum spribillei	882	ID	Bonner	1208	*Abies grandis*	bark of bole	Hald
Cliostomum spribillei	2641	ID	Boundary	1128	*Abies lasiocarpa*	bark of 40 cm diam. bole	Hald
Coenogonium pineti	1596	ID	Shoshone	893	*Thuja plicata*	bark at base of large bole	Hald
Cyphelium inquinans	485	ID	Shoshone	1131	*Thuja plicata*	bark	Hald
Japewia subaurifera	895	WA	Pend Oreille	1124	*Pinus monticola*	bark	Hald
Japewia subaurifera	2470	ID	Shoshone	1026	*Pseudotsuga menziesii*	bark of 28 cm dia. bole	WWU
Japewia subaurifera	3313	WA	Ferry	671	*Abies grandis*	bark of suppressed tree	Hald
Japewia tornoënsis	1666	ID	Clearwater	848	*Thuja plicata*	bark of bole	Hald
Lecania dubitans	659	ID	Benewah	850	*Populus tremuloides*	bark of bole	Hald
Lecanora anopta	1400	ID	Shoshone	1756	*Tsuga mertensiana*	wood of 75 cm dia. tree	Hald
Lecanora boligera	1264A	ID	Benewah	890	*Pinus ponderosa*	twig bark	Hald
Lecanora carpinea	2611	ID	Latah	891	*Salix scouleriana*	twig bark	Hald
Lecanora circumborealis	2617	ID	Latah	891	*Pinus ponderosa*	twig bark	Hald
Lecanora circumborealis	McCune 23772	OR	Linn	1780	*Abies lasiocarpa*	bark of bole	OSC
Lecanora fuscescens	878	ID	Boundary	1744	*Abies lasiocarpa*	bark of bole	Hald
Lecanora fuscescens	963	ID	Bonner	1656	*Abies lasiocarpa*	bark of bole	Hald
Lecanora intumescens	1379	ID	Bonner	899	*Alnus incana*	bark	Hald, CANL, OSC
Lecanora laxa	2060	ID	Clearwater	1032	*Abies grandis*	twig bark	WTU
Lecanora pulicaris	2231	ID	Shoshone	915	*Alnus incana*	bark	Hald
Lecanora pulicaris	2611	ID	Latah	891	*Salix scouleriana*	twig bark	Hald
Lecanora pulicaris	3433	WA	Whatcom	29	*Alnus rubra*	bark of fallen branch	Hald
Lecanora salicicola	863	ID	Boundary	1291	*Tsuga heterophylla*	twig bark	WTU
Lecanora salicicola	3200	WA	Whatcom	1262	*Alnus viridis*	bark	Hald
Lecidea albofuscescens	1639A	ID	Clearwater	797	*Holodiscus discolor*	bark	Hald
Lecidea betulicola	1424	ID	Clearwater	1207	*Menziesia ferruginea*	bark at base	Hald
Lecidella elaeochroma/ euphorea	2054	ID	Clearwater	1032	*Acer glabrum*	bark of 8 cm dia. stem	Hald
Lecidella elaeochroma/ euphorea	2611	ID	Latah	891	*Salix scouleriana*	twig bark	Hald
Lepra ophthalmiza	1478	ID	Clearwater	1040	*Abies grandis*	bark of suppressed tree	Hald
Lepra ophthalmiza	1484	ID	Clearwater	1134	*Thuja plicata*	bark of large bole	Hald
Lepra ophthalmiza	2637	ID	Bonner	819	*Acer glabrum*	bark	Hald
Lepra ophthalmiza	3016	WA	Clallam	20	*Alnus rubra*	bark of fallen branch	Hald
Lepra ophthalmiza	2105B	ID	Clearwater	1147	*Thuja plicata*	bark of twig	Hald
Lepraria elobata	1667A	ID	Clearwater	848	*Thuja plicata*	bark at base	NY, Hald
Lepraria jackii	2159	ID	Clearwater	1079	*Larix occidentalis*	bark at base of bole	Hald
Lepraria jackii	2199B	ID	Shoshone	1102	conifer	rotted stump	Hald
Lichenoconium erodens	882	ID	Bonner	1208	*Cliostomum spribillei*	apothecial disks	Hald
Lichenodiplis anomala	2495A	ID	Clearwater	785	*Ochrolechia szatalaënsis*	apothecial margins	Hald

Species	Coll #	State	County	Elev (m)	Substrate species	Substrate position	Herb.
Lichenodiplis lichenicola	2149B	ID	Clearwater	314	*Rinodina sp.*	--	Hald
Lichenodiplis lichenicola	3306A	WA	Ferry	1074	*Rinodina sp.*	apothecial disk	Hald
Lichenopeltella biatorae	874	ID	Boundary	1744	*Biatora flavopunctata*	thallus	Hald
Lichenopeltella biatorae	2193A	ID	Shoshone	1102	*Biatora flavopunctata*	thallus	Hald
Lichenostigma alpinum	2637	ID	Bonner	819	*Lepra ophthalmiza*	thallus and apothecia	Hald
Lichenostigma alpinum	2967	WA	Clallam	3	*Lepra ophthalmiza*	thallus	Hald
Llimoniella pertusariae	2105B	ID	Clearwater	1147	*Lepra ophthalmiza*	thallus	Hald
Lopadium disciforme	1423	ID	Clearwater	1207	*Thuja plicata*	bark of large bole	Hald
Micarea denigrata	2183	ID	Clearwater	1042	*Thuja plicata*	bark of 45 cm dia. bole	Hald
Micarea peliocarpa	2039	ID	Clearwater	647	*Thuja plicata*	bark of 75 cm dia. bole	Hald
Micarea synotheoides	1485A	ID	Clearwater	1134	*Thuja plicata*	bark of large bole	Hald
Micarea synotheoides	2040	ID	Clearwater	647	*Thuja plicata*	bark of 75 cm dia. bole	Hald
Mycoblastus sanguinarius	181	ID	Bonner	745	*Pseudotsuga menziesii*	bark of bole	Hald
Mycocalicium subtile	1400	ID	Shoshone	1756	*Tsuga mertensiana*	wood of 75 cm dia. tree	Hald
Myochroidea porphyrospoda	1316	ID	Shoshone	1716	*rotted log*	bark shell of rotted log	Hald
Myochroidea rufofusca	1029	ID	Shoshone	1654	*Abies lasiocarpa*	bark of dead sapling	Hald
Ochrolechia gowardii	3313	WA	Ferry	671	*Abies grandis*	bark of suppressed tree	Hald
Ochrolechia juvenalis	881	ID	Boundary	1065	*Pseudotsuga menziesii*	bark	Hald
Ochrolechia juvenalis	1253	ID	Clearwater	1026	*Abies grandis*	bark of bole	Hald
Ochrolechia laevigata	3006	WA	Clallam	20	*Alnus rubra*	branch bark	Hald
Ochrolechia montana	1060	ID	Latah	1030	*Abies grandis*	bark of bole	Hald
Ochrolechia montana	1252	ID	Clearwater	1026	*Abies grandis*	bark of bole	Hald
Ochrolechia szatalaënsis	1643	ID	Clearwater	594	*Alnus rubra*	bark	Hald
Ochrolechia szatalaënsis	2495A	ID	Clearwater	785	*Physocarpus capitatus*	bark	Hald
Opegrapha anomea	1415	ID	Clearwater	992	*Ochrolechia montana*	--	Died
Ophioparma rubricosa	793	ID	Shoshone	919	*Pseudotsuga menziesii*	bark	Hald
Palicella schizochromatica	683A	ID	Kootenai	823	*Pseudotsuga menziesii*	wood of twig	Hald
Palicella schizochromatica	781	ID	Kootenai	1019	*Abies grandis*	bark	Hald
Palicella schizochromatica	878	ID	Boundary	1744	*Abies lasiocarpa*	bark of bole	Hald
Palicella schizochromatica	2617	ID	Latah	891	*Pinus ponderosa*	twig bark	Hald
Palicella schizochromatica	2687	WA	Whatcom	1083	*Abies amabilis*	bark	Hald
Palicella schizochromatica	2919	WA	Chelan	850	*Acer circinatum*	bark of 5 cm diam. stem	Hald
Pertusaria carneopallida	2679	WA	Whatcom	689	*Alnus rubra*	bark of bole	Hald
Pertusaria leioplaca	2280	ID	Shoshone	725	*Amelanchier alnifolia*	bark of 10 cm dia. stem	Hald
Pertusaria mccroryae	2491	ID	Clearwater	1015	*Menziesia ferruginea*	bark	Hald
Pertusaria nigristella	1450	ID	Clearwater	782	*Philadelphus lewisii*	bark	Hald, OSC
Pertusaria nigristella	3097	WA	Whatcom	6	*Quercus garryana*	bark flake	Hald
Pertusaria sommerfeltii	1637	ID	Clearwater	797	*Vaccinium membranaceum*	bark	Hald
Pertusaria stenhammarii	1005	ID	Shoshone	1585	*Tsuga mertensiana*	twig bark	Hald
Pertusaria subambigens	1404	ID	Clearwater	524	*Pseudotsuga menziesii*	bark	Hald
Phaeocalicium compressulum	2091	ID	Shoshone	902	*Alnus viridis*	twig bark	Hald
Phaeocalicium populneum	644	ID	Shoshone	847	*Populus trichocarpa*	twig bark	Hald
Phaeocalicium populneum	1634	WA	Whatcom	48	*Populus trichocarpa*	bark of fallen branch	Hald
Phlyctis argena	1293	ID	Shoshone	1401	*Acer glabrum*	bark	Hald
Phlyctis speirea	674	ID	Clearwater	594	*Alnus rubra*	bark	Hald

Species	Coll #	State	County	Elev (m)	Substrate species	Substrate position	Herb.
Protoparmelia ochrococca	2178	ID	Clearwater	1042	*Thuja plicata*	bark of 45 cm diam. bole	Hald
Protoparmelia ochrococca	McCune 31673	OR	Benton	341	*Pseudotsuga menziesii*	bark of bole	OSC
Pseudosagedia aenea	1861B	WA	Whatcom	1064	*Vaccinium membranaceum*	bark	Hald
Pseudotryblidium neesii	1060	ID	Latah	1030	*Abies grandis*	bark of bole	Hald
Pseudotryblidium neesii	1478	ID	Clearwater	1040	*Abies grandis*	bark of suppressed tree	Hald
Ramboldia cinnabarina	1340A	ID	Shoshone	1497	*Abies lasiocarpa*	bark of bole	Hald
Ramboldia cinnabarina	2366B	ID	Shoshone	1808	*Abies lasiocarpa*	bark of 30 cm dia. bole	Hald
Ramboldia gowardiana	1264A	ID	Benewah	890	*Pinus ponderosa*	twig bark	Hald
Rhymbocarpus neglectus	2199B	ID	Shoshone	1102	*Lepraria jackii*	thallus	Hald
Rinodina capensis	684	ID	Kootenai	823	*Holodiscus discolor*	twig bark	SASK
Rinodina capensis	911	ID	Latah	984	*Thuja plicata*	twig bark	Hald
Rinodina capensis	3313	WA	Ferry	671	*Abies grandis*	bark of suppressed tree	Hald
Rinodina disjuncta	2472	ID	Shoshone	1026	*Acer glabrum*	bark	Hald
Rinodina disjuncta	2637	ID	Bonner	819	*Acer glabrum*	bark	Hald
Rinodina freyi	644	ID	Shoshone	847	*Populus trichocarpa*	twig bark	Hald
Rinodina freyi	911	ID	Latah	984	*Thuja plicata*	twig bark	Hald
Rinodina orculata	858	ID	Shoshone	983	*Alnus incana*	branch bark	Hald
Rinodina orculata	1617	ID	Shoshone	817	*Vaccinium membranaceum*	bark	Hald
Rinodina orculata	1731	ID	Idaho	1429	*Vaccinium membranaceum*	bark	Hald
Schaereria dolodes	1448	ID	Clearwater	782	*Pseudotsuga menziesii*	bark of large bole	Hald
Schaereria dolodes	1800A	ID	Clearwater	626	*Pseudotsuga menziesii*	bark of bole	Hald
Sclerococcum parasiticum	3006	WA	Clallam	20	*Ochrolechia laevigata*	apothecium	Hald
Scoliciosporum umbrinum	661	ID	Benewah	850	*Holodiscus discolor*	bark	Hald
Scoliciosporum umbrinum	1798	ID	Clearwater	626	*Holodiscus discolor*	twig bark	Hald
Spirographa lichenicola	2447	ID	Shoshone	1309	*Lecanora cirumborealis*	apothecium	Hald
Spirographa lichenicola	3433	WA	Whatcom	29	*Lecanora pulicaris*	apothecia	Hald
Stenocybe major	2687	WA	Whatcom	1083	*Abies amabilis*	bark	Hald
Stenocybe major	3313	WA	Ferry	671	*Abies grandis*	bark of suppressed tree	Hald
Tephromela sp.	2399	ID	Shoshone	1346	*Acer glabrum*	bark of stem	OSC
Tephromela sp.	2400	ID	Shoshone	1346	*Acer glabrum*	bark of stem	Hald
Trapelia corticola	2036A	ID	Clearwater	647	*Thuja plicata*	bark of bole	Hald
Varicellaria rhodocarpa	1619	ID	Shoshone	817	*Amelanchier alnifolia*	bark	NY
Varicellaria rhodocarpa	2059	ID	Clearwater	1032	*Abies grandis*	twig bark	WTU
Vouauxiella lichenicola	684	ID	Kootenai	823	*Lecanora cirumborealis*	hymenium	SASK
Vouauxiella lichenicola	783	ID	Kootenai	1019	*Lecanora pulicaris*	hymenium	Hald
Vouauxiella lichenicola	863	ID	Boundary	1291	*Lecanora salicicola*	apothecia disk edges	WTU
Xylopsora friesii	558	ID	Kootenai	911	*Thuja plicata*	bark of large tree	Hald
Xylopsora friesii	McCune 17002a	ID	Idaho	1090	conifer	--	OSC

Appendix III. USDA Plant Codes Used in the Text

Plants codes are from the USDA (2020).

ABGR – *Abies grandis* (Douglas ex D. Don) Lindley, Grand fir
ABLA – *Abies lasiocarpa* (Hook.) Nutt., Subalpine fir
ACGL – *Acer glabrum* Torr., Rocky Mountain maple
ADAL – *Adiantum aleuticum* (Rupr.) Paris, Aleutian maidenhair
ALINT – *Alnus incana* (L.) Moench ssp. *tenuifolia* (Nutt.) Breitung, Thinleaf alder
ALVIS – *Alnus viridis* (Chaix) DC. ssp. *sinuata* (Regel) À. Löve & D. Löve, Sitka alder
AMAL2 – *Amelanchier alnifolia* (Nutt.) Nutt. ex M. Roem., Saskatoon serviceberry
ARNU2 – *Aralia nudicaulis* L., Wild sarsaparilla
ASCA2 – *Asarum caudatum* Lindl., British Columbia wildginger
ATFI – *Athyrium filix-femina* (L.) Roth, Common ladyfern
BEPA – *Betula papyrifera* Marshall, Paper birch
CESA – *Ceanothus sanguineus* Pursh, Redstem ceanothus
CLUN2 – *Clintonia uniflora* (Menzies ex Schult. & Schult. f.) Kunth, Bride's bonnet
COOC – *Coptis occidentalis* (Nutt.) Torr. & A. Gray, Idaho goldthread
CRDO2 – *Crataegus douglasii* Lindl., Black hawthorn
FRPU7 – *Frangula purshiana* (DC.) A. Gray, Cascara buckthorn
GYDR – *Gymnocarpium dryopteris* (L.) Newman, Western oakfern
HODI – *Holodiscus discolor* (Pursh) Maxim., Oceanspray
LAOC – *Larix occidentalis* Nutt., Western larch
LEGL – *Ledum glandulosum* Nutt., Western Labrador tea
MAAQ2 – *Mahonia aquifolium* (Pursh) Nutt., Hollyleaved barberry
MAST4 – *Maianthemum stellatum* (L.) Link, Starry false lily of the valley
MEFE – *Menziesia ferruginea* Sm., Rusty menziesia
OPHO – *Oplopanax horridus* (Sm.) Miq., Devilsclub
PAMY – *Paxistima myrsinites* (Pursh) Raf., Oregon boxleaf
PHCA11 – *Physocarpus capitatus* (Pursh) Kuntze, Pacific ninebark
PHLE4 – *Philadelphus lewisii* Pursh, Lewis' mock orange
PHMA5 – *Physocarpus malvaceus* (Greene) Kuntze, Mallow ninebark
PICO – *Pinus contorta* Douglas ex Loudon, Lodgepole pine
PIEN – *Picea engelmannii* Parry ex Engelm., Engelmann spruce
PIMO3 – *Pinus monticola* Douglas ex D. Don, Western white pine
PIPO – *Pinus ponderosa* Lawson & C. Lawson, Ponderosa pine
POBAT – *Populus balsamifera* L. ssp. *trichocarpa* (Torr. & A. Gray ex Hook.) Brayshaw**,** Black cottonwood
POTR5 – *Populus tremuloides* Michx., Quaking aspen
PREM – *Prunus emarginata* (Douglas ex Hook.) D. Dietr., Bitter cherry
PRVI – *Prunus virginiana* L., Chokecherry
PSME – *Pseudotsuga menziesii* (Mirb.) Franco, Douglas-fir
RHAL2 – *Rhododendron albiflorum* Hook., White rhododendron
SARA2 – *Sambucus racemosa* L., Red elderberry
SASC – *Salix scouleriana* Barratt ex Hook., Scouler's willow
SHCA – *Shepherdia canadensis* (L.) Nutt., Russet buffaloberry
SOSC2 – *Sorbus scopulina* Greene, Greene's mountain ash
SYAL – *Symphoricarpos albus* (L.) S. F. Blake, Common snowberry
TABR2 – *Taxus brevifolia* Nutt., Pacific yew
THPL – *Thuja plicata* Donn ex D. Don, Western redcedar
TSHE – *Tsuga heterophylla* (Raf.) Sarg., Western Hemlock
TSME – *Tsuga mertensiana* (Bong.) Carrière, Mountain hemlock
VAME – *Vaccinium membranaceum* Douglas ex Torr., Thinleaf huckleberry
VAMY2 – *Vaccinium myrtillus* L., Whortleberry
VASC – *Vaccinium scoparium* Leiberg ex Coville, Grouse whortleberry
XETE – *Xerophyllum tenax* (Pursh) Nutt., Common beargrass

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