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The California Lichen Society seeks to promote the appreciation, conservation, and study of lichens. The interests of the Society include the entire western part of the continent, although the focus is on California. Dues categories are (in $US per year): Student and fixed income (eBulletin only) - $10, Regular - $20 ($25 for foreign members, or $20 foreign student memberships), Family - $25, Sponsor and Libraries - $35, Donor - $50, Benefactor - $100, and Life Members - $500 (one time) payable to the California Lichen Society, PO Box 472, Fairfax, California 94978. Members receive the Bulletin (print and online access), the right to vote in society elections, and notices of meetings, field trips, lectures and workshops.

This number of the Bulletin of the California Lichen Society (ISSN 1093-9148) was edited by John Villella (Editor@californialichens.org) and was produced by Tom Carlberg (tcarlberg7@yahoo.com). The Bulletin welcomes manuscripts on technical topics in lichenology relating to western North America and on conservation of lichens, as well as news of lichenologists and their activities. The best way to submit manuscripts is by e-mail attachments in the format of a major word processor (DOC or RTF preferred). Use italics for scientific names. Please submit figures in electronic formats with a resolution of 300 pixels per inch (600 minimum for line drawings). Email submissions are limited to 10MB per email, but large files may be split across several emails or other arrangements can be made. Contact the Interim Editor, Tom Carlberg, at tcarlberg7@yahoo.com, for details of submitting illustrations or other large files. A review process is followed. Nomenclature follows Esslinger's cumulative checklist online at http://www.ndsu.edu/pubweb/~esslinge/chcklst/chcklst7.htm. The editors may substitute abbreviations of authors names, as appropriate from The International Plant Names Index - www.ipni.org/index.html. Style follows this issue. Electronic reprints in PDF format will be emailed to the lead author at no cost. Photographs are by the author(s) unless otherwise noted.

The deadline for submitting material for the Summer 2013 CALS Bulletin is 30 April 2014.

The California Lichen Society is online at: www.californialichens.org/ and has email discussions through http://tech.groups.yahoo.com/group/CaliforniaLichens/.

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Front Cover: Fiber samples – bundles of wool yarn, muslin (cotton), and woven raw silk – dyed with lichens; from bottom to top, dyes pictured are *Parmotrema perlatum, Letharia vulpina, L. vulpina* with afterbath of copper solution, *Usnea sp., Evernia prunastri* with no acidification, *E. prunastri* acidified with vinegar, *Flavopunctelia flaventior* acidified with vinegar, and *F. flaventior* with no acidification.

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VOLUME 20 NO. 2 Winter 2013

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A Bit of History

Lichens have been used as dyes for thousands of years (Brodo et al. 2001). Native Americans used natural dyes, including some lichens, to color basketry materials, quills, and fibers for weaving (Brodo et al. 2001; Sharnoff 2014). These dyes were likely the yellows, oranges, and browns created by boiling certain lichens in water to extract dye substances from the vegetative material. Well-known examples of these "boiling-water-method" dyes include bright yellows obtained from wolf lichen (*Letharia* species) and the red-brown colors of Harris tweed dyed with "crottle", a dye made from *Parmelia* species (Brodo et al. 2001; Cassleman 2001).

In addition to dyes made using the boiling-water-method, purple colors can be produced from lichens by fermenting particular species in a solution of ammonia. Purple lichen dyes date back to at least the third century A.D. when *Roccella* species, especially *Roccella tinctoria*, were used to create a dye called "orchil" (Casselman 2001). Orchil - a name referring to either the dye, itself, the purple color, or the lichen from which it was obtained - may have been used to augment or replace the use of murex, a dye that was originally sourced from predatory sea snails in the Mediterranean. Due to the small quantity of dye substance obtained from each snail and the difficulty to produce the dye, the value of murex increased, and the color purple became a status symbol worn primarily by the wealthy and aristocratic (Cassleman 2001; Cassleman and Terada 2012). Subsequently, the color became known as "royal purple". Whether orchil from lichens was secretly introduced into "royal purple" for economic reasons, as suggested by references to orchil as the "poor man's purple" (Best 2012), or was used because it improved the results of the murex dye process (Cassleman and Terada 2012), lichens played an important role in the economy of textile production.

Wool yarn dyed with wolf lichen *(Letharia* species, shown in foreground); dyed yarn is displayed with an undyed sample for comparison.

Lichen Dyes

Lichens can be used as dyes because they contain acids that are dye precursors. Some acids will produce colors good for dyeing after simply being extracted from the lichen by way of boiling in water (i.e. boiling-water-method). Acids used to produce purple dye, however, must undergo a chemical reaction before they yield their purple color. During the chemical reaction, orcinol from the lichen acid combines with ammonia and oxygen to create orcein, which is red-purple in color. Lichen acids that can produce orcein include evernic, gyrophoric, and lecanoric acids, as well as erythrin. These generally have a positive red reaction to chlorine spot tests.

Fiber samples dyed purple with lichen; this particular dye was made with *Flavopunctelia flaventior*.

In practice, we create the purple dye by placing chopped lichens in a solution of ammonia. For contemporary dyeing, the availability of commercially-produced ammonia is advantageous; historically, however, dye recipes incorporated urine as their source of this necessary component in the chemical reaction. After adding ammonia and water to the lichens, the vat is stirred to incorporate oxygen. The colorful orcein develops over a fermentation period of 3 weeks to 4 months or more, depending on the species of lichen and the particular conditions of the dye vat.

An array of lichen species being tested for their performance as dye lichens using the boiling-water-method.

After the color has fully developed, the liquid in the dye vat is strained, diluted with water, and used as dye. A relatively small amount of lichens can be used to dye a larger amount of fiber. According to *Lichen Dyes: The New Source Book* (Casselman 2001), a cup of dime-sized lichen pieces should be enough to dye at least an ounce of fiber. In my tests with some species, I have had good results using dry lichens weighing as little as 10-25% of the weight of fiber to be dyed. In one case, this translated to using one quarter cup of chopped, packed lichens to dye one ounce of fiber.

pH Sensitivity

The purple lichen dyes are usually sensitive to pH. Since the ammonia used in the recipe is alkaline, the resulting dye will often tend toward the blue end of a red-blue spectrum. By adjus-

ting the pH of the dye in the acidic direction, reddish hues can be obtained. The acidity can be increased by adding vinegar to the dye bath; alternately, dyed fibers can be dipped in an acidic solution of vinegar and water to obtain similar results.

While this color-changing property may seem miraculous at first, it is commonly observed during basic chemistry courses when litmus paper is used as an indicator of pH. Litmus paper is essentially lichen-dyed filter paper; blue litmus paper is an alkaline dye that turns red when dipped in an acidic solution, while red litmus paper is an acidic dye that turns blue when dipped in a basic solution.

Fiber samples that have been dyed with the lichen Flavopunctelia flaventior change color from blue-purple to magenta when dipped in a vinegar solution.

Mordants

Lichen dyes are substantive, meaning they don't require any additional mordant to help the color adhere to the fiber. In fact, these fixative properties have led to lichens being used as mordants for other dyes (Cassleman 2001). In particular, lichens that are prevalent and that do not give significant color when boiled are good candidates for use as mordants. One mordant that is commonly used for dyeing animal fibers is alum. It would be interesting to see the results of a comparison between lichen-mordanted fibers and alum-mordanted fibers, particularly using a type of dye that truly requires a mordant for adhesion.

Sustainability

Overharvest to the detriment of the species is something we have all too many examples of. The overharvest of sea snails for murex dye is one such example, and the overharvest of *Ochrolechia* species for lichen-based dyes in the Scottish Highlands is another. With that in mind, I have developed the following sustainable collection practices to guide my own work:

1. Know your lichens – Learn to identify and key lichens, read books, speak to experts. Learn how to identify and avoid rare species.
2. Collect locally abundant species – Never collect rare species even when locally abundant.
3. Collect unattached lichens – Blow-down from storms, those growing on firewood, no crustose species!
4. Collect no more than 10 percent – This should be enough for individual use... if it's not, the lichen is not abundant enough! Don't collect for storage, sale, or large-scale use.

A New Species for Purple

I worked closely with lichenologist Shelly Benson, and we discovered a relatively common lichen, *Flavopunctelia flaventior*, that gave a beautiful magenta color after only 6 weeks of ammonia fermentation. The color was similar to that of *Umbilicaria phaea* fermented for 12 weeks. Dyes from both species developed into a rich, deep bluish-purple during the following year and remained quite similar to each other when tested on various fiber samples.

Knowing about lichens in the area greatly increased our chances of finding this new dye lichen. We researched lichens to find species with the appropriate acids, and we learned which of these were locally available. We tested many species and were happy to discover one

Flavopunctelia flaventior, upper right, shown growing next to *Flavoparmelia caperata*, bottom left; only the former species can be used to create purple dye because it contains an appropriate type and quantity of dye precursor acids.

that worked well for dyeing and was quite common, locally. While *Umbilicaria* species perform similarly as a dye, it would not be appropriate to collect them in our local area due to their scarcity. *F. flaventior*, on the other hand, is much more abundant, and can often be found on fence posts, fallen trees, or branches blown down in storms.

This discovery of *F. flaventior* also underscores the importance of correct lichen identification. *Flavoparmelia caperata* is very similar in appearance and can be found growing side-by-side with *F. flaventior*. Close inspection revealing pseudocyphellae or a positive red medullary reaction to the C test will confirm *F. flaventior*. (Note: Other species of *Flavopunctelia* will have a positive red medullary reaction, but these have not been tested by the author for their suitability as a dye source.) If *F. caperata* is fermented in ammonia, instead, the result is a disappointing shade of tan, rather than bright purple. A mixture of the two species might be assumed to produce a muddied or dilute version of the purple dye; even if the resulting dye is acceptable in hue, the *F. caperata* contained therein is unnecessary and wasteful. It is therefore prudent to know the intricacies of any lichen species you are interested in collecting and how to differentiate it from similar species.

Lichen Dyes at SOMA Camp

Members of the California Lichen Society (CALS) have been sharing information about lichens at the Sonoma Mycological Association (SOMA) Wild Mushroom Camp for the last few years. One of the first things we like to convey is how lichens fit into the world of fungi. Within the fungal division Ascomycota, a whopping 42% are lichenized (Lutzoni et al. 2001). Overall, about twenty percent of kingdom fungi is lichenized (17.5%; Lumbsch et al. 2011), so we like to say we are "representing the 20%" when we attend fungus-focused events.

Last year, Shelly and I introduced SOMA Camp attendees to the possibilities of dyeing fiber with lichens. Over the years, mushroom dyeing and related fiber arts workshops have developed a large following at SOMA Camp,

SOMA workshop attendees admire lichen dye results as they hang samples to dry.

and many people were excited to learn about how lichens can be used as dyes. The general response to the 2013 Lichen Dyes workshop was resoundingly positive; the class filled to capacity, and we received much appreciative feedback from the attendees.

As the year wore on and planning for the following year of SOMA Camp got underway, Shelly and I were asked to return to teach about lichen dyeing at the 2014 event. Other workshop leaders were interested in signing-up for our class, and some of our students from the previous year wanted to solidify their knowledge with a second round of the Lichen Dyes curriculum. Again, the workshop filled to capacity, and we were delighted to teach the students, both new and returning, about dyeing with lichen-based substances.

Workshop attendees had a chance to work with *F. flaventior* and three other lichen dyes. A beautiful array of colors was produced using only four lichen species. People were also impressed at how well the lichen dyes worked on vegetable fibers, such as cotton. Many students left the workshop with a new appreciation for lichens. A few even headed out the door with a CALS Miniguide in hand and the confidence and intent to perform C tests and UV-tests for lichen identification.

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Lichens at the Carrizo Plain National Monument. Photograph by Tara Collins.

Initial Lichen Inventory of the Trinity Alps Wilderness

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Lichen inventories on Forest Service lands are few. The Trinity Alps Wilderness is a unique and complex area of multiple vegetations, geologies, and moisture regimes, providing numerous habitats for lichen diversity. Six different locations were inventoried in 2013, resulting in 89 species recorded. An additional 13 species were added from incidental records. Collection locations and significant species are discussed. Additional areas are identified for future inventories.

Introduction

Lichen inventory data for federally-administered lands is scant to nonexistent. While there is a policy document (NPS 2001) and a monitoring program (NPS 2014) in place for the national parks in the United States, it is currently estimated to be only 46% complete. In California there are only three published inventories for national parks (Knudsen & Kokourkova 2012; Hutten et al. 2013; Knudsen et al. 2013). Additional inventories are recommended (McCune *et al.* 2007). For the much larger land area managed by the US Forest Service, no formal lichen inventories have been made, aside from species-specific surveys conducted within the range of the northern spotted owl, as part of the Survey and Manage component of the Northwest Forest Plan. Informal inventory data exist in the form of spatial queries of online lichen herbaria (CNALH, UC Riverside, NY Botanic Garden), but data for these are incidental rather than focused.

The objective of this work was to initiate a focused inventory and collection of macrolichens on National Forests in northwest California. Large portions of National Forest lands have been fragmented by logging and related road construction. Wilderness areas, while not exempt from the disturbance of wildfire, are relatively undisturbed by land management activities and also capture relatively wide elevational gradients and thus diverse vegetative communities, providing an advantageous setting for lichen inventory.

Geographic setting

The Trinity Alps is a 525,627-acre Wilderness located primarily in northern Trinity County in northern California, and except for approximately 4623 acres under the jurisdiction of the Bureau of Land Management, is administered by the Shasta-Trinity, Klamath and Six Rivers National Forests. The Wilderness also crosses the boundaries of Trinity, Siskiyou and Humboldt Counties; the county boundaries coincide with the National Forest boundaries. The wilderness is located in the Salmon and Scott Mountains, subranges of the Klamath Mountains. Elevations range from 2400 feet in the Stuart Fork Canyon to just over 9000 feet at Thomson Peak (Ferlatte 1974). Rainfall varies between 29 and 107 inches of precipitation annually (Gibson et al. 2002); higher elevations typically receive greater precipitation than low.

The following information on the geology of the Trinity Alps Wilderness is excerpted from Davis et. al, 1965:

> "The oldest rocks are Pre-Upper Jurassic metamorphics. Igneous rocks are younger, mostly Upper Jurassic-Lower Cretaceous in age. Plutons at Caribou Mountain and in

Canyon Creek are quartz diorite; there are also large ultramafic outcrops, most of which have altered to serpentine. The youngest rocks are Quaternary glacial deposits, alluvium and talus".

Portions of the vascular flora are predominantly Sierran, a unique occurrence for mountains that lie only sixty miles from the Pacific Ocean. The following ecological zones occur (Ferlatte 1974): mixed conifer forest, red fir forest, subalpine forest, alpine fell-field, and montane chaparral.

Collection locations

Inventory locations were chosen to capture as much of the habitat diversity of the Wilderness as was practical (Figure 1), given the time and funding available. Visits to west side locations around Limestone Ridge, Tish Tang Creek and Mill Creek Lakes had to be cancelled due to the Corral and Baker fires of 2013. This was unfortunate because the west side (approximately west of the New River) receives more moisture than the rest of the Wilderness, both in precipitation and also in relative humidity (PRISM 2010). The resulting loss of inventory diversity was significant.

Locations 7, 8 and 9 were not a formal part of this Inventory. They represent earlier collections from my personal herbarium, and were made during casual recreational trips into the Alps and surrounding areas, or were collected during field work for Six Rivers National Forest. All collections (Table 1) have been accessioned into the herbarium at the California Academy of Sciences (CAS).

1. East Fork New River Trail. 33 species.

Portions of this trail had burned during the 1999 Megram Fire, but as was typical of the patchy nature of Megram, certain areas remained unburned, despite their proximity to areas of high-intensity burn. East Fork New River Trail follows the north bank of the East Fork, beginning at about 2000' elevation. Except for the river benches the habitat is a relatively uniform moist vegetation type, and consists primarily of early- to late-mature *Pseudotsuga menziesii/Notholithocarpus densiflora* forest mixed with *Calocedrus decurrens* and *Pinus ponderosa* in slightly drier areas, and *Acer macrophyllum* where more moisture is available. Small *Quercus garryana* woodlands less than 10 acres in size are scant along the portions of the trail surveyed. On old river benches the vegetation changes to an *Alnus*

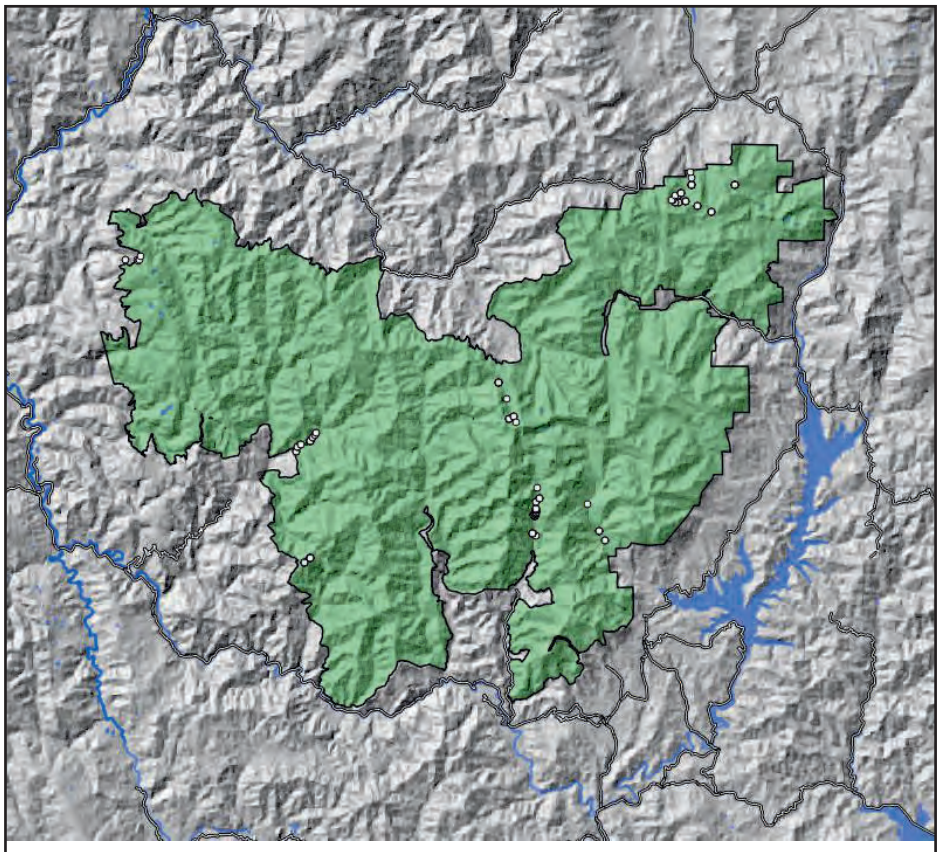

Figure 1. Trinity Alps Wilderness, showing collection locations (white dots).

rhombifolia/Acer macrophyllum forest with an understory of *Cornus canadensis* and *Taxus brevifolia*. Light levels can be very low and moisture is available year-round.

Due to the valley bottom slope position (McCune et al.2002) and hardwood species, cyanolichens are well-represented on trees and sometimes on the ground along many parts of the trail. *Collema nigrescens, Nephroma helveticum, N. resupinatum* and *Pseudocyphellaria anthraspis* are common on maple and yew branches and trunks. The lowest portions of mossy clustered dogwood trunks host smaller cyanolichens: *Leptogium palmatum, L. polycarpum*, and *Fuscopannaria pacifica*. Some of the larger cyanolichens are also present in the drier Garry oak stands, including *Lobaria hallii*. Terrestrial lichens are present in unburned portions of the trail, but species diversity is low.

2. Green Mountain Trail. 17 species.

Green Mountain Trail begins at 5,050' in a small Quercus garryana grassland, and climbs steeply up the southeast ridge of Brushy Mountain, ascending through a mixed early-mature/old-growth forest of *Pseudotsuga menziesii/Abies grandis/Abies magnifica*, until approximately 5,800', where Douglas-fir drops out, and the forest is composed entirely of fir trees. Lichen species conformed to that of a typical mid-elevation mid- to upper-slope fir forest, with *Alectoria sarmentosa, Platismatia glauca, P. stenophylla, Letharia columbiana, L. vulpina, Esslingeriana idahoensis, Bryoria pseudofuscescens*, and *Hypogymnia imshaugii* dominating the boles and/or litterfall. *Parmeliopsis ambigua* grew abundantly on tree butts, and *P. hyperopta* was notably absent. Species diversity is low, and in keeping with its slope position (Berryman & McCune 2006), cyanolichens were expectedly absent from this relatively high-elevation ridgetop trail.

Greater species diversity would have been present, however one of teh fires of the Bar Complex (2006) had burned through Brushy Mountain, starting above the Garry oak grove at the start of the trail. Burn evidence was apparent throughout the length of the trail surveyed. While the pattern of burning is a beautiful example of an old-growth forest's tendency towards ground-hugging fire (it may in fact have been a controlled back-burn), it also demonstrates that ground-based fire is catastrophic to any plant community less than eight feet tall. There was no vascular plant understory and virtually no graminoid presence in any surveyed part of this trail. Lichens that are typically found on soil, soil on rocks, directly on small and large rocks, or on tree bases or the cut banks of trails were completely absent from all parts of the Green Mountain Trail. No specimens were found of the common terrestrial/saxicolous genera *Peltigera, Leptogium, Cladonia, Leptochidium, Polychidium, Fuscopannaria,* and *Massalongia*.

3. Canyon Creek Trail. 58 species.

This popular backpacking trail had the least elevational gradient and the greatest substrate diversity of any inventoried location. Lower portions of the trail are *Pseudotsuga menziesii/Abies concolor/Notholithocarpus densiflora* forest with regular *Quercus kelloggii* and frequent *Quercus chrysolepus, Calocedrus decurrens* and *Abies magnifica*, as well as *Acer macrophyllum* where more moisture is available. Small granite boulders are common along the lower trail, increasing in size and frequency approaching the subalpine parts of the trail. Portions of the first 1.5 miles of the trail show evidence of a controlled underburn. Above Canyon Creek Falls, tree size and diversity increased – *Picea breweriana, Tsuga mertensiana*, some large (>40"dbh) *Pinus lambertiana* and *P. ponderosa*, *Pinus monticola*, and *Populus trichocarpa* are present in various locations in the meadows paralleling the creek.

Canyon Creek Trail resembles East Fork New River Trail in that both have a vegetation type indicative of a mesic habitat, which in combination with the absence of widespread fire and the high substrate diversity, contributes to a high lichen species diversity. Both chlorolichens and cyanolichens were abundant and diverse. Additionally, the greater presence of rocky substrates in this area resulted in detections of

terrestrial and saxicolous species not found at East Fork, including *Vestergrenopsis sonomensis, Cladonia ochrochlora, C. verruculosa, Leptochidium albociliatum, Leptogium teretiusculum, Melanelia disjuncta*, seven species of *Peltigera*, and *Xanthoparmelia verruculifera*. Especially notable is the presence of *Peltigera gowardii*, a Sensitive species in Region 5. This is only the second occurrence of this species on the Shasta-Trinity National Forest.

4. East Boulder Lake – Pacific Crest Trail. 13 species.

This inventory location had low species diversity for a number of reasons: 1) the northeast corner of the Trinity Alps has a mixed geology of metamorphic and granitic parent materials. The rocks of East Boulder Lake and the Pacific Crest Trail above the lake are peridotite, the chemistry of which is not conducive to macrolichen diversity; 2) based on the absence of lichens from the lowest 5-10' of tree trunks in the area, the area experiences significant persistent snow. In summer-dry climates, lichens photosynthesize and increase biomass significantly during periods of winter sun in the presence of snow (Kappan & Breuer 1991; Schroeter et al. 1997), but only to the depth that sunlight can penetrate the upper layers of snow. Below this depth, there is moisture but insufficient light, resulting in the decay and death of the lichen; 3) the habitat is rocky and alpine to subalpine, and 4) the trail contours along the dry south face of a long east-west ridge. Each factor taken singly (exotic chemistry, persistent snow pack, dry south slope, sub/alpine habitat) will reduce species diversity; taken together they result in overall very low macrolichen species diversity.

5. Mavis Lake/Fox Lake/Fox Creek cross-country loop. 19 species.

This portion of the inventory had similarities to the East Boulder Lake/Pacific Crest leg of the trail, in that the habitat was subalpine and rocky, with an apparent persistent snowpack. In particular, the stretch of terrain between Fox Lake and Fox Creek showed significant snow damage in the form of heavy branch litterfall, absence of understory, and numerous dead and dying standing Abies spp. on the gentle slopes east of Fox Creek, all of which contributed to diminished lichen diversity because of the short life of the substrate. However the granitic parent material and the northerly aspect combined to provide substrate, temperature and moisture conditions suitable to lichen metabolism. Notable collections made here were *Leptogium rivale*, found where the cool waters of Fox Creek flowed over slopes of 5-15%, and *Bryoria simplicior*, a species with white soredia, which is an uncommon character in California species of Bryoria.

The ridge between Fox Lake and Fox Creek is rocky enough that trees grow poorly here, and the accumulation of litter and duff is minimal. A well-established community of terrestrial lichens grows here, including *Placynthiella icmalea*, a widely distributed and frequently overlooked minute soil crust.

The highest species diversity associated with this particular route was found on flat ground at the confluence of Fox Creek and the unnamed outflow from Mavis Lake. At this site, there were five species that showed up here that had been undetected all day: *Alectoria sarmentosa, Bryoria simplicior, Melanohalea exasperatula, Platismatia glauca* and *Tuckermannopsis chlorophylla*.

6. Fox Ridge Trail. 11 species.

The habitat along Fox Ridge was the driest encountered in the course of this inventory. Typical of ridgetop locations, it is more exposed, receives more insolation, and becomes drier as one descends. These changes are reflected in the presence of species indicative of drier environments such as *Pinus ponderosa* and *Arctostaphyllos* spp.

Two species found on the ridge are unusual. Additional occurrences of *Bryoria simplicior* were found on *Abies concolor* and *Abies magnifica*. The only detection within the Alps of *Hypocenomyce castaneocinerea* came from Fox Ridge. This common lichen grows almost exclusively on burned wood and charcoal; given the large acreage of burned forest surveyed, it is

unusual that only one detection was made.

West Side Inventory. Day trips planned for the west side trailheads at Limestone Ridge, Mill Creek Lakes and Tish Tang Creek were cancelled, as the Corral and Baker fires of 2013 had increased in size and caused closures in these Wilderness areas.

7. Grizzly Lake and **North Fork Trinity Trail**. 16 species.

Collections from Grizzly Lake and North Fork Trinity Trail were made in 2002 incidental to a recreational backpacking trip, and are not as representative of the lichen flora of the area as collections from other sites, the collections having been made sporadically. A detailed inventory of this trail is recommended, especially the portion between China Spring Trail and Grizzly Meadows, as this segment of the trail has dense and moist vegetation. Despite the unstructured nature of this trip, some significant collections were made of species representative of a community that inhabits drier, more easterly habitats (i.e., California Cascade Mountains or Interior Coast Ranges): *Nephroma parile, Dermatocarpon intestiniforme, Lobothallia melanaspis*, and *Phaeophyscia decolor.* Other notable species from North Fork Trail include *D. meiophyllizum, Pseudephebe pubescens* and *Umbilicaria polyphylla*.

8, 9. Stuart Fork Creek and incidental westside locations. 10 species.

Like the Grizzly Lake and North Fork Trinity Trail collections, the specimens from Stuart Fork Creek were made in 2002 while backpacking, and were not intended to represent the lichen flora of these areas. They are included here to increase the value of this report, and because some of the species from Stuart Fork Creek were not found in other parts of the Alps. *Melanelia panniformis* is uncommon throughout the Pacific Northwest.

Incidental collections are from the Lower Trinity Ranger District on Six Rivers National Forest, and were made during the course of botanical field work in 2001 related to the Megram Fire. Notable species are *Leptogium subaridum*, which was described in 1994 and is seldom collected, and *Psoroma hypnorum*, from the headwaters of Mill Creek.

Significant species

The following collections are noteworthy, representing species encountered that are unusual, under-reported or uncommon to rare.

Bryoria simplicior (Vainio) Brodo & D. Hawksw. (Carlberg #03519A, 03522, 03534).

It is unusual to find in California any of the species of *Bryoria* that produce white soredia. *Brioria furcellata, B. fuscescens, B. glabra, B. implexa* and *B. pikei* have all been found sporadically and in small quantities in California, mostly in relatively pristine locations. The USDA National Lichens & Air Quality Database (USDA 2013) shows only one previous detection of *B. simplicior* in California (Marble Mountains).

"Dendriscocaulon" intricatulum (Nyl.) Henssen.

The taxonomy of this occasional cyanolichen is still unresolved, however the lower elevations of both the Fox Ridge and Canyon Creek Trails, with their mixed hardwood/conifer forests that include *Quercus kelloggii*, seem like suitable habitat. This lichen was not found during the current inventory.

Dermatocarpon intestiniforme (Körber) Hasse (Carlberg #00742).

Widespread, uncommon, and distinctive, this specimen is from the north side of the Wilderness, along Grizzly Creek Trail. In reference books that recognize this taxon (Brodo et al. 2002; McCune & Geiser 1997) it keys easily because of the multiple holdfasts for each thallus, however some recent texts (McCune & Geiser 2009) treat it as a synonym of *D. miniatum* var. *complicatum*, which however has a single holdfast.

Dermatocarpon meiophyllizum Vainio (Carlberg #00744, 00745, 03499, 03512).

In western North America prior to 2009, this lichen was identified as *D. luridum*, a rare lichen protected under the Survey & Manage component of the Northwest Forest Plan. Research by Glavich & Geiser (2009) determined that

most North American specimens were actually the European taxon *D. meiophyllizum*, distinguished by the Melzer's (+) reaction of the medulla. It was found at two widely separated locations in the Wilderness.

Hypocenomyce castaneocinerea (Räsänen) Timdal (Carlberg #03404, 03538).

Given the amount of burned forest visited during this inventory, it is surprising that this lichen was not found numerous times, given the specificity of its substrate (charcoal and burned wood).

Leptogium polycarpum P. M. Jørg. & Goward (Carlberg #03334).

Widely distributed and possibly uncommon in California, *L. polycarpum* is easily distinguished from other fertile species of *Leptogium* by the 4-spored asci.

Leptogium rivale Tuck. (Carlberg #03506B).

An aquatic cyanolichen that is more likely overlooked and undercollected than rare (Glavich 2009), *L. rivale* is found in clear cold perennial streams, especially on granitic substrates. The thin brown thallus resembles a smudge on the rock surface,

Leptogium subaridum Jørgensen & Goward (Carlberg #00518).

Seldom reported in California, and usually absent from the Central and Outer Coast Ranges. Possibly overlooked, and very widely distributed, having been reported from Greece, Italy, Spain, and Morocco(Aragón et al. 2004).

Massalongia carnosa (Dickson) Körber (Carlberg #00725, 00729, 03427, 03468).

Published reports of this widespread and common species that grows on moss over rock are few (Tucker 2013), so it perhaps deserves more frequent mention.

Melanelia panniformis (Nyl.) Essl. (Carlberg #00726).

Another specimen from the Grizzly Creek Trail, *Melanelia panniformis* is isidiate and saxicolous, and like many lichens has the apparently contradictory distribution pattern of being both uncommon and widespread. Only two recent reports from California (Tucker 2013).

Nephroma parile (Ach.) Ach. (Carlberg #00747).

Uncommon in northern California, and absent from the northern Outer Coast Ranges, this lichen is sporadic in mesic areas, and becomes the dominant representative of the genus in drier forests further east.

Peltigera britannica (Gyelnik) Holt.-Hartw. & Tønsberg (Carlberg #03327).

From the East Fork New River Trail. More common further west, and may be restricted to the Coast Ranges in northern California.

Peltigera gowardii Lendemer & H. O'Brien (Carlberg #03437A, 03437B).

This species has in recent times undergone a somewhat bewildering series of name changes (Miadlikowska & Lutzoni 2000; Lendemer & O'Brien 2011).

Like *Leptogium rivale*, *Peltigera gowardii* prefers clear cold spring-fed creeks. *P. gowardii* has very strict requirements regarding stream temperature, scour and sedimentation (Davis et al. 2000, 2003). This lichen is a Sensitive species in Region 5, and occupies much of its predicted habitat in the central Sierra Nevada (Peterson 2010), but is scarce in the Coast Ranges, with only four occurrences on the Six Rivers (1), Shasta-Trinity (2), and Mendocino (1) National Forests. A new unvouchered detection was made recently on the Klamath National Forest (Rentz 2013), but given the ease with which this lichen can be identified, it seems very likely that the identification is valid.

Peltigera leucophlebia (Nyl.) Gyelnik (Carlberg #03439, 03458, 03464).

The most common green *Peltigera* in the Wilderness. Green species of *Peltigera* are a symbiosis of a fungus, a green primary photopartner, and a secondary cyanobacterial photopartner. In the outer Coast Ranges of northern California, *P. britannica* dominates, and apparently in the central Coast Range, the opposite is true. *P. leucophlebia* has also been reported from Plumas County (*Bratt 7550*; det. McCune).

Peltigera venosa (L.) Hoffm. (Carlberg #03408).

Uncommon throughout northern California,

and absent from the southern part of the state.

Placynthiella icmalea (Ach.) Coppins & P. James (Carlberg #03501B).

Another overlooked and underreported lichen, *P. icmalea* is nearly indistinguishable from the dirt on which it grows.

Psoroma hypnorum (Vahl) Gray (Carlberg #00519).

Uncommon to rare in California, but more common in states to the north and east (Oregon and Colorado). This voucher is actually from just west of the Wilderness, in the Mill Creek drainage on Six Rivers National Forest. The location is near the Corral Fire (2013), and has possibly burned since the 2001 collection.

Acknowledgememts

Grateful appreciation goes out to numerous Forest Service personnel who provided funding and/or logistical support during the weeks of the Inventory. Trent Procter (Region 5 Air Quality Program Manager) and Christina Boston (Region 5 Wilderness Program Leader) provided funding, Lisa Hoover (Forest Botanist, Six Rivers National Forest) made personnel resources available, and Lusetta Nelson (Westside Botanist, Shasta-Trinity National Forest) co-wrote the proposal that secured the funding.

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Table 1. Species encountered during Trinity Alps Inventory (2013), collection numbers, and locations. Site 1 = East Fork New River Trail; 2 = Green Mountain Trail; 3 = Canyon Creek Trail; 4 = East Boulder Lake – Pacific Crest Trail; 5 = Mavis Lake/Fox Lake/Fox Creek; 6 = Fox Ridge Trail; 7 = Grizzly Lake and North Fork Trinity Trail; 8-9 = Stuart Fork Creek and incidental westside locations; "Y" = present; "NC" means observed but not collected.

Scientific Name	Carlberg Collection number(s)	1	2	3	4	5	6	7	8-9
Ahtiana pallidula (Tuck. ex Riddle) Goward & Thell	#03320	Y							
Ahtiana sphaerosporella (Müll. Arg.) Goward	#00733, 03482, 03494, 03509				Y			Y	
Alectoria imshaugii Brodo & D. Hawksw.	#03355, 03451A		Y	Y					
Alectoria lata (Taylor) Lindsay	#03353		Y						
Alectoria sarmentosa (Ach.) Ach.	#03313, 03462, 03513	Y		Y		Y			
Bryoria cf. *pseudofuscescens* Brodo & D. Hawksw.	#03413			Y					
Bryoria fremontii (Tuck.) Brodo & D. Hawksw.	#03481, 03490, 03526				Y	Y	Y		
Bryoria pseudofuscescens Brodo & D. Hawksw.	#03351, 03359, 03375, 03378		Y						
Bryoria simplicior (Vainio) Brodo & D. Hawksw.	#03519A, 03522, 03534					Y	Y		
Cladonia carneola (Fr.) Fr.	#03508					Y			
Cladonia chlorophylla (Flörke ex Sommerf.) Sprengel	#03324	Y							
Cladonia fimbriata (L.) Fr.	#03387	s.n.		Y					
Cladonia ochrochlora Flörke	#03441			Y					
Cladonia pyxidata (L.) Hoffm.	#03420	s.n.		Y					
Cladonia transcendens (Vainio) Vainio	#03442	s.n.		Y					
Cladonia verruculosa (Vainio) Ahti	#03465			Y					
Collema nigrescens (Hudson) DC.	#03335A, 03344, 03388, 03444	Y		Y		Y	Y		
Dermatocarpon intestiniforme (Körber) Hasse	#00742							Y	
Dermatocarpon meiophyllizum Vainio	#00744, 00745, 03499, 03512					Y		Y	
Dermatocarpon reticulatum H. Magn.	#03429, 03483A			Y	Y				
Esslingeriana idahoensis (Essl.) Hale & M. J. Lai	#00094, 03322, 03373, 03394	Y	Y	Y		Y			
Evernia prunastri (L.) Ach.	#03349, 03460B	Y		Y					
Fuscopannaria pacifica P. M. Jørg.	#03332, 03338	Y							
Hypocenomyce castaneocinerea (Räsänen) Timdal	#03404, 03538			Y			Y		
Hypogymnia enteromorpha (Ach.) Nyl.	#03323	Y							
Hypogymnia imshaugii Krog	#03318, 03352, 03400, 03475, 03479, 03510, 03529	Y	Y	Y	Y	Y	Y		
Hypogymnia occidentalis L. Pike		s.n.							
Kaernefeltia merrillii (Du Rietz) Thell & Goward	#03477				Y				
Leptochidium albociliatum (Desm.) M. Choisy	#03425			Y					
Leptogium lichenoides (L.) Zahlbr.	#00517, 00746, 03418, 03426, 03463	Y		Y				Y	Y
Leptogium palmatum (Hudson) Mont.	#03346	Y		s.n.		s.n.			
Leptogium polycarpum P. M. Jørg. & Goward	#03334	Y							

Scientific Name	Carlberg Collection number(s)	1	2	3	4	5	6	7	8-9
Leptogium rivale Tuck.	#03506B					Y			
Leptogium subaridum Jørgensen & Goward	#00518								Y
Leptogium teretiusculum (Wallr.) Arnold				s.n.					
Letharia columbiana (Nutt.) J. W. Thomson	#03362, 03474		Y		Y				
Letharia vulpina (L.) Hue	#00734, 03361, 03397, 03473, 03478, 03527	s.n.	Y	Y	Y		Y	Y	
Lobaria hallii (Tuck.) Zahlbr.	#03343, 03457	Y		Y					
Lobaria pulmonaria (L.) Hoffm.	#03337, 03449A	Y		Y			s.n.		
Lobothallia melanaspis (Ach.) Hafellner	#00740							Y	
Massalongia carnosa (Dickson) Körber	#00725, 00729, 03427, 03468	Y		Y		Y			Y
Melanelia disjuncta (Erichsen) Essl.	#03431			Y					
Melanelia panniformis (Nyl.) Essl.	#00726								Y
Melanelia subolivacea (Nyl.) Essl.	#00529								Y
Melanohalea exasperatula (Nyl.) O. Blanco et al.	#03518					Y			
Melanohalea multispora (A. Schneider) O. Blanco et al.	#03434			Y					
Melanohalea subelegantula (Essl.) O. Blanco et al.	#03398, 03511, 03524, 03533			Y		Y	Y		
Melanohalea subolivacea (Nyl.) O. Blanco et al.	#03369, 03383			Y					
Nephroma helveticum Ach.	#03316, 03328, 03385	Y		Y					
Nephroma parile (Ach.) Ach.	#00747							Y	
Nephroma resupinatum (L.) Ach.	#00721, 03319, 03330, 03433, 03443	Y		Y					Y
Nodobryoria abbreviata (Müll. Arg.) Common & Brodo	#03358, 03432, 03476, 03480, 03525		Y	Y	Y		Y		
Normandina pulchella (Borrer) Nyl.	#03333, 03389, 03456	Y		Y					
Parmelia hygrophila Goward & Ahti	#03356, 03374, 03382, 03393		Y	Y					
Parmelia saxatilis (L.) Ach.	#00730, 03428, 03435			Y				Y	
Parmelia sulcata Taylor	#03314, 03377	Y	Y	s.n.					
Parmeliopsis ambigua (Ach.) Arnold	#03367, 03405, 03488, 03496, 03515		Y	Y		Y	s.n.		
Parmeliopsis hyperopta (Ach.) Arnold	#03341, 03498, 03516	Y		s.n.		Y			
Peltigera britannica (Gyelnik) Holt.-Hartw. & Tønsberg	#03327	Y							
Peltigera collina (Ach.) Schrader	#00724, 03326, 03407	Y		s.n.					Y
Peltigera gowardii Lendemer & H. O'Brien	#03437B, 03438			Y					
Peltigera leucophlebia (Nyl.) Gyelnik	#03439, 03458, 03464			Y					
Peltigera membranacea (Ach.) Nyl	#03331, 03459	Y		Y					
Peltigera ponojensis Gyelnik	#03417, 03466, 03469			Y					
Peltigera praetextata (Flörke ex Sommerf.) Zopf	#00748, 03419, 03440, 03460A			Y				Y	
Peltigera venosa (L.) Hoffm.	#03408			Y					
Phaeophyscia decolor (Kashiw.) Essl.	#00743							Y	

Scientific Name	Carlberg Collection number(s)	1	2	3	4	5	6	7	8-9
Physcia dubia (Hoffm.) Lettau	#03470, 03504A				Y	Y			
Physcia subtilis Degel.	#00722								Y
Physconia americana Essl.	#00095A, 03342, 03386, 03446	Y		Y					
Physconia enteroxantha (Nyl.) Poelt	#00723								Y
Physconia perisidiosa (Erichsen) Moberg	#03390			Y					
Placidium lachneum (Ach.) Breuss	#03502B, 03503					Y			
Placidium squamulosum (Ach.) Breuss	#03483B, 03484				Y				
Placopsis lambii Hertel & V. Wirth	#03437A			Y					
Placynthiella icmalea (Ach.) Coppins & P. James	#03501B					Y			
Platismatia glauca (L.) Lindsay	#03317, 03364, 03517, 03531	Y	Y	s.n.	s.n.	Y	Y		
Platismatia herrei (Imshaug) Culb. & C. Culb.	#03340	Y							
Platismatia stenophylla (Tuck.) Culb. & C. Culb.	#03360, 03380, 03461		Y	Y					
Polychidium muscicola (Sw.) Gray	#00821, 03325, 03416, 03430	Y		Y					Y
Pseudephebe miniscula (Nyl. ex Arnold) Brodo & D. Hawksw.	#00732, 03487					Y		Y	
Pseudephebe pubescens (L.) M. Choisy	#00731							Y	
Pseudocyphellaria anomala Brodo & Ahti	#03415			Y					
Pseudocyphellaria anthraspis (Ach.) H. Magn.	#03329, 03384, 03448	Y		Y					
Psoroma hypnorum (Vahl) Gray	#00519								Y
Sphaerophorus tuckermanii Räsänen	#03411			Y					
Tuckermannopsis chlorophylla (Willd.) Hale	#00093, 03412, 03514, 03530	Y		Y	Y	Y			
Tuckermannopsis orbata (Nyl.) M. J. Lai	#03321, 03376	Y	Y						
Tuckermannopsis platyphylla (Tuck.) Hale	#03363, 03489, 03528		Y			Y	Y		
Umbilicaria hyperborea (Ach.) Hoffm.	#00735, 03472				Y			Y	
Umbilicaria phaea Tuck.	#03421, 03485			Y	Y				
Umbilicaria polaris (Savicz) Zahlbr.	#00738, 03471				Y			Y	
Umbilicaria polyphylla (L.) Baumg.	#00736							Y	
Umbilicaria polyrrhiza (L.) Fr.	#03436			Y					
Umbilicaria vellea (L.) Hoffm.	#00737							Y	
Usnea cornuta Körber	#03381			Y					
Usnea diplotypus Vainio	#03350, 03391, 03414, 03532	Y		Y			Y		
Usnea pacificana P. Halonen	#03339, 03357	Y	Y						
Usnea subfloridana Stirton	#03409			Y					
Vestergrenopsis sonomensis (Tuck.) T. Sprib. & Muggia	#03424			Y					
Vulpicida canadensis (Räsänen) J.-E. Mattsson & M. J. Lai	#03315	Y							
Xanthoparmelia verruculifera (Nyl.) O. Blanco et al.	# 03423			Y					

Sterile Crusts of the West, a Workshop with Dr. James Lendemer

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On April 5-7, 2013 sixteen lichenologists from Alaska to Iowa gathered at Southern Oregon University in Ashland Oregon to resolve a mutual frustration: identifying sterile crustose lichens. Dr. James Lendemer from the New York Botanical Garden led the group through three days of hands on experience to conquer their fears and frustrations in identifying this overlooked category of lichens.

On Friday the group stayed indoors studying the various morphology of sterile crustose lichens. By the end of the day everyone was fluent in the many different forms of diaspores that were required to know for proper identification. The group also reviewed the three major types of algae that are included in the Preliminary Keys to the Typically Sterile Crustose Lichens in North America: *Trentepohlia*, Trebuxioid, and *Stichococcus* types (Lendemer, 2013).

On Saturday the crew journeyed through three collection sites, all located on BLM lands around Jackson County. The first stop was at Upper Table Rock just north of Medford. During the 2.8-mile hike to the top, many admired the array of wildflowers and macrolichens along the trail. Upon reaching the crest, many were relieved by the sight of the flat prairie covering the top. After delicately making our way across flat ground, we encroached upon steep rock crevasses laced with patches of poison oak where many species of sterile lichens were found. A majority of species collected at Upper Table Rock were chiseled from the andesite rock outcroppings. While chiseling out samples of *Lepraria neglecta* in particular, James emphasized the importance of noting habitat when collecting lichens that intuitively appear to be *Lepraria* sp. Habitat can be incredibly useful when determining the difference between *Lepraria neglecta* which is found on rock exposed to full sun, and dry conditions and *Leprocaulon adhaerens* which is found in the more moist cracks of rocks. Although the two species look morphologically similar, *Lepraria neglecta* contains a pseudocortex that gives it a somewhat shiny appearance that is a defining feature when compared to other similar species (Figure 1).

The second site was the historic Sterling Mine Ditch Trail in the Little Applegate River valley. This trail is the result of a ditch built by the Sterling Mining Company in 1877 to bring water from the Applegate River and aide in separating gold from rock. The winding trail cuts through a valley with a mix of forests and more open rocky areas, trees encountered here include Oregon white oak, black oak, madrone, Douglas-fir and ponderosa pine. Many different corticolous sterile lichen species were collected.

The third site was located at a mid elevation site along Anderson Creek in the little Applegate River watershed. This site has a moister microclimate and a different suite of species were encountered here. On Sunday everyone worked through his or her specimens using Lendemer's key. Some specimens were set out in pairs to test our ability to decipher the subtle differences in their morphology. Though some of us had traveled quite far, it was refreshing to see Oregon's rich lichen biodiversity contained little bits of home (for example *Lepraria finkii* and *Trapelia placodioides* are also found in Iowa!) making it the perfect destination to concur the frustrations of identifying sterile crusts.

Site 1 Upper Table Rock
Caloplaca demissa (Körber) Arup & Grube
Caloplaca stellata Wetmore & Kärnefelt
Chrysothrix chlorina (Ach.) J. R. Laundon
Lecanora epanora (Ach.) Ach.
Lecanora reagens Norman
Lecidella asema (Nyl.) Knoph & Hertel
Lepraria finkii (B. de Lesd.) R.C. Harris
Lepraria neglecta (Nyl.) Erichsen
Leprocaulon adhaerens K. Knudsen et al.
Leprocaulon knudsenii Lendemer & Hodkinson
Phlyctis speirea G. Merr.
Trapelia placodioides Coppins & P. James
Trapeliopsis flexuosa

Site 2 Sterling Ditch
Buellia griseovirens (Turner & Borrer ex Sm.)
Caloplaca stellata Wetmore & Kärnefelt
Fuscopannaria cyanolepra (Tuck.) P. M. Jørg.
Japewia subaurifera Muhr & Tønsberg
Lepraria adhaerens Knudsen, Elix & Lendemer
Lepraria neglecta (Nyl.) Erichsen
Lepraria pacifica Lendemer
Leprocaulon knudsenii
Micarea prasina Fr.
Xylographa vitiligo (Ach.) J. R. Laundon

Site 3 Anderson Creek
Japewia subaurifera Muhr & Tønsberg
Lecidea nylanderi (Anzi) Th. Fr.
Lepraria pacifica Lendemer
Mycobilimbia epixanthoides (Nyl.) Vitik., Ahti, Kuusinen, Lommi & T. Ulvinen
Phlyctis speirea G. Merr.
Trapelia corticola Coppins & P. James

Workshop participants explore a variety of habitats for sterile crust lichens.

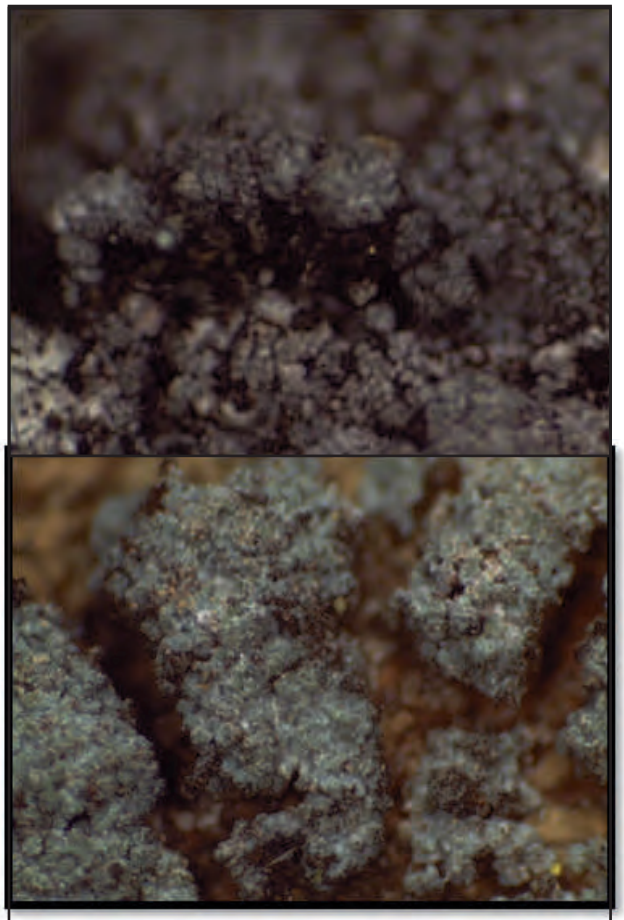

Figure 1. Above is *Lepraria neglecta*, showing the somewhat shiny appearance of the pseudocortex. Below is *Leprocaulon adhaerens* which has a softer appearance, without a cortex.

Lichen Discovery

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I am primarily a photographer. But the lack of mushrooms, exotic fungi, slime molds to photograph in park lands this winter and last

Lichens found on sycamore trees, Longwall Canyon Trail, Rancho Canada del Oro OSP.

propelled me in a different direction: lichen discovery!

In January 2013, I started noticing, enjoying and photographing lichens found along trails throughout south Santa Clara Valley. Thrilled with this discovery and wanting to spread the word, I devoured everything I could find in print and online on lichens, combined this newly acquired knowledge with my lichen photos to create a simple pamphlet on lichens. And my lichen evangelism didn't stop there. My enthusiasm for this mostly overlooked natural resource carried over into leading lichen discovery hikes and walks for both Santa Clara County Parks and SCC Open Space. Within parks and preserves in south Santa Clara Valley, there are several trails ideal for hosting lichen programs.

In February 2013, I led my first lichen discovery hike for County Parks at Santa Teresa County Park - lots of weathered serpentine, colorful lichens thriving along the Stile Ranch Trail. This first venture into leading lichen-theme hikes attracted 23 people! Inspired by this level of interest, I began to include discussions on lichens in all my interpretive hikes and walks.

This year I've been leading short lichen discovery walks monthly at Anderson-Coyote Creek Parkway County Park. We wander along the Coyote Creek Nature Trail, a 1.7 mile riparian corridor edged with derelict orchards.

Lichens associated with serpentine, Stile Ranch Trail, Santa Teresa County Park.

Examining lichens on a piece of deadfall. Anderson-Coyote Creek County Park.

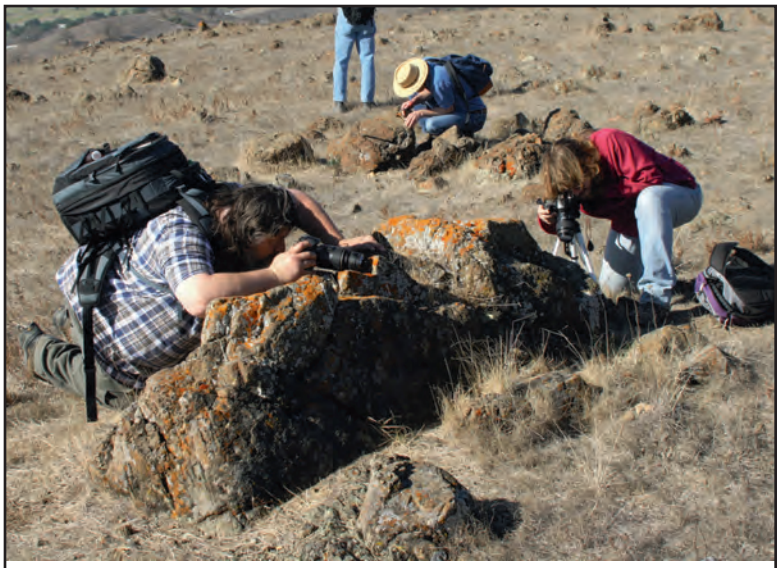
The moist atmosphere, living and decaying plant matter, provide an ideal habitat for many lichen species.

In stark contrast, I've also led an SCC Open Space lichen discovery hike across barren hillsides that frown on 8-lanes of traffic streaming past on Highway 101, at Coyote Springs. This prime serpentine habitat is littered with weathered, lichen-encrusted rock. And within its protected boundaries are found numerous endangered plant species endemic to serpentine. My guided lichen discovery hike in this preserve attracted 16 people most had never given much thought to, or noticed lichen before. But they soon fell under the lichen spell.

Lichen discovery added a whole new dimension to both my photography and parkland interpretive programs. Lichens can be seen, enjoyed nearly everywhere year round. Lichen discovery activities seem to have captured the public's interest as well. Once the public starts to notice lichens, when they gain a better understanding of lichens' positive role in the natural world, it is hoped that they too will want to share this knowledge, to become lichen evangelists spreading the word.

For information on lichen hikes and walks

Left, young lichen enthusiast taking a closer look, Anderson-Coyote Creek County Park. Right, lichens found on weathered serpentine rock, Coyote Springs Preserve.



Hike participants photographing lichens. Coyote Springs Preserve.

in the Santa Clara Valley, review the activities listed on these web sites: Santa Clara County Parks & Recreation (http://www.parkhere.org), Santa Clara County Open Space Authority (www.openspaceauthority.org), Midpeninsula Regional Open Space District (www.openspace.org).

Cait Hutnik is a new California Lichen Society member, an amateur photographer, volunteer trail guide and interpretive docent in Santa Clara County. She leads free interpretive hikes and walks monthly for Santa Clara County Parks & Recreation and for SCC Open Space.

News and Notes

A Field Guide to California Lichens

By Stephen Sharnoff

with a Foreword by Peter H. Raven

The definitive guide to California's diverse array of lichen flora, with color photographs and descriptions of over 500 species is coming, on May 17, 2014!

Lichens are among the most colorful and abundant organisms in the world. They provide food and nesting material for a wide variety of wildlife, contribute nutrients to the soil, and are indicators of both undisturbed ecosystems and clean air. They lend color and pattern to trees, shrubs, and rocks, yet most people know little about them.

This richly illustrated, authoritative guide to the lichens of California draws new attention to these striking and ecologically important organisms, which are symbionts—representing a relationship between a fungus and either an alga or a cyanobacterium—and highlights their beauty, diversity, and value as a natural resource. Lichens are especially abundant and varied in California, where climates range from temperate rainforests to arid deserts. *A Field Guide to California Lichens* features stunning new photographs of some 500 lichen species by award-winning nature photographer Stephen Sharnoff. Up-to-date descriptions accompany each illustration.

Among the special contributions of the guide are its coverage of most common macrolichens in California and its inclusion of many of the crustose species. For land management professionals and scientists involved with ecosystem studies, for birders, hikers, and all others curious about the natural world around them, this book will be a welcome field companion.

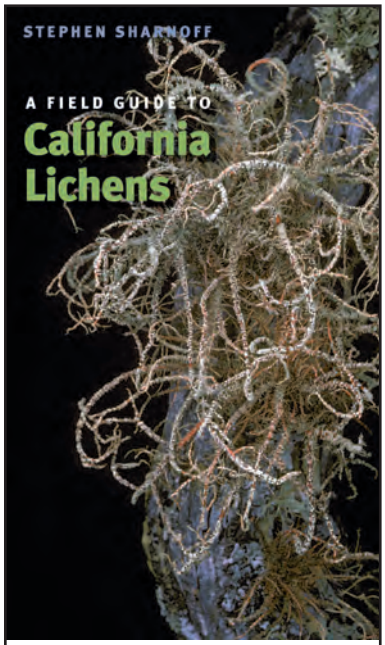
Stephen Sharnoff is research associate at the Missouri Botanical Garden and the University and Jepson Herbaria, University of California, Berkeley. A renowned nature photographer best known for his contributions to the definitive reference *Lichens of North America*, he is currently at work on a guidebook to the wildflowers of the Sierra Nevada. He lives in Berkeley, CA.

"Finally... a guidebook covering the fantastic California lichens with beautiful, full-color photographs! Steve Sharnoff's book will find a place in the backpacks of all lichen-lovers on the West Coast."—*Irwin Brodo, coauthor of* Lichens of North America

."Lichens are of great interest to the general public as well as professionals. This book will stimulate that widespread interest."—*Kerry Knudsen, Lichen Curator, University of California Riverside Herbarium*.

"All Californians should be grateful for the appearance of this fine guide, a welcome introduction to the study of abundant but often unnoticed organisms that play such critical roles in the balance of nature."—*Peter H. Raven, President Emeritus, Missouri Botanical Garden*.

424 pages, 530 color illustrations, 5.5 x 9.25 inches. ISBN 978-0-300-19500-2, $32.50 Trade Paperback. As we go to press, advance copies can be ordered through Amazon, at the discounted rate of $25.00!



A Field Guide to California Lichens!

CALS Celebrated its 20th Anniversary at Bouverie Preserve

This year marks the 20th anniversary of the California Lichen Society! We celebrated this historic benchmark at the society's annual meeting on January 25, 2014. The event was held at Bouverie Preserve in Sonoma County. More than 30 members attended the celebration, traveling from as far north as Humboldt County, as far east as Lake Tahoe, and as far south as Ventura County. New and old members alike enjoyed the lichenizing, stories, food and company. We were honored to share the day with three of our founding members!

Brenda Hillman, Bill Hill, and Ted Robertson examining *Punctelia*, *Flavopunctelia*, and *Flavoparmelia* on oak trees at Bouverie Preserve. Photograph by Sarah Minnick.

Public access to the preserve is limited, so this was a unique opportunity for CALS members to explore the magnificent 535-acre property. The preserve supports a variety of vegetation communities including diverse oak woodlands, mixed evergreen forest, riparian woodland, and chaparral. Docents from the preserve met us in the morning to guide us on a walk. Traveling at a lichenologist's pace, we didn't cover many miles of trail. We marveled at the impressive display of lace lichen (*Ramalina menziesii*) in the oak woodland near the preserve entrance. After lunch we were motivated to check out some different vegetation communities farther along the trail.

We explored the mixed evergreen forest and a riparian woodland. We ran out of time and were not able to make it as far as the chaparral community.

We took many photos of the lichens we saw along the way and identified approximately 40 species. We are currently working on creating an iNaturalist field guide for the lichens of Bouverie Preserve. Keep an eye on our website (www.CaliforniaLichens.org) for a link to the iNaturalist page with the field guide, once it is completed.

Founder's Awards

After the walk we gathered in the preserve's education center for refreshments and took the opportunity to honor the society's founding members and some of the trailblazers who helped shape CALS into the institution it is today. The CALS Board of Directors presented awards to the society's nine founding members for their commitment to create a society centered on lichens. Three of the nine founding members were in attendance to accept their awards: Doris Baltzo, Cherie Bratt, and Bill Hill. The remaining founding members include Mona Bourell, Janet Doell, and Barbara Lachelt. Certificates were presented to the families of the three founding members who have passed away: Richard Doell, Harry Thiers, and Darrell Wright.

Peter Bratt with CALS founding members Cherie Bratt, Bill Hill, and Doris Baltzo pose in front of the Bratt's personalized license plate: California LICHENS. Photograph by Shelly Benson.

Usnea longissima Awards

The board also recognized members, other than the founders, who joined CALS during that first year in 1994 and have shown continued support for the society over the past 20 years. The *Usnea longissima* Long-term Membership Award was presented to Mikki McGee, Irene Brown, and Stephen Sharnoff.

Reaching the 20 year point in the society's history is the perfect opportunity to look back and appreciate the strides we've made. The board established the *Ramalina menziesii* Award of Excellence to recognize members who have given outstanding service to CALS and who are dedicated to advancing the society's mission: to promote the appreciation, conservation, and study of California lichens. Driven by their passion for lichens, award recipients are active members who have volunteered countless hours of their time, skills, and imagination to improve the society. The name chosen for this award signifies the pride the society has in its recipients. Just as *Ramalina menziesii* represents CALS as our logo, and hopefully one day becomes our state lichen, *Ramalina menziesii* award recipients are individuals who honorably represent the society. The board bestowed this award on four outstanding individuals: Bill Hill, Erin Martin, Eric Peterson, and Irene Winston. You may read more about these recipients below.

Usnea intermedia at Bouverie Preserve. Photograph by Aaron Sims.

After the award ceremony, we shared more lichen stories over dinner and dessert. This year with 20 candles on the CALS birthday cake, the three founding members joined forces to blow them out. The evening was rounded out with our guest speaker, Stephen Sharnoff, who gave us a sneak peak at his new book, *A Field Guide to California Lichens*. With the same high quality photography we know from *Lichens of North America* (I. Brodo, S. Sharnoff, and S.D. Sharnoff), this new guide is sure to be an addition to the backpacks of dedicated lichenologists and amateur naturalists alike. The book is divided into sections based on growth form and covers more than 500 species of macrolichens and crusts. Although the book does not have keys to species, the detailed color photos, species descriptions, and updated nomenclature will prove a valuable resource.

Ramalina menziesii Award of Excellence

Bill Hill

As a founding member, Bill has been active in CALS since day one. Bill has volunteered countless hours performing a wide range of tasks—promoting field trips; acquiring domain names; networking with members, institutions and educators; representing CALS at fairs and other events; providing technical resources; monitoring the printing and mailing of the Soci-

Kathy Faircloth and Bill Hill on the trail at Bouverie Preserve. Photograph by Steve Faircloth.

ety's Bulletin… you name it and Bill has likely been involved in it. He has a passion for being involved, for getting others involved, and especially for making new members feel welcome. Bill is known for his brainstorms and has a plethora of great ideas for lichen projects and activities. His willingness to provide assistance is legendary. He's always there at field trips to help answer lichen-related questions, he functions as coordinator for the College of Marin lichen identification workshops to introduce folks to lichens under the microscope, and he always attends the San Francisco Mycological Society's Fungus Fair to help set up and take down CALS displays.

Bill began serving on the CALS Board of Directors as treasurer from 1998 through 1999. He then served as vice-president from 2000-2001, after which he accepted the position of president, a post he held for three terms, through the end of 2007. He stepped back into this office for 2011 and 2012. Bill also chaired the Database Committee from 2005 through 2011.

Erin Martin

Erin is a go-getter with lots of enthusiasm and energy. Soon after joining CALS she was invited to join the Board of Directors and accepted the role of president in 2008. She held the position for two years and then continued to devote time to the board by serving as secretary

Erin Martin working in the field along the Yana Trail near Redding, CA. Photograph by Carrie Diamond.

for two years (2010-2011) followed by member at large for another two years (2012-2013). Erin's passion for education motivated her to build the CALS Grants Program. This program is a shining example of what CALS stands for. Under Erin's direction, the Grants Program has awarded students and researchers over $5,000 to further the study of California lichens. A wide range of projects have been funded including Seth Shteir's educational program with high school students studying lichens and climate change at Joshua Tree National Park, Gajendra Shrestha's study of anti-microbial activity of extracts from *Ramalina menziesii* and *Usnea lapponica*, and James Lendemer's taxanomic study of *Lepraria* in California. Erin also served as production editor of the Bulletin of the California Lichen Society for four issues, from Summer 2011 through Summer 2013.

Eric Peterson

Eric is currently the chair of the CALS Conservation Committee and co-webmaster for the CALS website. The Conservation Committee would not be what it is today without Eric's dedication. His professional experience with national and state conservation programs was a major gain for CALS. After assuming the

Conservation Committee chair position in 2002, he collaborated with the California Department of Fish & Wildlife and the California Native Plant Society's Rare Plant Committee to establish a rigorous sponsorship process for listing rare lichens in the California Natural Diversity

Eric Peterson looking for Caliciales at Horseshoe Ranch, on the border between Oregon and California. Photograph by Tom Carlberg.

Database, thus providing conservation status under the California Environmental Quality Act and the California Endangered Species Act. Portions of this process were subsequently adopted by the CNPS Rare Plant Committee during a revision of their own rare plant process. His knowledge and guidance were instrumental in guiding the committee through numerous sponsorships for rare California lichens.

Besides these achievements in conservation, Eric is responsible for the sophistication of the CALS website. His tech skills help keep CALS current in the ever-changing world wide web. He also served as production editor of the Bulletin of the California Lichen Society from the Summer 2006 through the Fall 2010 issues.

Irene Winston

Many of us have an image of Irene as the small woman carrying the big book. Irene is the only lichen enthusiast I know who will lug her nine pound copy of *Lichens of North America* into the field. We all greatly appreciate her for this because we frequently ask to refer to it while on the trail.

Irene is a born naturalist and educator. She constantly has an ear out for new opportunities to introduce people to the world of lichens. She has been the motivator behind the presence of CALS at outreach events such as the Mycological Society of San Francisco Fungus Fair, CALDay at UC Berkeley, and the Bay Area Environmental Educators Resource Fair. Her experience as a teacher shines through in her work on creating educational displays for

Irene Winston at UC Berkeley, with the "big book". Photograph by Bill Hill.

outreach events. Irene saw a need for a regularly occurring lichen workshop in the East Bay and decided to do something about it. Through her connections with the Regional Parks, she facilitates the Tilden Park lichen workshop.

Reported by Shelly Benson

Upcoming Events

Lichen Identification Workshop: Identifying Lichens to Genus
Chico State University, Chico, CA
Saturday, March 1, 2014, 9:00am – 4:00pm

The emphasis of this workshop will be identifying genera of lichens in the northern Sierra Nevada foothills. The workshop will start in the lab with handouts and a Powerpoint presentation covering lichen basics: anatomy and morphology, reproduction, and many of the characters used to identify lichens. Lunch will be in the field, in conjunction with a short collecting trip. The rest of the afternoon will be in the lab, where participants will spend time working on identifying lichens, using dissecting scopes, microchemical reagents, books, keys (provided), and the material they collected that day, supplemented by additional specimens provided by the instructor. Please bring dissecting tools, a hand lens, and lunch. You will benefit more from the workshop if you have experience using dichotomous keys.

The workshop will be led by Tom Carlberg. Tom has a degree in Botany from Humboldt State University. He has been a cryptogamic botanist for 11 years, working for the Forest Service, private contractors, and non-profit organizations. His current special interest is habitat modeling for rare species of lichens and vascular plants, using satellite imagery, and GIS analysis of spatial data. He is the past Editor of the Bulletin of the California Lichen Society (CALS), and a member of the Society's Conservation Committee. In addition to CALS, he also belongs to the American Bryological and Lichenological Society and the British Lichen Society.

Please register in advance; the workshop is limited to 16 participants and is usually full. Registration information and a flyer for the workshop will soon be on the Friends of the Chico State Herbarium website www.csuchico.edu/biol/Herb/Events.html, or you can get additional details from Tom at tcarlberg7@yahoo.com.

Lichenizing after the field at the identification workshop in Chico. Photograph by Tara Collins.

Workshop on the Lichen Family Pannariaceae
Southern Oregon University, Ashland, OR
Friday through Sunday, April 18-20, 2014

The Cryptogam Biodiversity Observatory at Southern Oregon University and the Northwest Lichenologists are proud to welcome Dr. Peter R. Nelson for a three day workshop focusing on the lichen family Pannariaceae in the western hemisphere. This cryptic and diverse group of cyanolichens includes the lichen genera *Pannaria, Fuscopannaria, Erioderma, Leioderma, Parmeliella* and others.

Dr. Nelson is currently a postdoctoral researcher at Oregon State University and a member of the board of directors for the American Bryological and Lichenological Society. He has published several papers in recent years on this group of lichens spanning the western hemisphere from Alaska to Chile.

He will give presentations on ecology and species distribution for this group, providing specimens for observation from his extensive work in arctic Alaska, the Pacific Northwest and South America. The time will be split between lectures, identification of local species in the lab and a day in the field on the Oregon coast. Field time will focus on Pannariaceae habitat requirements as well as recognition of the major genera, and federally listed Survey & Manage species. Microscopes and reagents will be available for use by participants.

The cost is $200 and those interested in attending should contact John Villella at jvillella@siskiyoubiosurvey.com. This is the fourth year that this workshop series has taken place and it has sold out very early in the past, as space is limited you are encouraged to sign up early to ensure your place.

COM Lichen Identification Workshop
College of Marin
ScienceMathNursingRoom SMN112
835 College Avenue, Kentfield.

We encourage you to attend these enjoyable workshops as Dr. Paul da Silva has graciously allowed us to use the classroom and scopes. Please RSVP to Bill Hill, who organizes the logistics (aropoika@gmail.com; 415-686-6146). We bring our own lichens and work with each other to identify them. There occasionally are snacks. Parking at the college is $3 but there is free parking just behind the (new) SMN building on Laurel Ave, off Sir Francis Drake Blvd.

Tilden Park Botanic Garden
Tilden Regional Park, Berkeley

Lichen workshops occur at the Regional Parks Botanic Garden on the second Saturday of each month, 1:30–4:30pm. Please contact Irene (irene@californialichens.org; 510-548-6734) or visit www.californialichens.org for details.

Golden Gate National Parks BioBlitz and Biodiversity Festival
Crissy Field, San Francisco
Friday and Saturday, March 28 – 29, 2014

Join the California Lichen Society at this two-day event where volunteer scientists, naturalists, families, and students work together to explore, discover, and document the living creatures in the park. We're seeking volunteers to staff our booth at BioBlitz base camp at 1199 East Beach at Crissy Field in San Francisco where the young audience can earn their degree at the "Biodiversity University"! Meanwhile, our own Shelly Benson and Tom Carlberg will be leading groups around the Golden Gate National Recreation Area to appreciate and document the lichen diversity. Check www.californialichens.org or our facebook page for more information as it becomes available.

CAL Day
University of California, Berkeley
Saturday, April 12, 2014

Every spring the University of California at Berkeley opens its campus to the community, showcasing each department's collections with activities, presentations, and booths. Volunteers are needed to staff the California Lichen Society table in the Jepson Herbarium.

Dye Lichens Walk
Point Reyes National Seashore
Saturday, May 3, 2014. 10:00am – 2:00pm

Meet at Bear Valley in front of the Point Reyes National Seashore Visitor Center for a walk led by CALS President Shelly Benson and CALS Secretary Sarah Minnick that will focus on distinguishing dye lichens. Learn how to use easy field chemical tests and keys to identify the species that will yield beautiful dye pigments.

CALS Research/Educational Grants Program

The California Lichen Society offers small grants to support research or education pertaining to lichens in California. No geographical constraints are placed on grantees or their associated institutions. The Educational Grants Committee administers the grants program, with grants awarded to an individual only once during the duration of a project.

Grant Applicants should submit a proposal containing the following information:

1. Title of the project, applicant's name, address, phone number, email address, and date submitted, as well as the estimated time frame for project.
2. Academic status: state whether you are a graduate student or an undergraduate student, and your experience in the field of lichenology. Preference is given to students, but CALS grants are also available to non-students conducting research on California lichens. CALS grants are available to individuals only and will not be issued to institutions.
3. Description of the project: outline the objectives, hypotheses where appropriate, and methods of data collection and analysis. Highlight aspects of the work that you believe are particularly important and creative. Discuss how the project will advance knowledge of California lichens.
4. Description of the final product: We ask you to submit an article to the CALS Bulletin, based on dissertation, thesis, or other work.
5. Budget: summarize intended use of funds. If you received or expect to receive grants or other material support, show how these fit into the overall budget. The following list gives examples of the kinds of things for which grant funds may be used if appropriate to the objectives of the project: expendable supplies, transportation, equipment rental or purchase of inexpensive equipment, laboratory services, salaries, and field living expenses.. CALS does not approve grants for outright purchase of high-end items such as computers, software, machinery, or for clothing. Exceptions may be made for certain items with reasonable justification.
7. Academic support: one letter of support from a sponsor, such as an academic supervisor, major professor, or colleague should accompany your application. The letter can be enclosed with the application, or emailed (or mailed) separately to the CALS Grants Committee Chair.
8. Your signature, as the person performing the project and the one responsible for dispersing the funds.

The proposal should be brief and concise. The research/education grants committee brings its recommendations for funding to the CALS Board of Directors, and will notify applicants as soon as possible of approval or denial. Members of the education committee review grant proposals once or twice a year based on: completeness, technical quality, consistency with CALS goals, intended use of funds, and likelihood of completion. Grant proposals received by October 1 of a given year will be considered for that year's grant cycle. CALS typically offers 2 grants in the amounts of $750 and $1000 each year.

Obligations of Recipients: 1) Acknowledge the California Lichen Society in any reports, publications, or other products resulting from the work supported by CALS; 2) submit a short article to the CALS Bulletin; 3) Submit any relevant rare lichen data to California Natural Diversity Data Base using CNDDB's field survey forms; 4) Periodically update the research/education committee of progress on the project.

How to submit an application: Please email submissions or questions to the committee chairperson by November. 1, 2014. The Committee Chairperson is Jennifer Riddell. Her email is grants@california-lichens.org.

President's Message

Good things do take time. Well, it took a little longer than usual to get this issue of the Bulletin of the California Lichen Society into your hands but I hope you enjoy the brand-new look—full color and glossy! We recently discovered that we can produce a color bulletin at practically the same cost as a black and white one. So, we made the upgrade. Color is an important characteristic in distinguishing lichens and the black and white images in past bulletins were not doing the lichens justice. Now you can better appreciate the lichen images published here.

This year marks the 20th anniversary of CALS and we are very proud of how far we've come through the years. One January weekend back in 1994, Janet Doell gathered a small group of her friends, who shared an appreciation for lichens, at her cabin in the Santa Cruz Mountains. By the end of the weekend these friends had become the founding members of the California Lichen Society.

Over the past 20 years the society has grown from the original nine founding members – Doris Baltzo, Mona Bourell, Cherie Bratt, Janet and Richard Doell, Bill Hill, Barbara Lachelt, Harry Thiers, and Darrell Wright – to approximately 200 members from eight different countries including Canada, the Czech Republic, Ecuador, Finland, New Zealand, Switzerland and the UK. The bulletin began as a newsletter and has matured into a reputable publication for scientific articles and continues to inform members about local lichen happenings like workshops, lectures, and field trips.

Since its inception, CALS has been working hard toward its goals of advancing lichen conservation and education. The CALS Conservation Committee has established a rigorous review process for listing rare California lichens and nine species have been added to the CALS List of Lichens of Concern. The CALS Grants Program has awarded over $5,000 in support of lichen education and research. These funds came directly from your generous contributions and membership dues. We could not have come this far in the past 20 year without you! Thank you for supporting CALS through the years and for your continued support into the future. Any contributions you can give will go a long way in helping us further our mission to promote the appreciation, conservation, and study of California lichens.

Shelly Benson
President@californialichens.org

The Bulletin of the California lichen Society

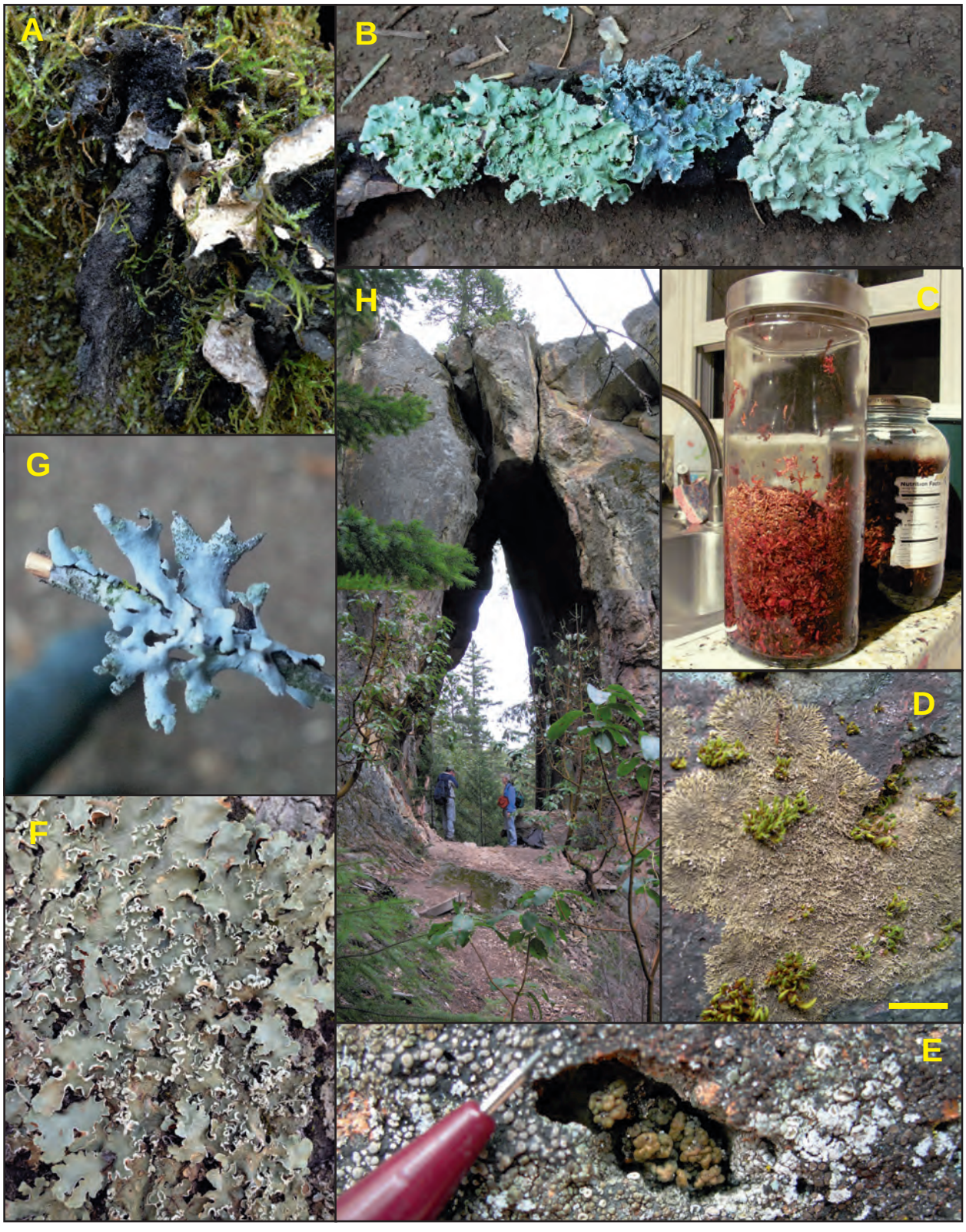
Volume 20, No.2 Winter 2013

Contents

The deadline for submitting material for the Summer 2013 CALS Bulletin is 30 April 2014.

Back cover:

A. *Sticta fuliginosa* on moss on a cut bank, at the Bouverie Preserve. Photograph by Daniel George.
B. *Flavopunctelia flaventior, Punctelia jeckeri* and *Flavoparmelia caperata* all on the same stick, at the Bouverie Preserve. Photograph by Daniel George.
C. A jar filled with lichens and ammonia begins to turn red as a chemical reaction causes orcein, a red-purple dye substance, to form. See story on p. 65. Photograph by Sarah Minnick.
D. *Vestergrenopsis sonomensis* in the Trinity Alps; see story on p. 70. Scale bar = 0.5cm. Photograph by Tom Carlberg.
E. *Lecanora pringlei* in a small cavity in an andesite boulder at Rattlesnake Rocks. Photograph by Tom Carlberg.
F. *Flavopunctelia flaventior* at the Bouverie Preserve. Photograph by Daniel George.
G. *Hypotrachyna revoluta*, on a conifer twig at the Bouverie Preserve. Photograph by Tom Carlberg.
H. Daphne Stone and Scot Loring at Rattlesnake Rocks. Photostitch by Tom Carlberg.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