

Bulletin
of the
California Lichen Society



Volume 21 No. 1 Summer 2014

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This issue of the Bulletin of the California Lichen Society (ISSN 1093-9148) was edited by John Villella (Editor@californialichens.org) and was produced by Sarah Minnick (sarah@californialichens.org) and Hanna Mesraty (hanna@californialichens.org). The Bulletin of the California Lichen Society is copyright © California Lichen Society. Authors retain ownership of their individual work and have permission to use and distribute their submitted material and photos; all other uses restricted.

Interested in submitting an article, photo, or workshop information for an upcoming issue of the Bulletin?

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 editor, John Villella at editor@californialichens.org, 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. The deadline for submitting material for the Winter 2014 CALS Bulletin is October 1, 2014.

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Cover Photo: *Usnea longissima*, one of the 14 rare lichens recently added to the CNPS Inventory of Rare and Endangered Plants of California. Photograph by Richard Droker.

Peltigera pacifica Vitik.
Sponsorship for the CALS Conservation Committee

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Figure 1. *Peltigera pacifica* Vitik. Photograph by Martin Hutten.

ABSTRACT

Peltigera pacifica is endemic to the Pacific Northwest of North America and is rare in California and Montana, uncommon in other parts of its range. Its typical habitat becomes increasingly scarce to the south of Oregon. The two occurrences in California are on Congressionally Withdrawn land allocations resulting from political designations of long standing (Wilderness Act), or by the reserve system of the Northwest Forest Plan. Recommended conservation ranks are G3.2, S2.2, CNPS-equivalent List 2B.

TAXONOMY

Accepted Scientific Name

Peltigera pacifica Vitik.

Common Name

Fringed Pelt, Pacific Pelt Lichen

Type Specimen and Location

Holotype UBC Goward 81-2025;

Isotype BM, CANL, H, US.

Synonyms

None

DESCRIPTION

In part from USDA/USDI (2007): Thallus foliose, up to 10 cm diameter; lobes 0.5–1 cm wide with ruffled-looking, mostly upturned margins that are often densely covered with abundant lobules, relatively thin compared to other *Peltigera* species (Figure 1). Upper cortex slightly undulating, smooth, shiny, light bluish grey, sometimes with a brownish tint, tomentum absent. Lower side without a cortex, white, with veins which are not thin and threadlike and are sometimes indistinct, pale brown near the margins and darkening in the center. Rhizines slender, 2–4 mm long, single or occasionally branching, without tufting or tomentum. Lobules marginal and laminal, frequently along cracks in the cortex, sometimes isidioid. Each lobule narrows where attached to the thallus, making it easily separated for dispersal. Lobules often somewhat dissected, giving the thallus a frilled appearance. Apothecia form on the upper side of narrow lobes and become revolute and vertical. The photobiont is a cyanobacterium (*Nostoc*).

SIMILAR SPECIES AND DISTINGUISHING**CHARACTERISTICS**

Peltigera praetextata also has lobules, but is slightly larger, has tomentose lobe tips, and veins that are thin and threadlike. The closely-related *Peltigera polydactylon* has no lobules, and indistinct veins that darken markedly towards the center of the thallus.

BIOLOGICAL CHARACTERISTICS**Growth Form**

Foliose, terrestrial/muscicolous.

Reproductive Method

Spores, and asexually through dispersal of lobules.

Dispersal Agents

Wind (spores); water and animals (lobules and spores).

Substrate and Specificity

Soil, rocks, logs, tree bases, and especially on moss on all these substrates. In California, it is found on thick moss mats on granite.

Habitat and Specificity

Moist forests, especially near creeks and on north aspect banks/slopes. The California occurrences are on heavily-forested north to northwest slopes between 1300 and 1400 meters. One is at the head of a major tributary of the Smith River; the other has no strong association with stream channels.

Pollution Sensitivity

Unknown.

Ecological Function

Nitrogen fixation and dissemination, invertebrate food.

GEOGRAPHY, GLOBAL

Peltigera pacifica is endemic to northwestern North America (Figure 2), with numerous occurrences in British Columbia, Canada (including the Queen Charlotte islands), and in the United States in coastally-influenced areas of Alaska, Washington, and Oregon (Carlberg et al. 2008, CNALH 2014, USDA 2014, USDA/USDI ISSSSP (GEOBOB) 2014, USDA NRIS 2014), and rare inland occurrences in western

Montana (McCune & Geiser 2009). There are two occurrences in California (Carlberg et al. 2005, hb. author).

GEOGRAPHY, LOCAL

In California, *P. pacifica* reaches the southern extent of its range. There are two verified occurrences (Figure 2) in Del Norte County (Carlberg et al. 2008, McCune 2005 [pers. comm.]). Both occurrences are small, are approximately 20km from the border with Oregon, and represent a minor southward range extension of 53km. Both occur on lands that are Congressionally Withdrawn. One is at a trailhead on a north slope in lands that are simultaneously a Wild River Corridor, a Special Interest Area, and a Wilderness. The other is on a northwest slope in land designated as a Late Successional Reserve (USDA Six Rivers 1995). Both occurrences are in upper slope positions, and are sited on banks above roads.

There are two California vouchers of *Peltigera pacifica* in SBBG (CNALH 2014), one from northeastern Yuba County (*Tucker 31804!*) and one from Monterey County (*Tucker 34729!*). Both are *P. praetextata*, having well-defined veins, lobules

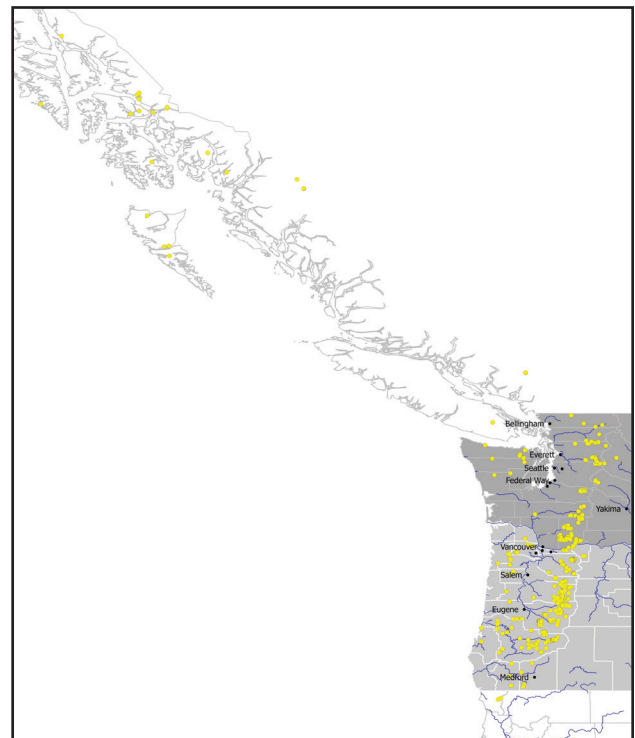


Figure 2. Global distribution of *Peltigera pacifica*.

that are primarily marginal, and a well-developed tomentum on the lobe tips.

POPULATION TRENDS

Unknown. The occurrences have not been visited since 2005.

THREATS, HISTORY

The site in the Late Successional Reserve was logged historically.

THREATS, FUTURE

Wild River corridors are focus areas for recreation, and there is potential for accidental damage or collecting at this occurrence. Late Successional Reserves are subject to management practices that exclude logging but include thinning.

PROTECTION

The occurrence in Wilderness, SIA and Wild River Corridor is well protected by the provisions of the Wilderness Act (1964). From the Six Rivers Land Management Plan (1995) regarding Wilderness: “The goal of Wilderness management is to preserve the integrity of the Wilderness resource as described in the Wilderness Act of 1964”; and regarding Wild River Corridors “The surrounding corridor will also appear in a natural condition, and terrestrial processes will function at normal rates and regimes”. The corridor is one kilometer wide, with the river running down the center.

The occurrence in a Late Successional Reserve is protected from some management practices but not all, for example commercial logging is not permitted but thinning is permitted.

CONSERVATION SUMMARY

Peltigera pacifica is endemic to the Pacific Northwest of North America and is rare in California and Montana, uncommon in other parts of its range. Its typical habitat becomes increasingly scarce to the south of Oregon. The two occurrences in California are on Congressionally Withdrawn land allocations resulting from political designations of long standing (Wilderness Act), or by the reserve system of the Northwest Forest Plan.

SPECIFIC CONSERVATION RECOMMENDATIONS

Recommended Global Rarity Rank G3 - Taxon is a Pacific Northwest endemic with limited global distribution. It does not appear to be overlooked or under-collected, being relatively easy to identify.

Recommended Global Threat Rank .2

Recommended Local Rarity Rank S2 - Only two small populations known in California.

Recommended Local Threat Rank .2 - California populations are not imperiled as they occur on Congressionally Withdrawn lands, however abundance at both sites is low.

Recommended List 2B - Rare in California but more common elsewhere.

LITERATURE CITED

Carlberg, T., R. Robertson, J. Robertson. 2008. New and interesting records for California. Bulletin of the California Lichen Society 15:1 (16).

CNALH. 2014. Consortium of North American Lichen Herbaria. Accessed 15 Mar 2014. <http://lichenportal.org/portal/collections/index.php>.

| State | County | UTM E | UTM N | Land Allocation | Elev. [ft.] | Observer[s] | Date | Herbarium |
|-------|-----------|--------|---------|--------------------------------------|-------------|-----------------------|------|----------------------|
| CA | Del Norte | 441xxx | 4628xxx | Wilderness, Wild River Corridor, SIA | 4323 | T.Carlberg, C.Stimson | 2005 | HSC, OSC, hb. author |
| CA | Del Norte | 436xxx | 4625xxx | LSR | 4512 | T.Carlberg, C.Stimson | 2005 | hb. author |

Table 1 : Known sites of *Peltigera pacifica* in California. SIA = Special Interest Area, LSR = Late-successional reserve land allocation, UTM coordinates are Zone 10, NAD 27.

McCune, B. 2005. Personal communication and identification of specimens.

USDA. 1995. Six Rivers National Forest Land Management Plan. Chapter 4, p. 26 (Wild Rivers). http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsm9_027542.pdf. Accessed 31 March 2014.

USDA. 2014. Forest Service National Lichens and Air Quality Database and Clearinghouse. Accessed 15 Mar 2014. <http://gis.nacse.org/lichenair/index.php>

USDA. 2014. National Resource Information System (NRIS) database.

USDA/USDI. 2007. SPECIES FACT SHEET (for

Peltigera pacifica). Interagency Special Status/Sensitive Species Program (ISSSSP). Accessed 1 April 2014. <http://www.fs.fed.us/r6/sfpnw/issssp/species-index/flora-lichens.shtml>

USDA/USDI. 2014. Interagency Special Status/Sensitive Species program (ISSSSP) GEOBOB database.

Vitikainen, O. 1985. Three new species of *Peltigera* (lichenized Ascomycetes). *Annales Botanici Fennici* 22: 291-298.

Wilderness Act. 1964. Public Law 88-577 (16 U.S. C. 1131-1136).



Usnea longissima, one of the 14 rare lichens recently added to the CNPS Inventory of Rare and Endangered Plants of California; shown on bigleaf maple (*Acer macrophyllum*). Photograph by Richard Droker.

Lichens Added to the CNPS Inventory from CALS Lichens of Conservation Concern

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BACKGROUND

The following fourteen lichens were added to the California Native Plant Society (CNPS) *Inventory of Rare and Endangered Plants of California* (Inventory) through a memorandum of understanding with CNPS and the California Lichen Society (CALs) to include the CALs Conservation Committee's *Lichens of Conservation Concern* in the CNPS Inventory. From this point on, CNPS will update and maintain lichens in the Inventory based on the completion and outcome of the CALs Conservation Committee's sponsorship process, and through continual review of data submitted to the California Natural Diversity Database (CNDDb). The CALs sponsorship process involves the development of a status review proposal in the manner of a form, or as a manuscript submission for *The Bulletin of the California Lichen Society*, along with a complete list of known occurrences in California. If the CALs Conservation Committee initially accepts the sponsorship, a 90-day technical review begins followed by a 1-year comprehensive review. Upon completion of the review periods, the CALs Conservation Committee may do one of the following: agree to rank the taxon according to sponsorship proposal, rank at a different level than the proposal, defer ranking pending additional information, or reject the ranking outright. To learn more about the CALs Conservation Committee and the lichen sponsorship process, please visit the following pages online: <http://californialichens.org/conservation/> and <http://californialichens.org/conservation/sponsoring/>.

Ten of the fourteen lichens added to the CNPS Inventory were previously included in the CNDDb. These include *Calicium adspersum*, *Cladonia firma*, *Graphis saxorum*, *Mobergia calculiformis*, *Peltigera gowardii*, *Solorina spongiosa*, *Sulcaria isidiifera*, *Texosporium sancti-jacobi*, *Thamnolia vermicularis*,

and *Usnea longissima*. Three of the lichens included in the CNDDb (*Graphis saxorum*, *Mobergia calculiformis*, and *Texosporium sancti-jacobi*) were not previously included as CALs *Lichens of Conservation Concern*. These species have been tentatively added to California Rare Plant Rank (CRPR) 3 of the CNPS Inventory based on the lack of information known by the CALs Conservation Committee, and are currently being evaluated through the CALs sponsorship process in order to be assigned a more appropriate rank.

For additional information about these lichens of concern we strongly encourage you to view their sponsorships that are available online (see links at the bottom of the CNPS Inventory records below), and/or review data on them included in the CNDDb (specifically for the three taxa added to CRPR 3 that currently do not have a sponsorship available for review).

LICHEN CNPS INVENTORY RECORDS

Species: *Bryoria pseudocapillaris* Brodo & D. Hawksw.

Common name: false gray horsehair lichen

Family: Parmeliaceae

Growth form: fruticose lichen (epiphytic)

Status: CRPR 3.2, G3 / S2

Distribution: Oregon, Washington, California
California locations: Del Norte, Humboldt, Mendocino, and San Luis Obispo Counties. Morro Bay South, Point Arena, Tyee City, Eureka, Rodgers Peak, Trinidad, Sister Rocks, Crescent City

Habitat: Coastal dunes (San Luis Obispo Co.), North Coast coniferous forest (immediate coast) / usually on conifers; elevation 0 to 90 meters

Notes: Largest known population in CA is on the Samoa Peninsula in Humboldt County. Possibly

threatened by coastal development, air pollution, and climate change. Usually on *Picea sitchensis*, *Pinus contorta* var. *contorta*, *Pseudotsuga menziesii*, *Abies grandis*, and *Tsuga heterophylla*. This species is similar to *B. capillaris*, *B. spiralifera*, and *Sulcaria badia*. See *Bulletin of the California Lichen Society* 15(1): 1-3 (2008) for CALS Conservation Committee sponsorship. (<http://californialichens.org/conservation/Bryoria+pseudocapillaris/>) Available online at <http://www.rareplants.cnps.org/detail/3801.html>



Above: *Bryoria pseudocapillaris*. Photograph by Scot Loring. Below: *B. pseudocapillaris* habitat. Photograph by Tom Carlberg.

Species: *Bryoria spiralifera* Brodo & D. Hawksw.
Common Name: twisted horsehair lichen
Family: Parmeliaceae
Growth form: fruticose lichen (epiphytic)
Status: CRPR 1B.1, G3 / S1S2
Distribution: Oregon and California

California locations: Del Norte, Humboldt, Monterey, San Luis Obispo, Sonoma Counties. Crescent City, Eureka, Monterey, Morro Bay South, Smith River, Stewarts Point, Tyee City

Habitat: North Coast coniferous forest / usually on conifers; elevation 0 to 30 meters

Notes: Largest known population is on the Samoa Peninsula in Humboldt County. Possibly threatened by coastal development, air pollution, and climate change. Usually on *Picea sitchensis*, *Pinus contorta* var. *contorta*, *Pseudotsuga menziesii*, *Abies grandis*, and *Tsuga heterophylla*. This species is similar to *B. pseudocapillaris* and *Sulcaria badia*. See *Bulletin of the California Lichen Society* 15(1): 4-6 (2008) for CALS Conservation Committee sponsorship. (<http://californialichens.org/conservation/Bryoria+spiralifera/>) Available online at <http://www.rareplants.cnps.org/detail/3803.html>



Bryoria spiralifera. Photography by Eric Peterson.

Species: *Calicium adpersum* Pers.

Common name: spiral-spored guilded-head pin lichen

Family: Caliciaceae

Growth form: crustose lichen (epiphytic)

Status: CRPR 2B.2, G3G4 / S1?

Distribution: Oregon, Washington, and California

California locations: Del Norte County. Crescent City, Hiouchi, and Sister Rocks

Habitat: Lower montane coniferous forest, North Coast coniferous forest / often restricted to old-growth bark of conifers that are over 200 years in age; elevation 200 meters

Notes: Known in California only from Jedediah Smith Redwoods State Park. Historically threatened by logging. Possibly threatened by alteration of fire regimes. Host conifers could include *Abies grandis*, *Pseudotsuga menziesii*, *Sequoia sempervirens*, and *Thuja plicata*. Similar to *C. lenticulare*; however, *C. adpersum* is the only species of *Calicium* currently known from the Pacific Coast with a yellow pruina. See *Bulletin of the California Lichen Society* 13(2): 51-54 (2006) for CALS Conservation Committee sponsorship. (<http://californialichens.org/conservation/Calicium+adpersum/>) Available online at <http://www.rareplants.cnps.org/detail/3804.html>



Calicium adpersum. Line = 1mm. Photograph by Eric Peterson.

Species: *Cladonia firma* (Nyl.) Nyl.

Common name: popcorn lichen

Family: Cladoniaceae

Growth form: squamulose lichen (terricolous)

Status: CRPR 2B.1, G4 / S1

Distribution: Southern California

California locations: San Luis Obispo County. Morro

Bay South

Habitat: Coastal dunes (stabilized), coastal scrub / on soil, detritus, and/or moss; elevation 30 to 75 meters

Notes: Known in California only from Morro Bay and Baywood-Los Osos areas. Threatened by habitat loss, recreational activities, and non-native plants. Often forms a biological soil crust with other lichens and mosses. See *Bulletin of the California Lichen Society* 14(2): 40-44 (2007) for CALS Conservation Committee sponsorship. (<http://californialichens.org/conservation/Cladonia+firma/>)

Available online at <http://www.rareplants.cnps.org/detail/3805.html>



Cladonia firma. Photograph by Janet Good.

Species: *Graphis saxorum* Egea & Torrente

Common name: Baja rock lichen

Family: Graphidaceae

Growth form: crustose lichen (saxicolous)

Status: CRPR 3, G1G3 / S1S3

Distribution: Channel Islands, Baja California

California locations: Santa Catalina Island, Santa Catalina North, Santa Catalina West

Habitat: Coastal scrub (?) / volcanic rocks; elevation 30 to 80 meters

Notes: Added to CRPR 3 based on prior inclusion in CNDDDB; CALS Conservation Committee sponsorship is pending. Known in CA only from vicinity of Isthmus Cove and Little Harbor on Santa Catalina Is. See *The Bryologist* 100(2): 207-209 (1997) for original description. (<http://californialichens.org/conservation/Graphis+saxorum/>)

Available online at <http://www.rareplants.cnps.org/detail/3806.html>

Species: *Hypogymnia schizidiata* McCune

Common name: island tube lichen

Family: Parmeliaceae

Growth form: foliose lichen

Status: CRPR 1B.3, G1 / S1

Distribution: Southern California, Baja California

California locations: Santa Cruz Island, Santa Rosa Island North, Santa Rosa Island South

Habitat: Chaparral, closed cone-coniferous forest / on bark and wood of hardwoods and conifers; elevation 360 to 405 meters

Notes: Often occurs on *Juniperus*, *Pinus*, *Quercus*, and *Simmondsia*. See *Bulletin of the California Lichen Society* 13(2): 42-44 (2006) for CALS Conservation Committee sponsorship. (<http://californialichens.org/conservation/Hypogymnia+schizidiata/>)

Available online at <http://www.rareplants.cnps.org/detail/3809.html>



Hypogymnia schizidiata. Ruler shows mm marks. Photograph by Bruce McCune.

Species: *Mobergia calculiformis* (W.A. Weber) H. Mayrhofer & Sheard

Common name: light gray lichen

Family: Physciaceae

Growth form: crustose lichen (saxicolous)

Status: CRPR 3, G1 / S1

Distribution: Baja California and Southern California
California locations: San Diego County. La Jolla, Point Loma

Habitat: Coastal scrub (?) / on rocks; elevation 10 meters

Notes: Added to CRPR 3 based on prior inclusion in CNDDDB; CALS Conservation Committee sponsorship is pending. See *The Bryologist* 95(4) 436 (1992) for original description. (<http://californialichens.org/conservation/Mobergia+calculiformis/>)

Available online at <http://www.rareplants.cnps.org/detail/3810.html>

Species: *Peltigera gowardii* Lendemer & H. O'Brien
Common name: western waterfan lichen [note: CNDDDB uses aquatic felt lichen]

Family: Peltigeraceae

Growth form: foliose lichen (aquatic)

Synonym: *Hydrothyria venosa*

Status: CRPR 4.2, G3G4 / S3

Distribution: British Columbia, Washington, Oregon, and California

California locations: El Dorado, Fresno, Madera, Mono, Plumas, Sierra, Tulare, Tuolumne, Yuba Counties. Patterson Mtn., Dinkey Creek, Shuteye Peak, Mammoth Pool Dam, White Chief Mtn., Mount Dana, Strawberry, Crandall Peak, Stanislaus, Boards Crossing, Peddler Hill, Echo Lake, La Porte, American House, Strawberry Valley Soapstone Hill
Habitat: Riparian forest / on rocks in cold water creeks with little or no sediment or disturbance, elevation 1,065 to 2,375 meters.

Notes: Threatened by hydrological alterations, recreational activities, erosion, logging, and vehicles. Often associated with rich bryophyte flora. See *Bulletin of the California Lichen Society* 13(2): 42-44 (2006) for CALS Conservation



Peltigera gowardii, shown in habitat, submerged under water. Photograph by Eric Peterson.

Committee sponsorship. (<http://californialichens.org/conservation/Peltigera+gowardii/>)

Available online at <http://www.rareplants.cnps.org/detail/3811.html>

Species: *Ramalina thrausta* (Ach.) Nyl.

Common name: angel's hair lichen

Family: Ramalinaceae

Growth form: fruticose lichen (epiphytic)

Status: CRPR 2B.1, G5 / S2?

Distribution: Alaska, Idaho, Maine, Michigan, Minnesota, Montana, Oregon, Washington, and California

California locations: Del Norte, Sonoma Counties. Fort Ross, Gasquet, High Divide, Hiouchi, Shelly Creek Ridge

Habitat: North coast coniferous forest / on dead twigs and other lichens; elevation 75 to 430 meters

Notes: Known in California only from the Smith River and its major tributaries in Del Norte County, and from a single disjunct occurrence along the Gualala River in Sonoma County; needs field surveys. Populations are in decline, with a net loss of 12.5% of sites in a three-year period. Potentially threatened by air pollution. In northern California it is usually found on dead twigs, and has been found on *Alnus*



Ramalina thrausta. Photograph by Tom Carlberg.

rubra, *Calocedrus decurrens*, *Pseudotsuga menziesii*, *Quercus garryana*, and *Rubus spectabilis*. In Sonoma County it grows on and among dangling mats of *Ramalina menziesii* and *Usnea* species. This species is similar to *Alectoria sarmentosa*, *A. vancouverensis*, and *R. menziesii*. See *Bulletin of the California Lichen Society* 13(1): 17 (2006) for CALS Conservation Committee sponsorship. (<http://californialichens.org/conservation/Ramalina+thrausta/>)

Available online at <http://www.rareplants.cnps.org/detail/3812.html>

Species: *Solorina spongiosa* (Ach.) Anzi

Common name: fringed chocolate chip lichen [no common name in CNDDDB]

Family: Peltigeraceae

Growth form: crustose lichen (terricolous)

Status: CRPR 2B.2, G4G5 / S1

Distribution: Alaska, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, California, Utah, and Wyoming

California locations: Inyo County. Mt. Thompson

Habitat: Meadows and seeps, subalpine coniferous forest (seeps) / carbonate, on moss mats; elevation 2,895 meters

Notes: Possibly threatened by grazing, foot traffic, and recreational activities. See *Bulletin of the California Lichen Society* 12(2) (2005) for CALS Conservation Committee sponsorship. (<http://californialichens.org/conservation/Solorina+spongiosa/>)

Available online at <http://www.rareplants.cnps.org/detail/3813.html>



Solorina spongiosa. Photograph by John Villella.

Species: *Sulcaria isidiifera* Brodo

Common name: splitting yarn lichen

Family: Alectoriaceae

Growth form: fruticose lichen (epiphytic)

Status: CRPR 1B.1, G1 / S1

Distribution: California endemic

California locations: San Luis Obispo County. Morro Bay South

Habitat: Coastal scrub (old growth) / on branches of oaks and shrubs; elevation 20 to 30 meters

Notes: Threatened by coastal development, alteration of fire regimes, and over collecting. Portions of populations have been extirpated due to historical residential development. See *Bulletin of the California Lichen Society* 14(2): 45-47 (2007) for CALS Conservation Committee sponsorship. (<http://californialichens.org/conservation/Sulcaria+isidiifera/>)

Available online at <http://www.rareplants.cnps.org/detail/3814.html>



Sulcaria isidiifera. Photograph by Janet Good.

Species: *Texosporium sancti-jacobi* (Tuck.) Nád. ex Tibell & Hofsten

Common Name: woven-spored lichen

Family: Caliciaceae

Growth form: crustose lichen (terricolous)

Status: CRPR 3, G3 / S1

Distribution: Idaho, Oregon, Washington, and California

California locations: Los Angeles, Riverside, San Benito, San Diego, Santa Barbara, and Ventura Counties. San Clemente Island, Bachelor Mtn., Camarilla, Del Mar, La Jolla, La Mesa, North

Chalone Peak, Peak Mountain, Sage, San Clemente Island South, Steele Peak

Habitat: Chaparral (openings) / on soil, small mammal pellets, dead twigs, and on *Selaginella* spp.; elevation 290 to 660 meters

Notes: Added to CRPR 3 based on prior inclusion in CNDDDB; CALS Conservation Committee sponsorship is pending. Possibly extirpated in Del Mar from urbanization. (<http://californialichens.org/conservation/Texosporium+sancti-jacobi/>)

Available online at <http://www.rareplants.cnps.org/detail/3815.html>



Texosporium sancti-jacobi. Photograph by Stephen Sharnoff.

Species: *Thamnomia vermicularis* (Swartz) Ach. ex Schaerer

Common name: white worm lichen [thamnomia lichen in CNDDDB]

Family: Icmadophilaceae

Growth form: fruticose lichen (terricolous)

Status: CRPR 2B.1, G3G5 / S1

Distribution: Alaska, Colorado, Connecticut, Idaho, Montana, New Hampshire, New York, Oregon, Vermont, Washington, Wyoming, and California

California locations: Marin County. Valley Ford

Habitat: Chaparral, valley and foothill grassland / on

rocks derived from sandstone; elevation 90 meters

Notes: Known in California only from near Dillon Beach. Preferred habitat may exist on Mt. Shasta; needs field surveys. Possibly threatened by trampling and foot traffic. See *Bulletin of the California Lichen Society* 16(2):21-26 (2009) for CALS Conservation Committee sponsorship. (<http://californialichens.org/conservation/Thamnolia+vermicularis/>)

Available online at <http://www.rareplants.cnps.org/detail/3816.html>



Thamnolia vermicularis. Photograph by Stephen Sharnoff.

Species: *Usnea longissima* Ach.

Common name: Methuselah's beard lichen [long-beard lichen in CNDDDB]

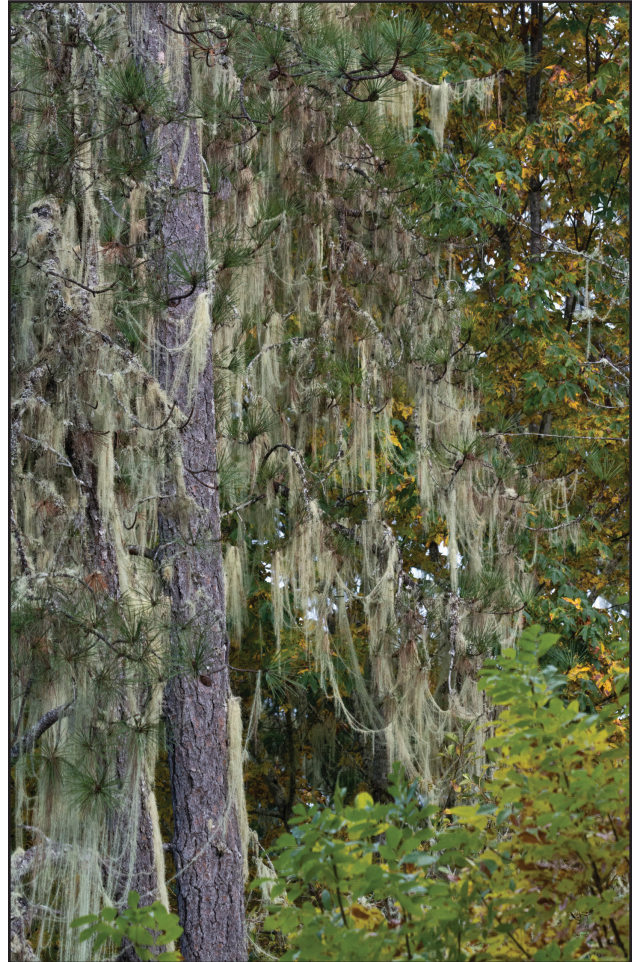
Family: Parmeliaceae

Growth form: fruticose lichen (epiphytic)

Status: CRPR 4.2, G4 / S4

Distribution: Alabama, Alaska, Maine, Michigan, Minnesota, Missouri, Montana, New Hampshire, New York, Oregon, South Carolina, Vermont, Washington, Wisconsin, and California

California locations: Del Norte, Humboldt, Mendocino, San Mateo, Santa Cruz, Sonoma Counties. Big Basin, Woodside, Camp Meeker, Duncans Mills, Guerneville, Fort Ross, Cazadero, Annapolis, Stewarts Point, Plantation, Yorkville, Orrs Springs, Bailey Ridge, Elk, Mallo Pass Creek, Noyo Hill, Mathison Peak, Lincoln Ridge, Dutchmans Knoll, Inglenook, Noble Butte, Leggett, Piercy, Bear Harbor, Mistake Point, Hales Grove, Harris, Honeydew, Shubrick Peak, Shelter Cove, Bridgeville, Redcrest, Weott,



Above: Close-up of *Usnea longissima*. Photograph by Eric Peterson.

Below: *Usnea longissima* in habitat. Photograph by Stephen Sharnoff.

Myers Flat, Scotia, Taylor Peak, Buckeye Mtn., Bull Creek, Iaqua Buttes, Owl Creek, Yager Junction, McWhinney Creek, Hydesville, Korbel, Arcata South, Bald Hills, Ah Pah Ridge, Fern Canyon, Cant Hook Mtn., Childs Hill, Shelly Creek Ridge, Gasquet, High Divide Hiouchi

Habitat: Broadleaf upland forest, north coast coniferous forest / on tree branches; usually on old growth hardwoods and conifers; elevation 50 to 1460 meters

Notes: Threatened by development, road maintenance, and logging. See CALS Conservation Committee sponsorship by E. Peterson (2005) for additional information. (<http://californialichens.org/conservation/Usnea-longissima/>)

Available online at <http://www.rareplants.cnps.org/detail/3817.html>



Sponsorship for the above pictured species, *Sulcaria badia*, has not yet been finalized. Photograph by Martin Hutten.

A NOTE OF THANKS FROM CALS

Inclusion of these lichens in the CNPS Inventory required some modifications to the Inventory database, which were not without cost. CALS would like to thank the Mead Foundation for the bulk of the financial assistance, as well as the generosity of others in the CALS family for supporting lichen conservation.

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Caliente Ranch: A Refuge for Rare Lichens in the South Sierra Nevada Mountains

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ABSTRACT

Two rare lichens, Lecanora munzii and Cyphelium brachysporum, endemic to California, are reported from Kern County in the South Sierra Nevada Mountains on Caliente Ranch, a property owned by The Nature Conservancy. The rarity of the two species is attributed to loss of habitat, loss of substrate, and increased fire frequency. Free range cattle grazing may help preserve these two species from extinction by reducing the fuel load on Caliente Ranch.

The Caliente Ranch is in the south Sierra Nevada Mountains in Kern County (Figure 1). Chaparral, *Fremontia* with bright yellow flowers, buckeyes and gray pine, oaks, California junipers and pinyon pines cover the rolling hills. The Nature Conservancy (TNC) owns the property. A rancher still leases grazing rights and cattle roam free. I have been there twice with TNC ecologist Zachery Principe for a preliminary evaluation of the lichen flora. I have just been skimming, sampling from one end of the property to the other, sticking close to truck trails. No one had ever collected lichens there before. Most places in California where I collect, no one has ever collected lichens before. I made 90 collections and I have determined 67 taxa, including many new county records, and James Lendemer and I are working on a new species of *Lecanora* from oak bark (UCR Herbarium 2014). Based on past experience, an intensive lichen survey of the Caliente Ranch and associated easements would probably report 150-200 species of lichen. Maybe more.

Some lichens are lignicolous, “lignum loving”, occurring on the dry wood of dead trees or on dead branches of chaparral or on chunks of wood scattered on the dusty earth. Some of these species also occur on old furrowed bark but you are more likely to find them on old wood fences. Caliente Ranch has two

rare lichens, endemic to California, growing on old wood baked in the long dry summers.

Munz’s *Lecanora*, *Lecanora munzii* K. Knudsen & Lendemer (Figure 2) is a rare California endemic that grows on scattered decorticated logs of pine and oak on Caliente Ranch. It is named for Phillip Munz, the great southern California botanist, whose descriptive taxonomic style was a big influence on me. I originally collected the taxon in Menifee Hills where Jana and I live in Riverside County in southern California. James Lendemer discovered the species produced gyrophoric acid (though spot tests are usually negative) and we described it from southern California (Knudsen and Lendemer 2009). It is rare, known from seven locations at low elevations in the coastal ranges of southern California (Claremont, Menifee Hills, San Bernardino Mountains, Santa Ana Mountains, and in Griffith Park in the Santa Monica Mountains, not far from the Hollywood sign) (UCR Herbarium 2014). It usually occurs on chaparral and coastal sage shrub wood, often on scattered branches on the ground. Once I collected it on a wood fence. Another time I collected it on a skeletal Mexican elderberry with a single brown leaf in the rocky floodplain of the Santa Ana River. The most northern location was in Los Angeles. We did not find it in Yosemite (Hutten et al. 2013) or on the Channel Islands (Knudsen & Kocourková 2012). It was definitely rare and I did not even collect it again after 2006 until we explored Caliente Ranch in 2013. Munz’s *Lecanora* on Caliente Ranch in the south Sierra Nevada Mountains is a range extension of over a hundred miles north from Los Angeles as the condor flies. Caliente Ranch is only the eighth known population center of Munz’s *Lecanora*. For a description and more pictures see Knudsen and Lendemer 2009 available for free download at the *Opuscula Philolichenum* website <http://sweetgum>.



Figure 1. Caliente Ranch. Photograph by Kerry Knudsen

nybg.org/philolichenum/.

The other rare California endemic growing on wood at Caliente Ranch is Pechanga Cyphelium, *Cyphelium brachysporum* Nád. (Figure 3). A Czech lichenologist in Prague described it during the dark deadly days of World War II from a specimen collected by H.E. Hasse in 1909 in Murrieta Hot Springs in southern California on the traditional land of the Pechanga tribe. How the specimen got to Prague we have never found out but Hasse did study at Charles University in Prague for part of his training as a doctor and he no doubt had botanical friends in the ancient city (Knudsen 2010). Jana Kocourková re-discovered the holotype in the National Herbarium of the Czech Republic in Prague. Working with James Lendemer, we revised the species (Lendemer et al. 2008). Though the type locality is near our home in California, we have not found it hiking the local hills. It is currently known from San Simeon, on Morro Manzanita in Los Osos, on a corral fence at the UC Sedgwick preserve, and

on a stump of *Quercus pacifica* in Bulrush Canyon on Catalina Island (UCR Herbarium 2014). Caliente Ranch is only the fifth known population center. For descriptions and pictures of Pechanga Cyphelium see Lendemer et al. 2008 and Sharnoff 2014.

Why are these species rare? Some species are naturally rare, for instance because they have evolved a specialized adaption to a narrow niche or are relics like redwoods from the Pleistocene or have not expanded yet from the locus of their recent speciation. It is possible both Munz's *Lecanora* and Pechanga Cyphelium are naturally rare. They are currently considered endemic to California (Tucker 2014).

In my opinion both species were once probably frequent in coastal sage shrub and chaparral and have become rare through habitat loss, substrate loss, and frequent fires.

Habitat loss is a common cause of rarity in California.



Figure 2. Munz's *Lecanora*. Santa Rosa Plateau, Santa Ana Mountains, Lendemer 14714 [NY]. Photograph by James Lendemer. ©TNC

In the last two hundred years, human development has transformed our foothills and valleys, our beaches and mountains and deserts, as millions of people from around the world have sought their fortune at the end of the rainbow in the Land of Dreams and settled in the vast urban sprawls of Los Angeles and San Francisco. Millions of acres of chaparral and native woodland have disappeared as housing tracts and malls have proliferated linked by the black asphalt veins of freeways.

Substrate loss is often a factor in the extirpation of lichens. During the last two hundred years, ranchers and settlers in California often depended on dry decorticated wood for fuel. On the Channel Islands, early settlers burned all the wood and in some case the last trees. Most ranches also regularly remove dead wood from pastures to maintain the land for grazing. Cal Fire often clears out the old wood from forests and chaparral too. In many cases it is only in undisturbed old-growth forest or chaparral that you even see a lot of old wood in southern and central California. Often it is easier to find lignum-loving lichens on wood fences than actually on the wood of native plants.

Frequent fire is the third probable cause of the rarity of Munz's *Lecanora* and Pechanga *Cyphelium*. Fire caused by lightning is a part of California's ecology. But except on mountain tops, these lightning fires

can be quite rare. In the Santa Monica Mountains or the San Francisco Bay area, for instance, a general opinion is that major fires naturally only happened every 125 years. When these fires blaze through an area they burn all the wood and dead trees as well as the lichens growing on them. Lichens in southern California probably take fifty years or more to fully recolonize a burnt area. In our experience, fires happening every 20 years or less reduce diversity on chaparral and coastal sage shrubs to *Candelaria pacifica* and a handful of fast-growing foliose species like *Parmotrema*, with crustose lichens like *Lecanora* or *Cyphelium* becoming absent or rare. Where fire frequencies caused by humans are as little as every five years, lichens literally disappear.

We are living through an extinction event which will soon probably be called by geologists the Anthropocene instead of the Holocene. A good book and a good read about the current human-caused extinction event is *The Sixth Extinction: An Unnatural History* by Elizabeth Kolbert (2014). We expect the extinction of as much as 40 per cent of the earth's 10 million species over the next two or three hundred years. Munz's *Lecanora* and Pechanga *Cyphelium* are the kind of species that could become extinct in the future, wiped out by loss of habitat and substrate and frequent human-caused fires in a world growing hotter. If it was not for recent taxonomic work, which



Figure 3. Pechanga *Cyphelium*. Murrieta, collected on dead shrub by H.E.Hasse 1905 [NY]. Photograph by James Lendemer. ©TNC

was not supported by grants, these two species may never have been recognized before they went extinct. Many fungi, microorganisms, and insects will go extinct without ever being known by science, the end products of billions of years of evolution irreplaceably lost.

All the locations where Munz's *Lecanora* and Pechanga *Cyphelium* have been collected have not burned in the last forty years or in some cases may have never been burned. At all the sites these two species could be wiped out by the next wildfire caused by arson or an illegal campfire or a carelessly tossed blunt.

Except Caliente Ranch.

There will be fires on Caliente Ranch. We saw burnt wood from past fires. What is unique about these species being preserved at Caliente Ranch is the free range grazing. Those hungry cattle, roaming back and forth across the rolling mountains and andesite ridges of Caliente Ranch, eat all those invasive grasses that form blankets of dry fuel by summer. The cattle prevent a big buildup of fuel. With less of a fuel load, a fire on Caliente Ranch will probably be less devastating, faster moving through much of the ranch, except where the chaparral is too dense for grazing like in the Harper Peak area. A fire would probably not be catastrophic. Some wood and dead trees and shrubs would survive unburnt to support the populations of Munz's *Lecanora* and Pechanga *Cyphelium*.

Generally the only good I see in grazing cattle is a steak. But at Caliente Ranch those cattle may be the key to preserving these two rare endemic lichens from extinction in the Anthropocene.

Photographs by J.C. Lendemer (NY) and copyrighted by TNC 2014.

ACKNOWLEDGMENTS

I thank The Nature Conservancy for the support of my research on the California lichen flora. I thank James C. Lendemer (NY) for thin-layer chromatography of specimens and for supplying pictures of Munz's *Lecanora* and Pechanga *Cyphelium*.

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A Workshop on the Family Pannariaceae of the Western Hemisphere with Dr. Peter Nelson

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Figure 1. Workshop group observing large patches of *Fuscopannaria thiersii*. Photograph by John Villella.

For the fourth year in row lichenologists from far and wide converged at Southern Oregon University in Ashland Oregon to take part in a lichen workshop about an obscure and difficult group of lichens. This year the focus was on the family Pannariaceae; this includes genera such as *Fuscopannaria*, *Pannaria*, *Psoroma*, *Parmeliella*, and *Vahliella* just to name a few. Many people are paranoid to ponder a pannarioid, but with the help of our expert teacher we came away with the confidence to tackle this intriguing and diverse group of cyanolichens.

Dr. Peter Nelson has conducted extensive fieldwork with lichens across the western hemisphere from Alaska to the Pacific Northwest to Chile. Along

the way he has discovered populations of rare Pannariaceae such as *Erioderma pedicellatum* in Alaska (Nelson et al. 2009), and discovered things about known species that are new to science, such as the fact that *Fuscopannaria viridescens* the only known green algal species in North America actually has cephalodia, something that had hitherto been overlooked (Nelson and Wheeler 2013).

On the first day of the workshop the group went on a field trip to Black Butte, on the edge of the Siskiyou Wilderness in Six Rivers National Forest California. This location was chosen on the suggestion of Bruce McCune, a site that was visited by his group during the IAL road trip in 2008. Even though there



Fuscopannaria pacifica, a member of the Pannariaceae.
Photograph by Richard Droker.

was some trepidation about finding a Pannariaceae “hotspot” we were not disappointed, during the day we encountered nine species that are currently or were formerly considered to be in this family.

After just crossing from Oregon into California, before we even arrived at Black Butte, we stopped along the side of the road and encounter our first two species: *Fuscopannaria pacifica* on the base of a large

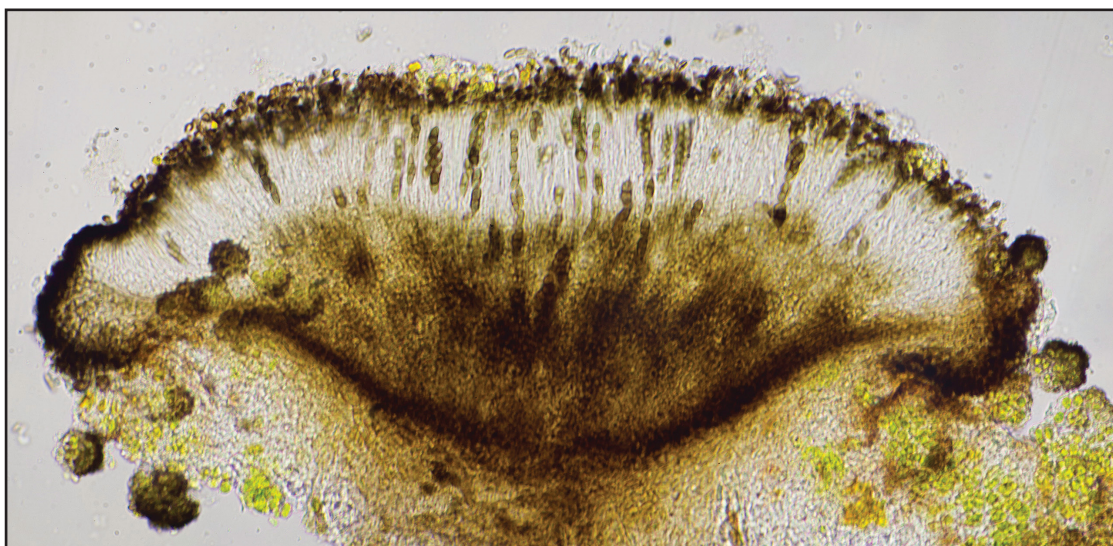
Madrone tree, and *F. californica* on a small roadside rock. *F. pacifica* (formally thought to be *F. saubinetii*) is the most common epiphytic member of the family in the local area.

A clue to separating these species in the field is the color of the apothecia, tan to dark orange in *F. pacifica* and brown to black in *F. californica*.

On a large open rock near the parking place we observed large patches of *Fuscopannaria thiersii* (figure 1). This species is distinguished in the field by its upturned isidia like lobes. This was found to be growing in close proximity to *Massalongia carnosa*, a lichen that was formally thought to be a member of this family.

As the group left the trail to hike cross-country through the forest to the base of a large rocky cliff we encountered several nice large thalli of *Psoroma hypnorum* growing among rock dwelling bryophytes. This is a lichen that is thought to be rare in California (Carlberg 2003). *P. hypnorum* is the world’s most wide ranging species of *Psoroma* and the only species that is known to occur in our area. The center of speciation for this genus is in Southern South America and New Zealand.

Upon reaching the base of the cliffs we were rewarded with several more species. On thin soil below the



Apothecial cross section of *F. pacifica*. Photograph by Richard Droker.

overhanging rocks we encountered *Fuscopannaria cyanolepra*, a species that is nearly completely composed of soredia. It appears more like a cyanobacterial *Lepraria* than a *Fuscopannaria*. We also observed *Fuscopannaria aurita*, a distinct rock dwelling species with flattened earlike lobes. After a bit more searching we found *Fuscopannaria praetermissa* growing on soil among rocks, distinguished by the frosty whitish tips of the lobes.

With Pannariaceae species swirling through our heads and snow swirling in the skies above us we made a hasty retreat to the warmth of the cars. After descending from the high country we stopped in a mixed conifer and white oak site and searched for *Fuscopannaria pulveracea* on the oaks. Although this species is known from nearby at the Siskiyou Field Institute growing on large open grown white oak we did not encounter it at this stop. Along with some of the other epiphytes mentioned above we also found *Vahiella leucostictoides* growing among rich bryophytes as an oak epiphyte.

The following days were spent with comprehensive lectures detailing all of the genera of North American Pannariaceae coupled with time in the lab to examine specimens. We spent the most time on *Fuscopannaria* the most diverse genus in our local flora. Along with a comprehensive tour of the lichens in this family we also learned of Dr. Nelson's efforts to model the habitat of several hypermaritime species such as *Erioderma solediatum*, *Leioderma solediatum* and *Pannaria rubiginosa* in the central Oregon coastal dunes. A lively and insightful discussion ensued with workshop participants sharing their experience with these species.

Dr. Nelson provided a wide selection of specimens for us to examine and compare from locations ranging from Arctic Alaska to the Pacific Northwest to southern Chile (figure 2). We learned the technique for discerning ascus tip morphology and hymenial reactions using IKI and how to conduct spot tests using PD. He provided a comprehensive bound workshop packet that includes a valuable selection of keys composed by him and his colleagues as well as gleaned from the most up to date literature.



Figure 2. Dr. Nelson provided a wide selection of specimens for us to examine and compare from locations ranging from Arctic Alaska to the Pacific Northwest to southern Chile. Photograph by John Villevilla.

All in all this was a valuable learning experience for all those in attendance and we are grateful to Dr. Nelson for making the time to share with us his knowledge of this truly amazing group of lichens. Once again the Northwest Lichenologists and the Cryptogam Biodiversity Observatory sponsored this event, thanks to Dr. Steve Jessup for facilitating the event at Southern Oregon University.

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What's in the Trees at Muir Woods?

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A BioBlitz is an exhaustive biological survey of the biodiversity in a certain area. Scientists, students, and volunteers work intensively to record as many species as possible across multiple taxonomic groups within a 24-hour period. The BioBlitz is also a chance for the general public to meet the scientists and learn more about biodiversity and science in general.

The 2014 BioBlitz event took place in Golden Gate National Recreation Area, an area with numerous smaller Parks that covers more than 80,000 acres and 91 miles of shoreline in Northern California. The event attracted about 9,000 people who interacted with more than 320 scientists to learn about the local biodiversity. At least 2,300 species were recorded ranging from bacteria to insects and vertebrates to vascular plants and lichens; more than 80 taxa were new to the Parks. Many of the recorded species can be viewed on iNaturalist (www.iNaturalist.org).

We became involved in the BioBlitz shortly before the event. Redwood canopy scientists Steve Sillett and Marie Antoine from Humboldt State University, along with Save the Redwoods League, applied for permission to climb two of the larger trees in Muir Woods National Monument during the BioBlitz to survey for epiphytes (lichens, bryophytes, and vascular plants) and to collect wood cores to document age, size, health, and tree-ring history in Muir Woods. We requested that Marie and Steve collect a few extra epiphytes for William Miller, a tardigrade expert from Baker University in Kansas. Tardigrades, also known as waterbears, are tiny (0.5 mm), segmented, invertebrate animals that are common in mosses and lichens. Tardigrades are considered extremophiles because they can tolerate extreme temperatures, pressures, and radiation (Miller, 2011). Just like lichens (Sancho *et al.* 2007; Onofri *et al.* 2012), tardigrades are able to survive the extreme conditions of outer space (Persson *et*



Figure 1. Rikke Reese Naesborg (left) and Cameron Williams (right) ascend an old Douglas-fir in Muir Woods National Monument to conduct an epiphyte diversity survey for the 2014 BioBlitz. Photograph by Tonatiuh Trejo-Cantwell, courtesy of Save the Redwoods League.

al. 2011). They can desiccate to less than 3% water content, then remain in a dormant state for more than ten years before rehydrating to live a normal life and even reproducing (Miller, 2011). Since tardigrades and epiphytic lichens and bryophytes all tolerate desiccation by becoming dormant, they have a natural tendency to co-occur. William Miller has long been curious whether tardigrades occur in the lichens and bryophytes that grow on tall trees, so he was excited to learn we were redwood canopy researchers. A BioBlitz collaboration was forged to collect additional epiphyte specimens for tardigrade research.

Steve and Marie canvassed our willingness to help with the biodiversity survey, and we were happy to assist. Since this was the first time trees were climbed for research in Muir Woods, the Park Service was hyper-conscious of the risks. Tree climbing is inherently dangerous without proper training, so the Park was appropriately conservative about permitting this climb. In fact, when we arrived Friday morning the area surrounding the two study trees was fenced off, and safety officers were regulating entry to avoid injury to passersby. We were escorted to the trees, and after dealing with a media circus we prepared for our climb. At noon the BioBlitz began, and we started ascending into the trees. Marie and Steve climbed a 76 m (249 ft) tall coast redwood (*Sequoia sempervirens*) while we climbed a 70 m (230 ft) Douglas-fir (*Pseudotsuga menziesii*, Fig. 1). The study trees were among the largest in the grove, and were probably at least several hundred years old.

We began our survey at the top and worked our way down. A tall, old tree typically has many different microhabitats, some of which include a relatively dry and exposed upper crown, a shady lower crown, a trunk with old and stable bark, soil accumulations on large branches, burnt bark, exposed wood, live and dead foliage, fine twigs, and burnt wood, just to mention a few. These different substrates and microclimatic conditions offer many microhabitats to different epiphyte species. In the top of the Douglas-fir we primarily found lichens—*Flavoparmelia caperata*, *Hypogymnia* spp., *Ochrolechia juvenalis*, *Parmotrema* spp., *Pertusaria amara*, *Punctelia jeckeri*, *Ramalina menziesii*, *Sphaerophorus tuckermanii*, *Tuckermannopsis orbata*, and *Usnea* spp. were the most common—with a few bryophytes

scattered here and there. The lower crown was dominated by the bryophytes *Isothecium cristatum*, *I. stoloniferum*, *Dicranoweisia cirrata*, and *Porella navicularis*, which covered the branch bases in thick mats. On the lower branches we also found the fern *Polypodium glycyrrhiza* growing from bryophyte mats over soil. The lower trunk was coated with *Cladonia transcendens*, *Lepraria* sp., *Carbonicola myrmecina*, and *Fulgidea oligospora*. About three meters off the ground we even found a tiny salamander (probably the black salamander, *Aneides flavipunctatus*). We found a total of 57 epiphyte species in the Douglas-fir, while Marie and Steve found about 35 species in the coast redwood (Table 1). Note that this list is not fully resolved since we have not yet found the time to reach higher resolution with all taxa.

One of the more interesting finds in the Douglas-fir was *Usnea longissima* (Fig. 2), which was only recently reported from Marin County. As an aside, we recently saw numerous strands of *U. longissima* along

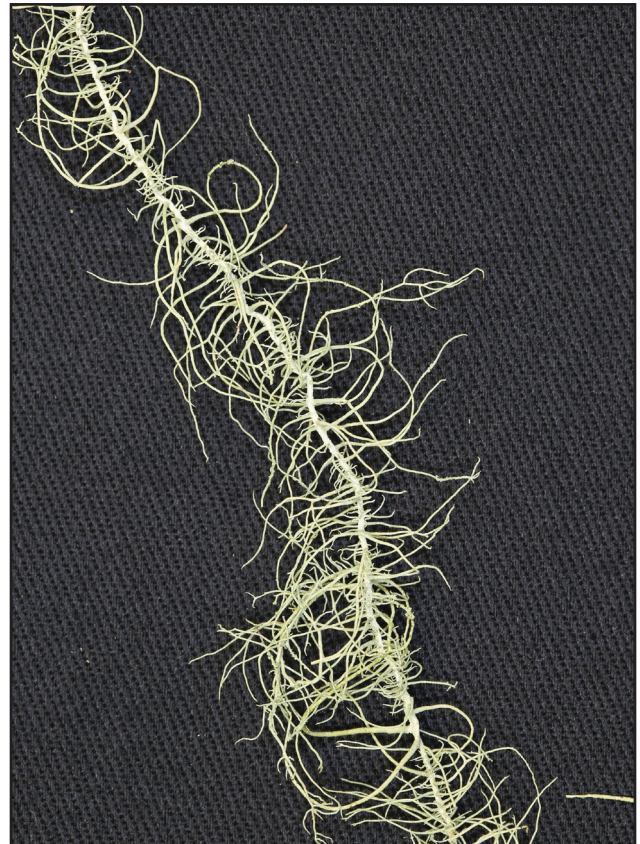


Figure 2. A strand of *Usnea longissima* from the Douglas-fir. Photo by Rikke Reese Næsborg.

Lagunitas Creek in Marin Municipal Water District, so perhaps the species has just been overlooked in the county so far. *Usnea longissima* was not as common as the other *Usnea* spp. in the Douglas-fir, but we estimate there were between 25 and 50 strands draped over branches. We also found *Loxosporopsis corallifera* (Fig. 3), the only isidiate crustose lichen with long, slender isidia (Brodo *et al.* 2001). This may be a range extension, as it is reported from Van Damme State Park in Mendocino County but not this far south (CNALH website).

Despite a thorough survey, Steve and Marie did not encounter any epiphytes below about 50 m on

the coast redwood. This unusual phenomenon is perhaps explainable by the combination of hostile bark chemistry, low light, and relatively dry bark of the coast redwood. Microclimate is particularly suspect here, as this coast redwood stands closely surrounded by other tall trees in the middle of the dense “Cathedral Grove”. The main trunks of coast redwoods generally support relatively sparse epiphyte communities, especially below the crown, but we usually at least find scattered *Cladonia* squamules and *Lepraria* soredia. Apart from the difference in number of taxa between the two trees, a few other differences stand out. Marie and Steve did not find *Usnea longissima* in the coast redwood,



Figure 3. *Loxosporopsis corallifera* displaying characteristic long, slender isidia. Photograph by Rikke Reese Naesborg

nor did they encounter *Sphaerophorus tuckermanii* or *Punctelia jeckeri* which were common species in the Douglas-fir. The coast redwood supported only the two bryophytes *Isothecium cristatum* and *Orthodontium gracile*, whereas the Douglas-fir supported five moss and five liverwort species. The coast redwood on the other hand had *Alectoria imshaugii*, *Menegazzia subsimilis*, *Flavopunctelia flaventior*, and *Hypogymnia physodes* – species we did not encounter in the Douglas-fir. These differences in epiphyte species composition are likely due to contrasting substrate and microclimatic conditions between the two trees. Despite the differences in epiphyte diversity we captured during our survey, the clearest distinction between the Douglas-fir and coast redwood we did not measure—the abundance of epiphyte material. The Douglas-fir, especially the branches and upper trunk, were so coated with epiphyte biomass that we could hardly see the bark! The main trunk below the crown did not support as much material, but it still had plenty of species. In contrast, the coast redwood was completely devoid of epiphytes below 50 m, with only a couple of moss-covered dead branches at around 50 m, followed by an abrupt transition to lichen-covered branches above 50 m. Although most upper crown branch surfaces in the coast redwood were completely covered with lichens, the lichen community was dominated by just a few taxa (*Parmotrema* spp., *Hypogymnia* spp., and *Usnea* spp.).

While this 2014 BioBlitz epiphyte survey included just one coast redwood and one Douglas-fir, the survey increased resolution of the epiphyte communities in Muir Woods National Monument, simply for the reason that nobody inventoried canopy epiphytes on large trees there before. It would be interesting to conduct a more thorough investigation of canopy epiphytes in Muir Woods by including not only additional Douglas-fir and coast redwood trees, but also angiosperm trees such as tan oak (*Notholithocarpus densiflorus*) and bay laurel (*Umbellularia californica*). In true BioBlitz spirit, we are optimistic that our epiphyte collections for William Miller will yield tardigrade taxa to add to the more than 2,300 total BioBlitz taxa already recorded.

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Table 1. Epiphytes collected on one Douglas-fir (*Pseudotsuga menziesii*) and one coast redwood (*Sequoia sempervirens*) in Muir Woods National Monument on 28 March, 2014.

| SPECIES | <i>Pseudotsuga menziesii</i> | <i>Sequoia sempervirens</i> |
|--|------------------------------|-----------------------------|
| LICHENS | | |
| <i>Alectoria imshaugii</i> Brodo & D. Hawksw. | | x |
| <i>Alyxoria varia</i> (Pers.) Ertz & Tehler | x | |
| <i>Bryoria fremontii</i> (Tuck.) Brodo & D. Hawksw. | x | |
| <i>Buellia muiriformis</i> A. Nordin & Tønsberg | x | |
| <i>Calicium</i> spp. Pers. | | x |
| <i>Calicium abietinum</i> Pers. | x | |
| <i>Carbonicola myrmecina</i> (Ach.) Bendiksby & Timdal | x | x |
| <i>Chrimofulvia dialyta</i> (Nyl.) Marbach | x | |
| <i>Chrysothrix xanthina</i> (Vainio) Kalb | x | x |
| <i>Cladonia bellidiflora</i> (Ach.) Schaerer | x | x |
| <i>Cladonia transcendens</i> (Vainio) Vainio | x | x |
| <i>Cyphelium inquinans</i> (Sm.) Trevisan | x | x |
| <i>Evernia prunastri</i> (L.) Ach. | x | |
| <i>Flavoparmelia caperata</i> (L.) Hale | x | x |
| <i>Flavopunctelia flaventior</i> (Stirton) Hale | | x |
| <i>Fulgidea oligospora</i> (Timdal) Bendiksby & Timdal | x | |
| <i>Hypogymnia apinnata</i> Goward & McCune | x | x |
| <i>Hypogymnia enteromorpha</i> (Ach.) Nyl. | x | x |
| <i>Hypogymnia heterophylla</i> L. Pike | x | x |
| <i>Hypogymnia physodes</i> (L.) Nyl. | | x |
| <i>Imshaugia aleurites</i> (Ach.) S. F. Meyer | x | |
| cf. <i>Lecania naegelii</i> (Hepp) Diederich & van den Boom | x | |
| <i>Lecanora</i> sp. Ach. | | x |
| <i>Lecanora</i> cf. <i>jamesii</i> J. R. Laundon | x | |
| <i>Lecanora strobilina</i> (Sprengel) Kieffer | x | |
| <i>Lepraria</i> sp. Ach. | x | x |
| <i>Loxosporopsis corallifera</i> Brodo | x | |
| <i>Menegazzia subsimilis</i> (H. Magn.) R. Sant. | | x |
| <i>Ochrolechia</i> spp. A. Massal. | | x |
| <i>Ochrolechia juvenalis</i> Brodo | x | |
| <i>Parmelia hygrophila</i> Goward & Ahti | | x |
| <i>Parmelia sulcata</i> Taylor | x | x |
| <i>Parmotrema arnoldii</i> (Du Rietz) Hale | x | x |
| <i>Parmotrema perlatum</i> (Hudson) M. Choisy | x | x |
| <i>Parmotrema stuppeum</i> (Taylor) Hale | x | |
| <i>Pertusaria</i> sp. DC. | | x |
| <i>Placynthiella uliginosa</i> (Schrader) Coppins & P. James | x | |

Table 1. (cont.) Epiphytes collected on one Douglas-fir (*Pseudotsuga menziesii*) and one coast redwood (*Sequoia sempervirens*) in Muir Woods National Monument on 28 March, 2014.

| SPECIES | <i>Pseudotsuga menziesii</i> | <i>Sequoia sempervirens</i> |
|--|------------------------------|-----------------------------|
| LICHENS (cont.) | | |
| <i>Platismatia glauca</i> (L.) W. L. Culb. & C. F. Culb. | x | |
| <i>Platismatia herrei</i> (Imshaug) W. L. Culb. & C. F. Culb. | x | |
| <i>Protoparmelia ochrococca</i> (Nyl.) P. M. Jørg., Rambold & Hertel | x | |
| <i>Punctelia jeckeri</i> (Roum.) Kalb | x | |
| <i>Pyrrhospora quernea</i> (Dickson) Körber | x | x |
| <i>Ramalina menziesii</i> Taylor | x | |
| <i>Sphaerophorus tuckermannii</i> Räsänen | x | |
| <i>Trapeliopsis flexuosa</i> (Fr.) Coppins & P. James | x | x |
| <i>Tuckermannopsis orbata</i> (Nyl.) M. J. Lai | x | x |
| <i>Usnea ceratina</i> Ach. | x | x |
| <i>Usnea chaetophora</i> Stirton | x | |
| <i>Usnea cornuta</i> Körber | x | x |
| <i>Usnea hirta</i> (L.) Weber ex F. H. Wigg | x | |
| <i>Usnea longissima</i> Ach. | x | |
| <i>Usnea rubicunda</i> Stirton | x | x |
| <i>Usnea subfloridana</i> Stirton | x | x |
| Unknown spp. | x | x |
| <i>Variolaria amara</i> Ach. | x | |
| LIVERWORTS | | |
| <i>Cephaloziella</i> sp. (Spruce) Schiffn. | x | |
| <i>Frullania nisquallensis</i> Sull. | x | |
| <i>Frullania</i> sp. Raddi | x | |
| <i>Porella navicularis</i> (Lehm. & Lindenb.) Lindb. | x | |
| <i>Radula bolanderi</i> Gottsche | x | |
| MOSSES | | |
| <i>Dicranoweisia cirrata</i> (Hedwig) Lindberg | x | |
| <i>Hypnum circinale</i> W. J. Hooker | x | |
| <i>Isothecium cristatum</i> (Hampe) H. Robinson | x | x |
| <i>Isothecium stoloniferum</i> Bridel | x | |
| <i>Orthodicranum tauricum</i> (Sapehin) Smirnova | x | |
| <i>Orthodontium gracile</i> Schwägrichen ex Bruch & W. P. Schimper | | x |
| VASCULAR PLANTS | | |
| <i>Polypodium glycyrrhiza</i> D.C.Eaton | x | |

News and Notes

LICHEN DISPLAY

The CALS Conservation Committee held a meeting in 2013, using a conference room at Turtle Bay Exploration Park in Redding, CA. In return, a couple members of the committee contributed a small lichen display.

The lichen display is located in the natural history museum's lab space, near the hydrogeomorphic flume and adjacent to a pair of microscopes. Most of the display is on a set of shelves with lichen examples

on several branches and a rock, plus a description of what a lichen is, and a couple example herbarium specimens. The description includes the CALS website: californialichens.org.

The display also includes one interactive piece: a set of lichens preserved in epoxy resin for viewing under the adjacent dissecting microscope. The embedded lichens were chosen to demonstrate the basic growth forms (crustose, foliose, and fruticose), plus variations (squamules with podetia [*Cladonia*], umbilicate, and calicioid [or pin-lichens]).

By Eric Peterson



LICHENS INCLUDED IN REGIONAL PARKS BOTANIC GARDEN NATURALIST WORKSHOP SERIES

Shelly Benson taught an introductory lichen workshop at Tilden Regional Park Botanic Garden. The event was part of the workshop series offered by the Friends of the Regional Parks Botanic Garden. The class introduced the basics of lichen biology and ecology, and emphasized recognition of lichen growth forms and structures that are used to differentiate between species. The workshop included a lecture, hands-on demonstrations exhibiting lichen structures, and a walk through the garden to observe lichens in their natural habitats.

By Shelly Benson



Above: Lichen display at Turtle Bay Exploration Park in Redding, CA. Below: Detail of lichen display in epoxy resin. Photograph by Eric Peterson.

LICHEN DYES WORKSHOP FOR FIBERSHED

On July 19, 2014, CALS board members Sarah Minnick and Shelly Benson taught a lichen dye workshop on a beautiful ranch in Nicasio, CA. The workshop was sponsored by Fibershed (www.fibershed.com) as part of their mission to change the way we clothe ourselves by supporting the creation of local textile cultures that enhance ecological balance, and utilize regional agriculture while strengthening local economies and communities. The class filled up quickly, and over 20 participants joined to learn about dyeing with lichens and how this local dye source fits into a textile culture that brings garments 'from soil to skin' within a 150 mile radius.

First, an overview and history of lichens and their use as dyes was presented, followed by information

on the methodologies of creating lichen dye baths. We heated up some dyes and added fiber samples including wool that was grown and processed within our fibershed.

While the dye lichens were doing their work, Shelly led a foray into the surrounding area to look for lichens. On the foray, participants became familiar with some common lichen species, and practiced observing the characteristics that would help them identify those good for dyeing. Much stress was given to the importance of salvage collection and the use of ‘blowdown’ lichens for dyes, as well as various other sustainable collection practices.

After the foray, everyone returned to see what colors had developed in the dye vats. Yarn samples dyed purple, orange, yellow, green, and rusty red were produced. Participants took home instructions for dyeing as well as the samples they dyed, not to mention a new appreciation for this often overlooked group of organisms that can play a unique role in our fibershed.

By Sarah Minnick

ERRATA

Volume 20 No. 2 Winter 2013, News and Notes article, ‘CALs Celebrated its 20th Anniversary at Bouverie Preserve’:

The *Usnea longissima* Long-term Membership Award was also presented to the following members: Beth Lowe Corbin, Jim Riley, Roger Rosentreter & Ann DeBolt, and Bob Stewart. We apologize for not recognizing these members in the article.



Above: Yarn samples from the Fibershed lichen dye workshop; dye species pictured include *Parmotrema perlatum*, *Usnea sp.*, *Letharia vulpina*, and *Flavopunctelia flaventior*.



Left: Lichen dye workshop participants admire their artwork.

Upcoming Events

Macrolichens Around San Francisco Bay

Instructors: Tom Carlberg and Rikke Reese Næsborg

October 3-5, 2014

UC Berkeley and Bay Area Field Sites

Fee: \$325 members, \$365 non-members

The area around the San Francisco Bay has a unique lichenological position, combining the moderate extremes of a cold, constantly moist hypercoastal climate with warmer, drier conditions in the East Bay. One result of this juxtaposition is that of the 1,930 lichen species reported for California, approximately 495 are conservatively reported within 40 miles of the Bay Area.

This diversity of epiphyllous, crustose, foliose, squamulose, and fruticose lichens is largely overlooked and understudied.

For an investment of three days of your time, you can come away with a much better understanding of what lichens are, what they do in the world, the characters used to identify them, and a quick checklist of species and genera from a couple of contrasting climatic sites around the Bay. The workshop will focus on identifying lichens to genus. Friday afternoon will be an introductory presentation/lecture involving pictures and provided specimens. The remaining two days will be composed of field work followed by lab time, working on your own collections.

Familiarity with a dissecting microscope is useful but not essential. It is highly recommended that you have experience using dichotomous keys and essential that you bring a 10-14 power hand lens.

For more information, and to register, visit <http://ucjeps.berkeley.edu/workshops/2014>.

Tom Carlberg has a degree in botany from Humboldt State University, and has always leaned towards nonvascular organisms. He is the past editor of the Bulletin of the California Lichen Society (CALs) and a member of the society's Conservation Committee. His current special interest is ageing lichens that grow

on the leaves of evergreen vascular plants.

Rikke Reese Næsborg has a Ph.D. in lichenology from Uppsala University, Sweden, where she studied phylogenetic relationships within a crustose lichen genus as well as ecological and conservation implications. She has also taught courses involving both cryptogams and vascular plants. Rikke now resides in California and studies the canopies of giant redwoods.

Lichens of the California Deserts

Instructor: Kerry Knudsen

October 25, 2014

Joshua Tree National Park

Fee: \$60 JTNPA/PINE member, \$70 non-member

Over 140 species of lichens occur in Joshua Tree National Park. Several species new to science have been recently discovered. However, these ubiquitous organisms are commonly overlooked. This introductory class will give you a basic understanding of lichen biology and ecology in desert habitats.

Two and a half hours of entertaining lectures in the morning will give an introduction to lichens. You will learn about the most common genera and species found in Joshua Tree as well as about the rarest species in the park. You will learn about all the species new to science. The remaining part of the day will be spent in the field, looking at lichens on rock, junipers, and in soil crusts. You will need a hand-lens (10X) and you will want to have a camera for photographing Joshua Tree's beautiful lichen mosaics.

For more information, and to register, visit <http://www.joshuatree.org/>.

Kerry Knudsen is Curator of Lichens at the Herbarium of the University of California, Riverside. He is a floristic expert in the lichen biota of southern California. As a lichen taxonomist he has described over 50 species new to science. He has spent over 100 days in the field in Joshua Tree National Park studying the lichens of the Mojave and Sonoran deserts.

**College of Marin (COM)
Lichen Identification Workshop**

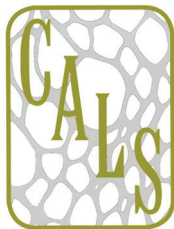
835 College Avenue
Kentfield, CA
ScienceMathNursing Bldg., Room SMN 112
1st and 3rd Fridays, 6-9 PM

We bring our own lichens and work with each other to identify them. There occasionally are snacks. We encourage you to attend these enjoyable workshops where we learn about and practice using various identification keys and microscopes. 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. Please RSVP to Bill Hill, who organizes the logistics:
aropoika@gmail.com, 415-686-6146.

**Tilden Regional Park Botanic Garden
Lichen Identification Workshop**

Junction of Wildcat Canyon Rd. and S. Park Dr.
Berkeley, CA
2nd Saturday of the month, 1:30-4:30 PM

We often check some lichens in the Garden and then do some keying and discuss some lichen interests. If you would like to have some particular topics covered please let us know. Please RSVP to Irene Winston, if you are planning to attend:
irene@californialichens.org, 510-548-6734



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 CNDDDB'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@californialichens.org.

President's Message

Lichen conservation is a core mission of CALS. We understand that education and outreach are crucial in advancing conservation practices. That's why we have partnered with the California Native Plant Society (CNPS) on a project to increase awareness of rare lichens by including them in the CNPS *Inventory of Rare, Threatened, and Endangered Plants of California (Inventory)*. The *Inventory* is the go-to database if you are looking for information about California rare plant species, whether you are a naturalist, conservationist, government agency, or a contractor working on environmental permitting. The *Inventory* will give invaluable exposure to lichens. For example, people searching for rare species in their area may stumble across records for rare lichens!

The project has been in the works for the past year and we are so excited to announce its completion. Check it out! www.rareplants.cnps.org

To view the 14 rare CA lichens in the database, just click the 'simple search' button and then, under the life form category, check 'lichen'. You can view a map showing the general locations for existing occurrences. To see photos of the lichens, click on the CalPhotos link at the very bottom of the page. Under the 'Notes' box there is a link for the CALS Conservation Committee, which takes you to a brand new corner of the CALS website that houses more info about the 14 rare lichens.

We can't say 'thank you' enough to all those who helped bring this project to fruition. So, thanks again to the Mead Foundation and the CALS members who funded this project, and to the CALS Conservation Committee and our partners at CNPS for all their great work towards conserving California's biological diversity.

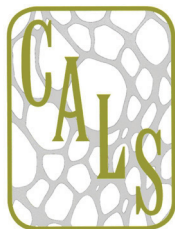
Within the last two years, the CALS community started using the online nature observation platform iNaturalist (www.inaturalist.org). iNaturalist is an interface that allows naturalists to record what they see in nature and learn about the natural world.

By promoting the use of tools like iNaturalist in conjunction with the *Inventory* we can equip lichen enthusiasts with the resources they need to inventory and monitor lichens throughout the state. These tools give everyone easy access to information about rare species and a user-friendly application-based system for documenting observations. Add to this toolbox the CALS *Ask a Lichenologist* project (www.inaturalist.org/projects/ask-a-lichenologist), which provides identification help for lichen observations posted on iNaturalist, and we're ready to make great strides in documenting California's lichen flora. There are so many places to explore and so many things to document! I hope you all will get involved and record some lichen observations from your favorite trail or on your next road trip.

Shelly Benson
President@californialichens.org



CALS president, Shelly Benson, modeling the lace lichen (*Ramalina menziesii*) cape made by Jeanette Carr. Photograph by Sarah Minnick.



CALIFORNIA LICHEN SOCIETY

PO Box 472, FAIRFAX, CALIFORNIA 94978

The California Lichen Society (CAL S) 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.

Members receive the *Bulletin of the California Lichen Society* (print and/or online access), voter rights in society elections, access to the CAL S community, and notices of meetings, field trips, lectures, and workshops.

Membership Dues (in \$US per year)

Student and fixed income (online eBulletin only) - \$10
Regular - \$20 (\$25 for foreign members)
Family - \$25
Sponsor and Libraries - \$35
Donor - \$50
Benefactor - \$100
Life Members - \$500 (one time)

Find CAL S online!

californialichens.org/

twitter.com/CALichenS

iNaturalist.org/users/cals

facebook.com/californialichens

Membership dues can be made payable to:

California Lichen Society, PO Box 472, Fairfax, California 94978

To join or renew online, please visit www.californialichens.org/membership

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Vice President Tom Carlberg, VicePresident@californialichens.org
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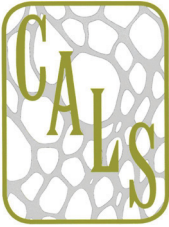
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Back cover: CAL S Lichens of Conservation Concern. Rare lichens not pictured are *Graphis saxorum* and *Mobergia calculiformis*. Photographs by Janet Good (*C. firma*, *S. isidiifera*), Martin Hutten (*S. spongiosa*), Scot Loring (*B. pseudocapillaris*), Bruce McCune (*H. schizidiata*), Eric Peterson (*B. spiralifera*, *C. adspersum*, *U. longissima*), Stephen Sharnoff (*T. sancti-jacobi*, *T. vermicularis*), John Villella (*P. gowardii*, *R. thrausta*)



LICHENS OF CONSERVATION CONCERN



Bryoria pseudocapillaris



Bryoria spiralis



Calicium adpersum



Cladonia firma



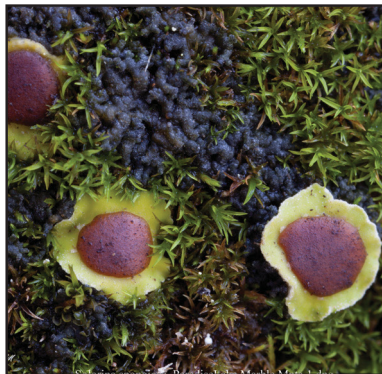
Hypogymnia schizidiata



Peltigera gowardii



Ramalina thrausta



Solorina spongiosa



Sulcaria isidiifera



Texosporium sancti-jacobi



Thamnolia vermicularis



Usnea longissima