Bulletin of the California Lichen Society

Volume 22 No. 1 Summer 2015

Bulletin of the California Lichen Society

Volume 22 No. 1 Summer 2015

Contents

This issue of the Bulletin of the California Lichen Society (ISSN 1093-9148) was edited by John Villella (Editor@californial-ichens.org) and was produced by Sarah Minnick (Sarah@californialichens.org). The *Bulletin of the California Lichen Society*

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 2015 CALS Bulletin is September 1, 2015.

Volume 22(1) of the Bulletin of the California Lichen Society was issued on July 1, 2015.

Cover Photo: *Baeomyces rufus.* Fertile. Czech Republic. Photograph by Jana Kocourková.

Baeomyces rufus discovered in southern California

Kerry Knudsen[1,2] & Jana Kocourková[1]
1 Department of Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences, Prague
Kamýcká 129, Praha 6 - Suchdol, CZ–165 21, Czech Republic
2 The Herbarium, Dept. of Botany and Plant Sciences, University of California
Riverside, California 92521, U.S.A.
Knudsen@ucr.edu

JANA KOCOURKOVÁ

Baeomyces rufus. Fertile. Czech Republic.

Baeomyces rufus is common in central and northern Europe and in the upper latitudes of North America. It forms schizidiate squamules that can break down into leprose patches. It is usually locally abundant and can spread across soil, covering mosses and stones, road cuts and stream banks, up stone walls and fence posts. It can quickly colonize disturbed areas. It produces beautiful fertile mushrooms with asci and ascospores. Unless it is covered with mushrooms, it is so common where it occurs, lichenologists usually ignore it unless looking for parasites. Jana Kocourková did not think anything of it when she collected a specimen of *B. rufus* in conifer-oak woodland in the San Bernardino Mountains in southern California.

Recently, Mary Crawford discovered in the San Bernardino Mountains a CALS-listed lichen *Solorina spongiosa*, about five hundred miles south of the next nearest known population in the Sierra Nevada Mountains (Knudsen & Crawford 2014). Species like *S. spongiosa* were probably common in California during the Pleistocene when much of Canada was under ice. But as western North America dried out at beginning of Holocene (about 10 thousand years ago) these species migrated north and died out throughout most of the southwest. Rare populations like Mary Crawford's discovery of *Solorina* are relics, the last remaining survivors of the Pleistocene flora, isolated populations, isolated maybe as recently as the end of the little ice age in early 20th century. Or maybe two or three thousand years ago.

In the San Bernardino Mountains Jana Kocourková collected *Baeomyces rufus* among moss on a shady slope above Miller Canyon, at about 3,600 feet, near Burnt Mill Canyon, where the forest begins beyond the Mojave's edge. Vanilla-smelling pines, deciduous oaks and big cone spruce grow together. She found just a small patch, a few centimeters across of schzidiate squamules. The nearest known populations are about 500 miles north in central California on Mount Tamalpais and Mount Vision in Marin

JANA KOCOURKOVÁ

Baeomyces rufus. Fertile. Czech Republic.

County north of San Francisco (CNALH 2015). Like *Solorina spongiosa*, *B. rufus* was probably common in California during the Pleistocene. Long term climate change had extirpated this hardy pioneer from most of California. It just got too dry. There are rare scattered records of *B. rufus* farther north in Mendocino and the pygmy forest (CNALH 2015). We did not find any in the Sierra Nevada Mountains during the Yosemite inventory (Hutten et el. 2013). And we did not find anymore during this year's inventory in November and December in the San Bernardino Mountains.

Successful pioneer species like *Baeomyces rufus* will probably survive rapid anthropogenic climate change over the next 300 years. They will survive somewhere at least in a vastly transformed northern hemisphere. But in California these Pleistocene relics are already the victims of long term climate change since the Holocene. This collection of *B. rufus* could be the last record of this species in southern California. You never know. Another drought, another catastrophic fire, and it may never be found again in the San Bernardino Mountains.

Specimen examined: U.S.A. California. San Bernardino Co.: San Bernardino Mountains, near Burnt Mill Canyon, San Bernardino National Forest, 3600 feet, Nov. 15, 2014, on soil and moss, sterile, *J. Kocourková 8564 & K. Knudsen*. (Hb. K & K).

Acknowledgments

The discovery of *Baeomyces rufus* was made possible by a grant to the UCR Herbarium for a continuing lichen inventory of the San Bernardino Mountains by the San Bernardino Mountain Foundation (in cooperation with the San Bernardino National Forest). Both authors were supported by the grant "Environmental aspects of sustainable development of society" 42900/1312/3166 from the Faculty of Environmental Sciences, Czech University of Life Sciences Prague. Pictures and article are copyrighted by Kerry Knudsen and Jana Kocourková.

Literature Cited

CNALH. 2015. Consortium of North American Lichen Herbaria. http://lichenportal.org/portal/ Accessed Jan., 2015.

Hutten, M., U. Arup, O. Breuss, T. L. Esslinger, A. M. Fryday, K. Knudsen, J. C. Lendemer, C. Printzen, H. T. Root, M. Schultz, J. Sheard, T. Tønsberg & B. McCune. 2013. Lichens and lichenicolous fungi of Yosemite National Park, California. North American Fungi 8 (11): 1-47.

Knudsen, K. & M. Crawford. 2014. A Pleistocene relic in the San Bernardino Mountains: a new record of *Solorina spongiosa*. Bulletin of the California Lichen Society 21(2): 33-34.

RICHARD DROKER

*S*hort-stalked (<6mm) apothecia of *Baeomyces rufus*, Washington state.

JANA KOCOURKOVÁ

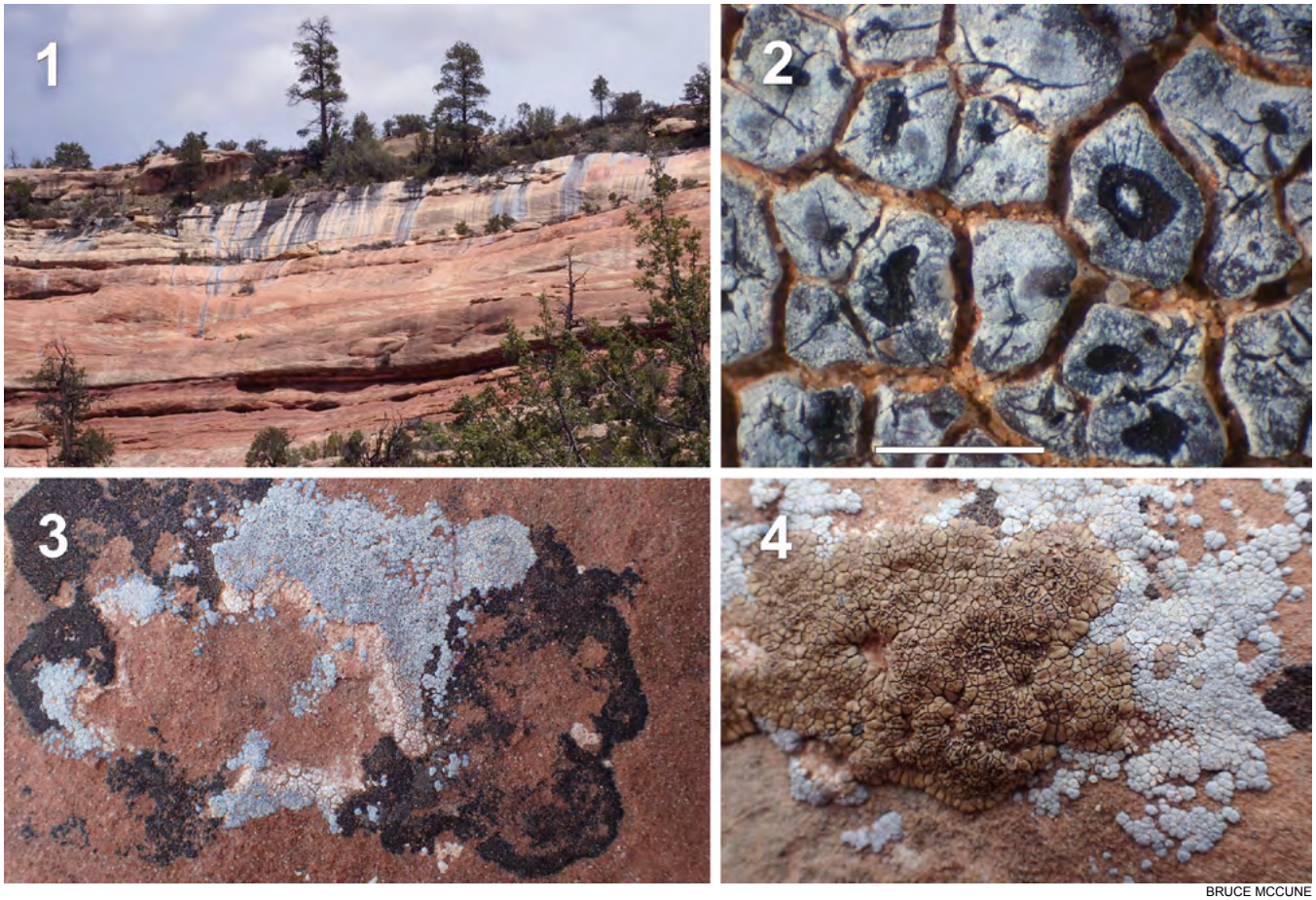
In a forest in the Czech Republic, the common parasite *Epilichen scabrosus* (green thalli with black apothecia) growing on *Baeomyces rufus* (paler sterile thalli covering most of the rock).

Acarospora strigata, the blue Utah lichen (blutah)

Bruce McCune
Oregon State University
2082 Cordley Hall, Corvallis, OR 97331
bruce.mccune@science.oregonstate.edu

My wife, Dr. Patricia Muir, asked me, "What do you think makes those blue stripes on the rocks up there? We saw a series of pale blue stripes, broad at the edge of the cliffs and tapering below, as if poured off the ledges. I suggested that someone had kicked over several buckets of blue paint (Figure 1). She demolished that hypothesis by pointing out the impossibility of climbing or descending to the painted ledges.

It wasn't long before we encountered the color up close (Figure 2), and I was surprised to see that it was *Acarospora strigata*. We were in Natural Bridges National Monument in southern Utah, and this lichen was both abundant and conspicuous. We continued to see it frequently as we visited additional parks, including Canyonlands and Arches National Parks, although in those it was less conspicuous than at Natural Bridges.



BRUCE MCCUNE

Figures 1-4. The blue Utah lichen, *Acarospora strigata*. 1. On calcareous sandstone cliffs, just east of Natural Bridges National Monument, Utah 2. Detail of areoles and apothecia (*McCune 35845*). 3. Overgrowing dark saxicolous lichens (including *Staurothele* sp.) at Canyonlands National Park. 4. Being overgrown by *Acarospora rosulata*, same location as 3.

I have seen *A. strigata* many times in the field, but never so colorful and covering such expanses of rock in conspicuous places. We started calling it the "blue Utah lichen" or "blutah" for short. In my previous experience, the species can be almost white (Figure 5), grayish white or, if the pruina are thin, then brownish with a white cast.

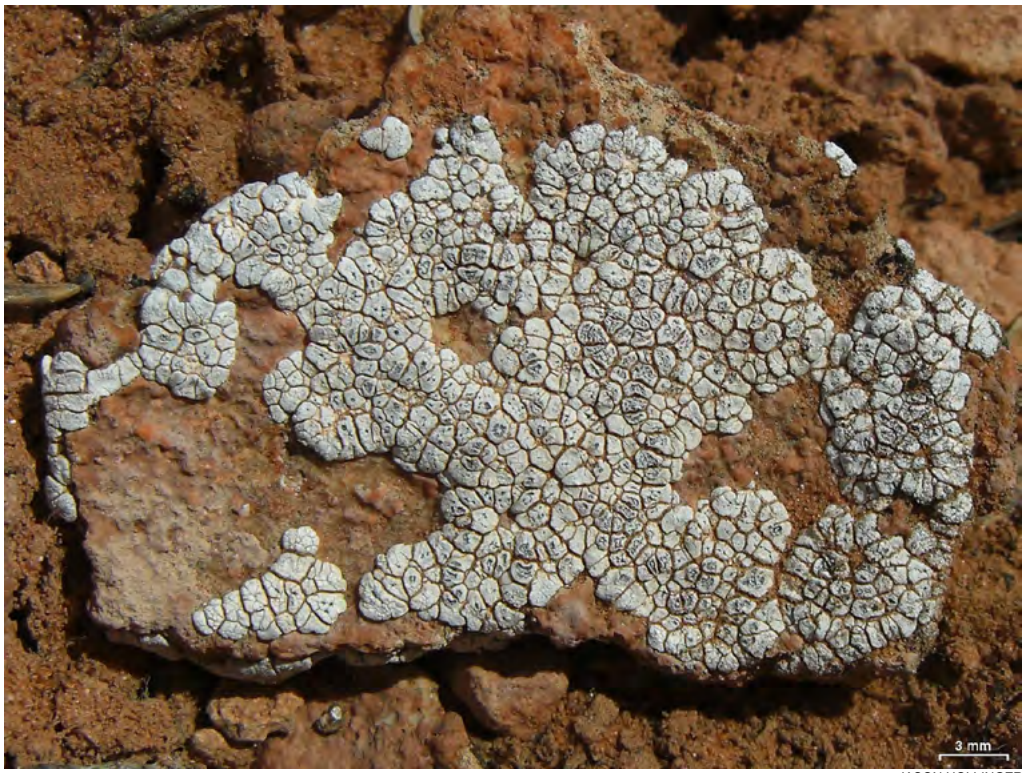
Acarospora strigata is a widespread species and a strict calciphile. But in southern Utah it was truly thriving as a dominant species on calcareous sandstone. It was most conspicuous on the white sandstone of the Cedar Mesa Formation, but also occurred on the reddish calcareous sandstone layers above and below the white sandstone. It was easy to see both at a distance and up close while hiking in Natural Bridges, Canyonlands, and Arches.

The species appeared to be a fierce competitor or even semi-parasitic among the other saxicolous lichens, often originating on and engulfing many other genera, including *Staurothele*, *Lecidea*, *Lecidella*, and *Aspicilia* (Figure 3). In seepage tracks, it frequently colonized stripes of dark pyrenolichens including *Staurothele* and *Verrucaria*, as well as non-lichenized cyanobacteria. The only lichen that I noticed that sometimes overgrew it was a brown congener, probably *Acarospora rosulata* (Figure 4).

Blue is a rare color in lichens, and it is even rarer to see a blue lichen in such proliferation. The intensity of the blue seemed to depend on the angle of the light. The sensor in both my digital camera and my eyes seemed ineffective at recording it in some lights. But at its best, it was a distinct pale sky blue, similar to the color of the wings of mountain bluebirds.

Acknowledgements

I thank Kerry Knudsen for reviewing this note and Jason Hollinger for contributing Figure 5.



JASON HOLLINGER

Figure 5. The more typical white form of *Acarospora strigata*, on sandstone, near Canyonlands, Utah.

California dreaming: Perspectives of a northeastern lichenologist

R. Troy McMullin
Biodiversity Institute of Ontario Herbarium, University of Guelph
50 Stone Road East, Guelph, ON N1G 2W1, Canada
rmcmulli@uoguelph.ca

We all take for granted common things in our lives that become the "norm". It often takes someone that lives with different norms to help us appreciate what is right in front of us. We rediscover from the wonder and learning of a child, visitors from unfamiliar cultures, and perhaps even a visit from a lichenologist who lives in an ecologically different part of the world.

In 2009, during the first year of my PhD program at the University of Guelph in Ontario, Canada, I visited the Golden State as part of my field studies. Travelling to California was my first visit to the west coast of North America since I began studying lichens ten years ago. I was taken by the large number of unfamiliar and spectacular species. My focus was on alectorioid genera, particularly *Bryoria* and *Sulcaria*, but my interests were broad. I will now take you on a tour of the areas I visited (Figure 1) and share some of the species I encountered (Table 1) that were interesting from the perspective of a northeastern (NE) lichenologist.

I started out from San Francisco heading north. My first stop was the Lucus Valley. There, I encountered *Parmotrema perlatum* and *Ramalina farinacea*, two species that are fairly common in the NE, so I was feeling right at home.

Next, I explored the area around Jenner and found two beautiful species that do not occur in the NE, *Nodobryoria abbreviata* and *Vulpicida canadensis*. The bright yellow thalli of *Vulpicida* species make them especially attractive. Unfortunately, the only common species of *Vulpicida* in the NE, *V. pinastri*, has become somewhat of a norm for me, but the larger lobes and abundant brown apothecia of *V. canadensis* really grabbed my attention. In this area, I encountered another species that does not occur in the NE, *Ramalina leptocarpha*. It is similar to the eastern *R. americana*, which differs in having apothecia on or near the lobe tips instead of on the branches (Brodo et al. 2001).

I then completed the rest of the drive up Hwy 1 along the coast, which lived up to its reputation of having stunning scenic views. At the end of the road I stopped in Legget where I encountered some old familiar species, *Alectoria sarmentosa* ssp. *sarmentosa* and *Variolaria amara*, but I also met some new ones, *Chrysothrix* sp., *Ochrolechia juvenalis*, and *Sphaerophorus tuckermanii*. *Sphaerophorus tuckermanii* got me wondering about this genus back home. Wedin et al. (2009) state that *S. globosus* in the west only grows on rock and mossy soil at subalpine and alpine environments. In the Canadian Maritimes, however, *S. globosus* frequently occurs on conifer trees in old-growth forests (Cameron and Bondrup-Nielsen 2012; McMullin et al. 2008, 2012). It is clearly a species in the NE worth having a closer

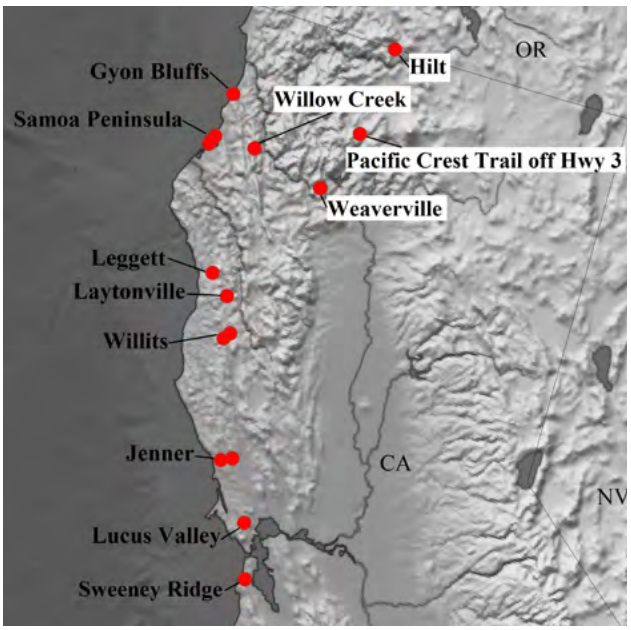


Figure 1. The main California locations examined for lichens during my trip.

Table 1. Location of the lichen species encountered during my California visit. Gyon Bluffs (I), Hilt (II), Jenner (III), Laytonville (IV), Leggett (V), Lucus Valley (VI), Pacific Crest Trail (VII), Samoa Peninsula (VIII), Sweeney Ridge (IX), Weaverville (X), Willits (XI), Willow Creek (XII). Bolded species preceded by an asterisk (*) are not known to occur in the northeast. Bolded species without asterisks are uncommon in the northeast, and the rest are common in the northeast.

Species	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Alectoria sarmentosa ssp. *sarmentosa*					●							●
Anomalobaria anomala											●	
Anomalobaria anthraspis											●	
Bryoria capillaris	●											
Bryoria fremontii				●						●		
Caloplaca cerina				●								
Candelaria pacifica										●		
Candelariella lutella				●								
Chrysothrix sp.					●			●				
Cladonia pyxidata								●				
Dermatocarpon reticulatum		●										
Esslingeriana idahoensis										●		
Evernia prunastri										●		
Flavoparmelia caperata			●						●			
Flavopunctelia soredica											●	
Heterodermia leucomela									●			
Hypogymnia heterophylla								●				
Hypogymnia imshaugii										●		
Hypogymnia physodes								●				
Letharia vulpina										●		
Lobaria pulmonaria												●
Melanelixia californica										●		
Melanohalea exasperatula							●					
Melanohalea multispora										●		
Nodobryoria abbreviata			●							●		
Ochrolechia juvenalis					●							
***Opegrapha* sp.**								●				
Parmelia sulcata											●	
Parmotrema perlatum						●			●			
Peltigera collina			●								●	
Peltigera neckeri			●									
Physcia adscendens			●									
Physconia isidiigera											●	
Plastimatia herrei								●		●		
Ramalina leptocarpha			●									
Ramalina dilacerata											●	
Ramalina farinacea				●		●			●		●	
Ramalina menziesii	●							●			●	
Sphaerophorus tuckermanii					●							
Sticta fuliginosa									●			
Sticta limbata									●			
Sulcaria badia				●							●	
Sulcaria spiralifera								●				
Teloschistes flavicans									●			
Tuckermannopsis chlorophylla								●				
Umbilicaria phaea* var. *coccinea		●										
Umbilicaria phaea* var. *phaea		●										
Usnea hirta									●			
Usnea intermedia											●	
Usnea rubicunda									●			
Variolaria amara					●							
Vulpicida canadensis			●							●		

look at. Another interesting discovery at this site was a sorediate morphotype of *Alectoria sarmentosa* ssp. *sarmentosa*, which is very rarely encountered (Brodo and Hawksworth 1977; McCune and Geiser 2009).

Bryoria spiralifera led me to the next location, the Samoa Peninsula, which is the type locality for this rare species (Brodo and Hawksworth 1977). I spotted it right away because of its distinctive pale red-brown colour (Figure 2), and I was surprised at how locally abundant it is. It often grew intermixed with what appeared to be *Ramalina thrausta* because of the fine branches with curled tips, but upon closer inspection I found a few small areas with the distinctive net-like branching of *Ramalina menziesii* (Figure 3), a renowned charismatic species I have always wanted to see in the field. This filamentous morphotype is known to occur near the coast (McCune and Geiser 2009). At this site, I also encountered three additional charismatic species that do not grow in the NE, *Hypogymnia heterophylla*, *Tuckermannopsis chlorophylla*, and *Plastimatia herrei*. It was interesting to see new species from familiar genera.

From the peninsula I headed inland to Weaverville, where I came across many more new and interesting species. I was hoping to see *Bryoria fremontii* growing in high abundance on this trip, which I had only seen

TROY MCMULLIN

Figure 2. *Sulcaria spiralifera* on the Samoa Peninsula.

TROY MCMULLIN

Figure 3. The filamentous morphotype of *Ramalina menziesii* growing with *Sulcaria spiralifera* on the Samoa Peninsula.

photos of, and I finally did. Both the vulpinic acid chemotype, previously *B. tortuosa* (Velma 2009), and the chemotype without lichen substances (Figure 4) were discovered. Also growing in high abundance was a species I can now check off my life list of species to see in the field, *Letharia vulpina* (Figure 5). *Candelaria pacifica* was another particularly interesting find because the very similar *C. concolor* is somewhat weedy in my home town of Guelph. Most of the mature deciduous trees in my neighbourhood are covered with *C. concolor* in high abundance, so it was helpful to see the subtle differences in morphology between these two species. Other new and interesting species for me at this stop included *Melanohalea multispora*, *Melanelixia californica*, *Hypogymnia imshaugii*, and *Esslingeriana idahoensis*.

I then headed north to Hilt to hunt for *Umbilicaria phaea* var. *coccinea*. The bright red thallus is unusual among lichens and I was excited to see it (Figure 6). It

TROY MCMULLIN

Figure 4. *Bryoria fremontii* in Weaverville.

TROY MCMULLIN

Figure 5. *Letharia vulpina* in Weaverville.

was easy to find, but I was surprised by its small size (Figure 7). It is much smaller than specimens of *U. phaea* var. *phaea* that I had seen in herbaria. However, the specimens of *U. phaea* var. *phaea* that were growing adjacent to *U. phaea* var. *coccinea* were also small (Figure 6), which suggests that the environment may be limiting their growth. These varieties looked so different that I wondered if they were indeed the same species. Therefore, with the help of colleagues we investigated the molecular relationship between these two species at four loci (ITS2, LSU, *Mcm7*, and mtSSU) and by doing haplotype-network analyses. All results suggest that the two taxa are conspecific and should remain varieties. Another new and interesting species for me at this site was *Dermatocarpon reticulatum*.

From Hilt I went to Oregon and Washington for a few weeks before returning to California, but that is another story. I came back into the Golden State on the coastal highway (101). My first stop was the Gyon Bluffs near Orick where I encountered large specimens of *Bryoria capillaris*, large compared to what I am used to seeing in the NE. I found that many of the alectorioid species I encountered on this trip were often longer and in larger clumps than in the NE. At this site, I also found a large specimen of *Ramalina menziesii* that had abundant net-like branching, which I never grew tired of seeing.

TROY MCMULLIN

Figure 6. *Umbilicaria phaea* var. *coccinea* (red) and *U. phaea* var. *phaea* (brown) in Hilt.

TROY MCMULLIN

Figure 7. The relative size of *Umbilicaria phaea* var. *coccinea* (red) and *U. phaea* var. *phaea* (brown) in Hilt.

My next destination was just north of Laytonville. I was in search of the rare *Sulcaria badia*. I had seen herbarium specimens, but seeing it in the field was spectacular. I found a glorious *Quercus garryana* growing on its own between highway 102 and an agricultural field. It was dripping with large clumps of the twisted, white and purple, *S. badia* (Figure 8). It was an impressive species to see, but so were the other species growing on that tree. A single small branch was home to: *Bryoria fremontii*, *Caloplaca cerina*, *Candelariella lutella*, *Lecanora* sp., *Ochrolechia* sp., *Pertusaria* sp., *Physcia* sp., *Physconia* sp., *Ramalina farinacea*, *Rinodina* sp., *S. badia*, *Usnea* spp., and *Xanthomendoza* sp. I particularly appreciated seeing *Candelariella lutella* because it is very rarely encountered in the NE (McMullin and Lendemer 2014).

I then visited an area close to Willits along Fort Bragg Road where I was also searching for *S. badia*. Here, I found a single small clump of it. The two sites where I searched for *S. badia* are two of only a handful of sites that it is known to occur (Peterson et al. 1998). At each of my sites it only grew on a single tree. This suggests that it is not only rare because it is known from a limited number of locations, but also because it is not abundant at those locations. *Sulcaria badia* is undoubtedly in need of active protection. The loss of a single tree may mean the loss of a substantial percentage of the population. At this site I also found another new species for me growing with *S. badia*, *Usnea intermedia*, which does not inhabit the NE.

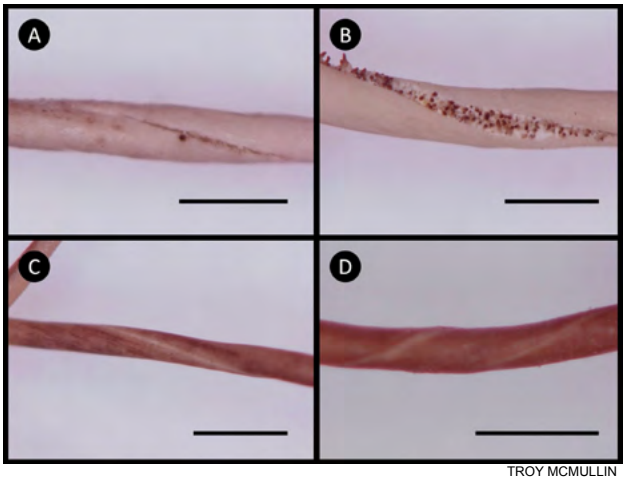
Before catching a plane back home I was treated to one last lichen rich site...in the suburbs of San Francisco of all places. *Bryoria subcana* had been reported from the hills directly south of San Francisco so I went to explore. I ended up on Sweeney Ridge hiking Sneath Line Trail. Surrounded by dense development, I started out along this trail with low expectations, but after about a mile I was pleasantly surprised when I encountered a number of beautiful species, such as *Heterodermia leucomela, Sticta limbata*, *S. fuliginosa*, *Teloschistes flavicans*, and *Usnea rubicunda*. *Teloschistes flavicans* does not grow in the NE and it was another species I was happy to cross off my life list of species to see. All of the other species listed are known from the NE, but are

TROY MCMULLIN

Figure 8. *Sulcaria badia* in Laytonville.

rare. The *U. rubicunda* was more red and robust than any specimens I have previously seen. Unfortunately, I did not locate *B. subcana* at this site, but it was a great send off nonetheless. I dream of living in a place where I can walk my dog from my house and see such wonderful lichen species.

Back home in my lab I was able to investigate a question in greater detail that came up during my trip. The pseudocyphellae of two *Bryoria* species, *B. pseudocapillaris* (from Oregon) and *B. spiralifera*, were very similar to the pseudocyphellae of *Sulcaria badia*, especially once I was able to get a closer look (Figure 9). I was intrigued, so I got a hold of some fresh material of the only other *Sulcaria* species in North America, *S. isidiifera*, and examined them molecularly at three nuclear loci (ITS2, *Mcm7*, and TSR1). My assumption was correct, these two *Bryoria* species were clearly grouped with the two *Sulcaria* species, which were all distant from any other species of *Bryoria*. Other researchers have since found the same results (Myllys et al. 2014). They lumped the two *Bryoria* species into one, *Sulcaria spiralifera*.



TROY MCMULLIN

Figure 9. (A-D) Pseudocyphellae of the North American species of Sulcaria, scale = 0.5 mm. (A) *Sulcaria badia*. (B) *Sulcaria isidiifera*. (C) *Sulcaria spiralifera* (barbatolic acid chemotype). (D) *Sulcaria spiralifera* (norstictic acid chemotype).

My trip to California was fruitful in many ways. It provided me with new research questions and helped to further my PhD studies. Perhaps the most useful thing it gave me, however, was a broader understanding of many lichen genera. I find that whenever I travel to different ecological regions and examine lichens the variation within genera becomes clearer. It helps to make identifications easier, but it also helps me to recognize slight differences, especially at home where many species have become the norm and I don't look at them as critically anymore. Thanks for taking this journey with me. I hope it helps you to appreciate the impressive species in the state, particularly the ones in your own backyard that you may not notice as much anymore.

Acknowledgments

I gratefully acknowledge: my field companions, Lizbeth Elias and Jocelyne Rankin; Eric Peterson for hosting and being a guide; Cherie Bratt for locating specimens; Bruce McCune for reviewing the manuscript; and in-kind or financial support from Bruce McCune, Steven Newmaster, the California Lichen Society Educational Grants Program, and the Biodiversity Institute of Ontario Herbarium.

Literature Cited

Brodo, I.M. and D. Hawksworth. 1977. Alectoria and allied genera in North America. Opera Botanica 42: 1-164.

Cameron, R.P. and S. Bondrup-Nielsen. 2012. Coral Lichen (Sphaerophorus globosus (Huds.) Vain.) as an Indicator of Coniferous Old-Growth Forest in Nova Scotia. Northeastern Naturalist 19:535-540.

McCune, B. and L. Geiser. 2009. Macrolichens of the Pacific Northwest, second edition. Oregon State University Press, Corvallis, OR.

McMullin, R.T. and J.C. Lendemer. 2013. Lichen biodiversity and conservation status in the Copeland Forest Resources Management Area: A lichen-rich second-growth forest in southern Ontario. Canadian Field-Naturalist 127: 240-254.

McMullin, R.T., S.R. Clayden, S.B. Selva, R. Curley, and L.J. Schram. 2012. The first lichen checklist for Prince Edward Island, Canada. Evansia 29: 4-25.

McMullin, R.T., P.N. Duinker, R.P. Cameron, D.H.S. Richardson, and I.M. Brodo. 2008. Lichens of coniferous old-growth forests of southwestern Nova Scotia, Canada; diversity and present status. The Bryologist 111: 620-637.

Myllys, L., S. Velmala, H. Lindgren, D. Glavich, T. Carlberg, L.S. Wang, and T. Goward. 2014. Taxonomic delimitation of the genera Bryoria and Sulcaria, with a new combination Sulcaria spiralifera introduced. The Lichenologist 46: 737-752.

Peterson, E.B., D.M. Greene, B. McCune, E.T. Peterson, M.A. Hutten, P. Weisberg, and R. Rosentreter. 1998. Sulcaria badia, a rare lichen in western North America. The Bryologist 101: 112-115.

Velmala, S., L. Myllys, P. Halonen, T. Goward, & T. Ahti. 2009. Molecular data show that Bryoria fremontii and B. tortuosa (Parmeliaceae) are conspecific. The Lichenologist 41: 231-242.

Wedin, M., F. Högnabba & T. Goward. 2009. A new species of Sphaerophorus, and a key to the family Sphaerophoraceae in western North America. The Bryologist 112: 368-374.

Lichen diversity in Muir Woods National Monument

Rikke Reese Næsborg & Cameron Williams
Berkeley, CA
Rikke.ReeseNaesborg@gmail.com

Introduction

Muir Woods National Monument in California protects about 560 acres, including 295 acres of old-growth redwood (*Sequoia sempervirens*) forest. It was designated a national monument in 1908 by President Roosevelt after Elizabeth and William Kent gifted the property to the federal government to spare the forest from being converted to lumber for rebuilding San Francisco after the 1906 earthquake (Auwaerter & Sears 2006). Muir Woods is located on the Marin Peninsula about 12 miles north of San Francisco across the straights of the Golden Gate and is surrounded by large tracts of public land. The monument is fully encompassed within Mt. Tamalpais State Park, with Golden Gate National Recreation Area and Marin Municipal Water District extending further to the south, west and north, respectively. To the east lie the communities of Mill Valley and San Rafael.

Most of the old-growth redwood forest in Muir Woods is concentrated along the floor and northeast facing slopes of a narrow, steep valley known as Redwood Canyon, one of the main drainages on the southwestern side of Mt. Tamalpais. Unlike the vast majority of redwood forests in the Bay Area, the trees in Redwood Canyon have never been logged, and the last major fire occurred in 1845 (Auwaerter & Sears 2006). The wet and cool microclimate in Muir Woods, that promotes lichen abundance, is mainly provided by ground water and winter rain as well as summer fog rolling in from the nearby ocean. The incoming fog is retained in the narrow Redwood Canyon by its steep and tall walls, and it adds to the 40 inches of average annual rainfall during the otherwise dry summer months (http://www.nps.gov/muwo/planyourvisit/weather-and-climate.htm).

Redwoods dominate the canyon floor with intermixed Douglas-fir (*Pseudotsuga menziesii* var. *menziesii*), tan oak (*Notholithocarpus densiflorus* var. *densiflorus*), and California bay (*Umbellularia californica*). The understory supports California huckleberry (*Vaccinium ovatum*), California hazel (*Corylus cornuta* ssp. *californica*), and, along Redwood Creek, red alder (*Alnus rubra*) and big-leaf maple (*Acer macrophyllum*). Moving up the slopes the redwoods give way to Douglas-fir, coast live oak (*Quercus agrifolia*), interior live oak (*Quercus wislizini*), and Pacific madrone (*Arbutus menziesii*), which finally yield to chaparral and grassland especially along the eastern flanks. Close to the parking areas large California buckeye (*Aesculus californica*, Figure 1) and coast live oak thrive, and along the tributary Camino del Cañon a smaller area is dominated by Monterey pine (*Pinus radiata*).

The lichens in Muir Woods National Monument have been briefly explored on five previous occasions (unknown author 1966; Hanson & Stewart 1996; Carlberg & Benson, pers. comm.; Carlberg, pers. comm.; Reese Naesborg & Williams 2014) with 15, 11, 22, 17 and 55 species reported, respectively. While results from these cursory investigations included several interesting finds, we were convinced that the lichen biodiversity of Muir Woods National Monument was largely unexplored and uncommunicated. Therefore, the objective was to conduct a thorough investigation of lichen biodiversity in the monument as well as to generate outreach material for educating the general public on lichen biology.

Methods

A terrestrial investigation of the lichen biodiversity in Muir Woods National Monument was conducted by the first author with occasional help from the second. The monument was visited six times in November 2014, when all available habitat types accessible via hiking were examined for lichen diversity (Figure 2). Each lichen species was collected for identification, curation, and photography. Nomenclature follows

RIKKE REESE NÆSBORG

Figure 1. Tiny Cameron Williams is dwarfed by a large California buckeye (*Aesculus californica*) near Redwood Creek Nursery. This tree accommodated the only occurrence of Sticta fuliginosum found in Muir Woods National Monument.

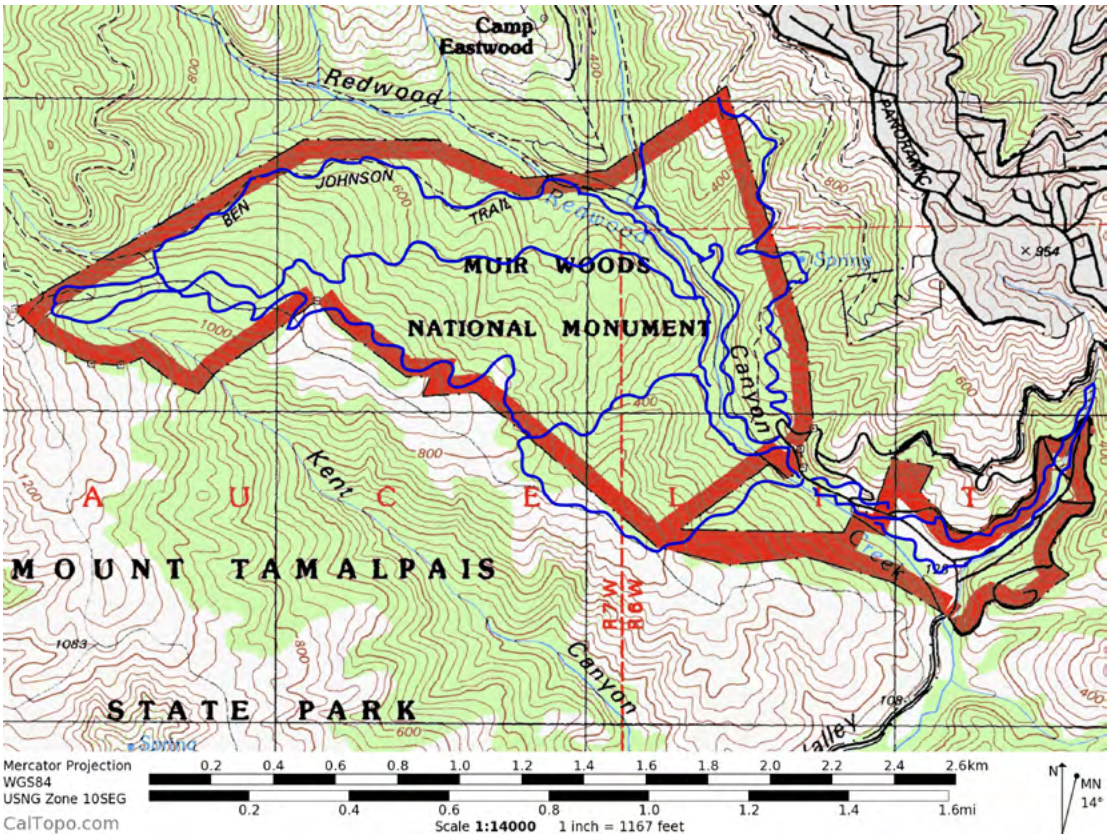


Figure 2. Approximate survey route (blue) for lichen inventory of Muir Woods National Monument.

Esslinger (2014). Vouchers will be deposited into the University and Jepson Herbaria at UC Berkeley.

Results and Discussion

A total of 103 species of lichens as well as one lichenicolous fungus (a fungus growing on a lichen) were identified and photographed (Table 1). Thirty-four of these species were also found during the 2014 BioBlitz in Golden Gate National Recreational Area.

The vast majority of lichens were chlorolichens of which the most abundant species were three *Parmotrema* (*P. arnoldii*, *P. perlatum*, and *P. stuppeum*) as well as *Tuckermannopsis orbata*. Only five species of cyanolichens were encountered (*Collema furfuraceum*, *C. nigrescens*, *Peltigera canina*, *P. collina*, and *Sticta fuliginosum*). The greatest lichen richness was found on California buckeye, followed by tan oak and Douglas-fir, but dead redwood foliage and cones retained by the tree for several years also supported many species (Figure 3). Coloring the trunks of many conifers in the monument were different species of *Lepraria* (*L. finkii* and *L. pacifica*) and *Cladonia* (*C. bellidiflora*, *C. pyxidata* and *C. transcendens*). In general, the forest floor along Redwood Canyon was densely covered by canopy dominants but supported shade tolerant shrubs. This dark habitat supported few lichens on soil or rock. Where light was more abundant along open trails *Cladonia squamosa* and *Peltigera canina* were encountered, and on a sunny rock outcrop near the monument boundary in Camino del Cañon *Xanthoparmelia coloradoënsis* was found. Untreated wood fence posts and railings near the parking area and along the Dipsea trail east of Muir Woods Road offered stable substrates for numerous lichens including *Calicium abietinum* and *Trapeliopsis flexuosa*.

RIKKE REESE NÆSBORG

Figure 3. *Sequoia sempervirens* cones with a beautiful display of lichens; scale bar = 1 cm.

The near absence of cyanolichens was surprising, especially given that the genera *Nephroma*, *Pseudocyphellaria*, and *Sticta* are present in nearby Mt. Tamalpais State Park and Marin Municipal Water District (pers. obs.). Most cyanolichens achieve positive net photosynthesis only when their cells are turgid with liquid water (Lange *et al.* 1986), and despite the relatively cool, moist microclimate in Muir Woods they may not be able to absorb sufficient water to flourish. The presence of cyanolichens in Mt. Tamalpais State Park and Marin Municipal Water District may indicate heavy fog bathing the ocean-facing ridge tops. On several occasions we observed an abrupt transition from dry conditions to heavy fog as we approached the ridge; trees in this fog zone dripped with moisture whereas the slopes eastward remained dry.

Several interesting finds are noteworthy of additional comment. *Fellhanera bouteillei* (Figure 4) grew on the cuticle of live California huckleberry leaves. Epiphyllous communities become depauperate south of Fort Ross likely due to increasingly dry conditions (Carlberg, pers. comm.). On California buckeye *Teloschistes chrysothalmus* and *T. flavicans* (Figure 5)

RIKKE REESE NÆSBORG

Figure 4. *Fellhanera bouteillei* on the tip of a California huckleberry (*Vaccinium ovatum*) leaf.

Table 1. Lichens found in Muir Woods National Monument. Symbology: bold = species encountered both during the terrestrial survey in November and the tree climbing investigation at the BioBlitz in March; underline = species found only during the terrestrial survey; regular font = species found only during the BioBlitz.

***Alectoria imshaugii* Brodo & D. Hawksw.**
***Alyxoria varia* (Pers.) Ertz & Tehler**
Arthonia ilicina Taylor
Arthothelium norvegicum Coppins & Tønsberg
Athalia pyracea (Ach.) Arup, Frödén & Søchting
Blastenia ferruginea (Hudson) Th. Fr.
Bryoria fremontii (Tuck.) Brodo & D. Hawksw.
***Buellia muriformis* A. Nordin & Tønsberg**
Calicium spp. Pers.
***Calicium abietinum* Pers.**
Caloplaca cerina (Ehrh. ex Hedwig) Th. Fr.
Carbonicola myrmecina (Ach.) Bendiksby & Timdal
***Chrismofulvea dialyta* (Nyl.) Marbach**
Chrysothrix granulosa G. Thor
***Chrysothrix xanthina* (Vainio) Kalb**
***Cladonia bellidiflora* (Ach.) Schaerer**
Cladonia pyxidata (L.) Hoffm.
Cladonia squamosa (Scop.) Hoffm.
***Cladonia transcendens* (Vainio) Vainio**
Cliostomum griffithii (Sm.) Coppins
Coenogonium luteum (Dicks.) Kalb & Lücking
Collema furfuraceum (Arnold) Du Rietz
Collema nigrescens (Hudson) DC.
Cyphelium inquinans (Sm.) Trevisan
***Evernia prunastri* (L.) Ach.**
Fellhanera bouteillei (Desm.) Vězda
***Flavoparmelia caperata* (L.) Hale**
***Flavopunctelia flaventior* (Stirton) Hale**
Fulgidea oligospora (Timdal) Bendiksby & Timdal
Graphis elegans (Borrer ex Sm.) Ach.
Gyalolechia flavorubescens (Hudson) Søchting, Frödén & Arup
Heterodermia leucomela (L.) Poelt
Hypocenomyce scalaris (Ach. ex Lilj.) M. Choisy
***Hypogymnia apinnata* Goward & McCune**
***Hypogymnia enteromorpha* (Ach.) Nyl.**
***Hypogymnia heterophylla* L. Pike**
Hypogymnia imshaugii Krog
Hypogymnia inactiva (Krog) Ohlsson
Hypogymnia occidentalis L. Pike
***Hypogymnia physodes* (L.) Nyl.**
Hypogymnia tubulosa (Schaerer) Hav.
Hypotrachyna revoluta (Flörke) Hale
Lecania cyrtella (Ach.) Th. Fr.
***Lecania naegelii* (Hepp) Diederich & van den Boom**
Lecanora sp. Ach.
Lecanora caesiorubella ssp. *merrillii* Imshaug & Brodo
Lecanora confusa Almb.
***Lecanora jamesii* J. R. Laundon**
Lecanora strobilina (Sprengel) Kieffer
Lecanora symmicta (Ach.) Ach.
Lepraria sp. Ach.
Lepraria cf. *finkii* (B. de Lesd.) R. C. Harris
Lepraria cf. *pacifica* Lendemer
Loxosporopsis corallifera Brodo
Megalaria columbiana (G. Merr.) S. Ekman
Melanelixia subaurifera (Nyl.) O. Blanco et al.
Melanohalea exasperatula (Nyl.) O. Blanco et al.
Melanohalea subelegantula (Essl.) O. Blanco et al.
Menegazzia subsimilis (H. Magn.) R. Sant.
Micarea micrococca (Körber) Gams ex Coppins
Ochrolechia spp. A. Massal.
Ochrolechia arborea (Kreyer) Almb.
***Ochrolechia juvenalis* Brodo**
Ochrolechia laevigata (Räsänen) Verseghy ex Kukwa
Ochrolechia oregonensis H. Magn.
Ochrolechia subpallescens Verseghy
Ochrolechia upsaliensis (L.) A. Massal.
Opegrapha herbarum Mont.
Parmelia hygrophila Goward & Ahti
***Parmelia sulcata* Taylor**
***Parmotrema arnoldii* (Du Rietz) Hale**
***Parmotrema perlatum* (Hudson) M. Choisy**
***Parmotrema stuppeum* (Taylor) Hale**
Peltigera canina (L.) Willd.
Peltigera collina (Ach.) Schrader
Pertusaria sp. DC.
Pertusaria leioplaca DC.
Phaeographis dendritica (Ach.) Müll. Arg.
Phaeophyscia hirsuta (Mereschk.) Essl.
Physcia adscendens (Fr.) H. Olivier
Physcia aipolia (Ehrh. ex Humb.) Fürnr.
Physcia caesia (Hoffm.) Hampe ex Fürnr.
Physcia dimidiata (Arnold) Nyl.
Placynthiella uliginosa (Schrader) Coppins & P. James
***Platismatia glauca* (L.) W. L. Culb. & C. F. Culb.**
***Platismatia herrei* (Imshaug) W. L. Culb. & C. F. Culb.**
Protoparmelia ochrococca (Nyl.) P. M. Jørg., Rambold & Hertel
Polycauliona polycarpa (Hoffm.) Frödén, Arup, & Søchting
Punctelia jeckeri (Roum.) Kalb
Punctelia perreticulata (Räsänen) G. Wilh. & Ladd
***Pyrrhospora quernea* (Dickson) Körber**
Ramalina dilacerata (Hoffm.) Hoffm.
Ramalina farinacea (L.) Ach.
Ramalina leptocarpha Tuck.
***Ramalina menziesii* Taylor**
Ramalina pollinaria (Westr.) Ach.
Ramalina subleptocarpha Rundel & Bowler
Scoliciosporum chlorococcum (Stenh.) Vězda
Sphaerophorus tuckermannii Räsänen
Sphaerophorus venerabilis Wedin, Högnabba & Goward
Stenocybe clavata Tibell
Sticta fuliginosa (Hoffm.) Ach.
Teloschistes chrysothalmus (L.) Th. Fr.
Teloschistes flavicans (Sw.) Norman
Thelotrema lepadinum (Ach.) Ach.
***Trapeliopsis flexuosa* (Fr.) Coppins & P. James**
***Tuckermannopsis orbata* (Nyl.) M. J. Lai**
***Usnea ceratina* Ach.**
Usnea chaetophora Stirton
***Usnea cornuta* Körber**
Usnea diplotypus Vainio
Usnea filipendula Stirton
Usnea flavocardia Räsänen
***Usnea hirta* (L.) Weber ex F. H. Wigg.**
Usnea intermedia (A. Massal.) Jatta
Usnea longissima Ach.
Usnea pacificana P. Halonen
***Usnea rubicunda* Stirton**
***Usnea subfloridana* Stirton**
Unknown spp.
***Variolaria amara* Ach.**
Xanthomendoza fulva (Hoffm.) Søchting, Kärnefelt & S. Y. Kondr.
Xanthoparmelia coloradoënsis (Gyelnik) Hale
Xanthoria parietina (L.) Th. Fr.

were found. These are warm climate specialists that are relatively rare in California, and neither species tolerates air pollution. This may be the first reported California occurrence of the lichenicolous fungus, *Stenocybe clavata* (Figure 6), though it has been documented from Oregon, Washington, and British Columbia (Tibell 1991; Peterson & Rikkinen 1999). The tiny stature of this species, yet the commonness of its host (*Ochrolechia* spp.) suggests it has been overlooked.

The lichen community occupying the forest interior was dominated by species considered either sensitive or somewhat sensitive to air pollution, whereas several pollution tolerant species (*Collema furfuraceum*, *Collema nigrescens*, *Physcia adscendens*, *Physcia aipolia*, *Polycauliona polycarpa*, and *Xanthoria parietina*, McCune & Geiser 2009) were discovered in the vicinity of the parking area. However, these pollution tolerant species were not abundant, and pollution sensitive species were also encountered near the parking area. Predominant westerly winds may dampen the negative effect of tailpipe emissions on epiphyte community composition near the parking area.

Despite the thoroughness of this survey, it is unlikely that all lichen species in Muir Woods National Monument were registered. For example, the epiphyll *Phylloblastia fortuita*, found by Tom Carlberg on a terrestrial survey during the BioBlitz (pers. comm.), was not recorded during this survey. Moreover, a study of epiphyte communities on coast redwood in the northern range found only 33% of canopy lichen species during a litterfall survey underneath the study trees (Williams & Sillett 2007), suggesting limited effectiveness at detecting epiphyte biodiversity using solely a terrestrial survey approach. During the 2014 BioBlitz when one Douglas-fir and one coast redwood were investigated for epiphyte biodiversity via tree-climbing, we found a total of 55 lichen species (Reese Naesborg & Williams 2014), but only 34 of these were encountered during the present survey. For example, *Usnea longissima* and *Loxosporopsis corallifera* were found during the BioBlitz tree-climbing investigation, but these lichens were not encountered during the terrestrial survey despite the much larger sampling area. This suggests that rare canopy species are seldom encountered on the forest floor.

This survey expanded the species list for lichens in Muir Woods National Monument by 91 species. Fifteen species previously reported were found neither during the tree-climbing investigation nor during the present survey. Two of those species, *Hypogymnia rugosa* and *Platismatia lacunosa* (unknown author 1966) were likely misidentified, as they are associated with the Pacific Northwest lichen flora (McCune & Geiser 2009). *Hypogymnia rugosa* has not otherwise been reported from California (http://ucjeps.berkeley.edu/constancea/85/tucker.html), and *P. lacunosa*, the rarest Pacific Northwest *Platismatia* (McCune & Geiser 2009), may have been a misidentified reticulate *P. glauca*.

RIKKE REESE NÆSBORG

Figure 5. *Teloschistes flavicans* on the left and *T. chrysothalmus* on the right.

RIKKE REESE NÆSBORG

Figure 6. *Stenocybe clavata* growing on *Ochrolechia oregonensis*.

Acknowledgments

The authors would like to thank the personnel in Muir Woods National Monument as well as Deborah Zierten from Save the Redwoods League for support for and interest in this project. Funding was provided by Save the Redwoods League.

Literature Cited

Auwaerter, J. & J.F. Sears. 2006. Historic Resource Study for Muir Woods National Monument. Olmstead Center for Landscape Preservation, Boston, Massachusetts.

Esslinger, T.L. 2014. A cumulative checklist for the lichen-forming, lichenicolous and allied fungi of the continental United States and Canada. North Dakota State University: http://www.ndsu.edu/pubweb/~esslinge/chcklst/chcklst7.htm (First Posted 1 December 1997, Most Recent Version (#19) 23 March 2014), Fargo, North Dakota.

Hanson, J. & Stewart, B. 1996. Notes on identification of common Muir Woods Lichens. Copy from MWNM.

http://www.nps.gov/muwo/planyourvisit/weather-and-climate.htm (accessed 04/13-2015)

http://ucjeps.berkeley.edu/constancea/85/tucker.html (accessed 04/16-2015)

Lange, O.L., E. Kilian & H. Ziegler. 1986. Water vapor uptake and photosynthesis of lichens: performance differences in species with green and blue-green algae as phycobionts. Oecologia 71: 104–110.

McCune, B. & Geiser, L. 2009. Macrolichens of the Pacific Northwest. 2nd Edition. Oregon State University Press, Corvallis.

Peterson, E. & J. Rikkinen. 1999. Range extensions for selected pin-lichens and allied fungi in the Pacific Northwest. Bryologist 102: 370–376.

Reese Naesborg, R. & Williams, C. 2014. What's in the trees at Muir Woods? Bulletin of California Lichen Society 21: 20–25.

Tibell, L. 1991. A new species of Stenocybe from western North America. Bryologist 94: 413–415.

Unknown author. 1966. List of lichens in Muir Woods collection. Copy from MWNM.

Williams, C.B. & S.C. Sillett. 2007. Epiphyte communities on redwood (*Sequoia sempervirens*) in northwestern California. The Bryologist 110: 420–452.

Additional sites of *Umbilicaria hirsuta* from southwestern Oregon, and the associated lichenicolous fungus *Arthonia circinata* new to North America

John Villella[1] & Steve Sheehy[2]
1 Siskiyou Biosurvey
324 Avery St., Ashland, OR
2 Klamath Falls, OR
jvillella@siskiyoubiosurvey.com

Introduction

Umbilicaria hirsuta (Sw. ex Westr.) Hoffm. is a widely distributed umbilicate lichen that is distinguished by its pale lower surface and rhizines and its sorediate margins, a unique feature of this species among North American *Umbilicaria* (Figure 1). It is generally considered rare in northwestern North America where it is known from Alaska, The Northwest Territories, Alberta (Thompson 1984), Washington (Ryan 1994), and one site each in Idaho (CNALH 2015), Montana (McCune et al. 2014), and Oregon (Kofranek & McCune 2008).

Two relatively recent collections have been made from northern and central California; in 2001 it was collected from the summit of Black Butte in Glenn County (Judy & Ron Robertson 6978b) and in 1975 it was collected east of Payne Creek in Tehama County (James Malachowski 676). In southern California it is considered rare (Hestmark 2004), known only from several historic collections from over a century ago, one made in 1904 from the summit of Mt. Whitney (Culberton 4643), a collection made in 1917 from Telegraph Peak in the San Gabriel Mountains (I. M. Johnson 3229), and an undated collection (H. A. Hasse s.n.) from "southern California on rocks". Label information for these collections was accessed through CNALH (2015). It was not encountered during recent inventory work in the San Bernardino Mountains (Knudsen pers. com. 2015).

STEVE SHEEHY

Figure 1. *Umbilicaria hirsuta* highlighting the pale lower surface and rhizines and the sorediate margins.

The initial discovery of this lichen in Oregon in 2006 documented it on a large partially shaded igneous rock outcrop in a mixed hardwood conifer setting at mid-elevation in the Butte Falls Resource Area of the Medford BLM District (Kofranek & McCune 2008). After this discovery a Species Fact Sheet was created by the BLM (Stone 2009) to assist field surveyors in locating new populations of this species. This document states that in Oregon it is suspected to occur on the Rogue River-Siskiyou National Forest, Umpqua National Forest and the Roseburg BLM district because of similar habitat. Since its discovery in the state it has been given a conservation ranking by the Oregon Natural Heritage Information Center of S1, meaning that it is thought to be critically imperiled in Oregon (ORBIC 2013).

Recent lichenological exploration of areas in southwestern Oregon has revealed new populations in different habitat types than those previously described for Oregon (Kofranek & McCune 2008), but more in line with the habitats described for others areas of western North America, especially California. This paper is meant to inform land managers and the lichenological community about these newly discovered populations and to provide a better picture of the expanded range of potential habitats for this lichen in the Cascade-Siskiyou region.

Materials and Methods

Lichen communities occurring on public lands in Southern Oregon and Northern California were explored for umbilicate species at various times and newly discovered populations of *Umbilicaria hirsuta* were noted. All known Oregon sites were then revisited in 2014 in order to collect specimens, record habitat data and to take photographs of the sites. During these field visits it was noted that a distinctive lichenicolous fungus was present on at least a few individual at each site, so infected thalli were also documented, collected and photographed. Examination of specimens was made with both dissecting and compound light microscopes and identification was made using McCune and Geiser (2009) Thompson (1984), Hestmark (2004), and Grube et al (1995). Selected voucher specimens were deposited at the Oregon State University Herbarium (OSC).

Specimens examined: U.S.A. Oregon. Jackson Co.: Butte Falls RD, Medford BLM, 2006, in partial shade on large igneous rock outcrop in mixed evergreen conifer woodland. 903 M elev. (2,961 ft.), this population was examined by us *in situ*, 2014, D. Kofranek 2097 (OSC); Lava flow near Summit Snowpark, Rogue River-Siskiyou National Forest, 1,550 M elev. (5,086 ft.). 2014, in large lava flow on large exposed rock outcrop, Sheehy45 (OSC), Villella 14-795 (Villella hb.); Ridge near Pacific Crest Trail south of Hobart Bluff parking area, Cascade-Siskiyou National Monument, 2014, on under hang of large boulder in exposed ridge top area, Sheehy 909 (OSC) Villella 14-705 (Villella hb.).

Results and Discussion

The discovery of new populations of *Umbilicaria hirsuta* in Southwestern Oregon highlights the need for continued surveys for this lichen in the Pacific Northwest. These new populations were all found on very large boulders or rock outcrops in open settings on high elevation (>1,500 meter) ridges in the Cascade-Siskiyou region, in fact sites were always on the largest rocks within sight (Figure 2). This habitat is different than the habitat described previously for the known Oregon population (Kofranek & McCune 2008), a shaded rock outcrop on a forested ridge at mid-elevation 903 meter (2,961 ft.); (Figure 3).

JOHN VILLELLA

Figure 2. Open high elevation lava flow site.

STEVE SHEEHY

Figure 3. Low elevation shaded site.

All Oregon sites were associated with underhangs or trickle lines (Figure 4). In the lava flows that we searched, only those with large intact boulders with significant under hangs harbored populations of *U. hirsuta*. *Umbilicaria americana* was also found to co-occur in these habitats, we consider it to be a good indicator species for the occurrence of *U. hirsuta*, although it tends to not have as strong an association with under hangs or trickle lines as *U. hirsuta*. These newly discovered sites are all above 1,300 M elevation, a characteristic also shared by the known California sites.

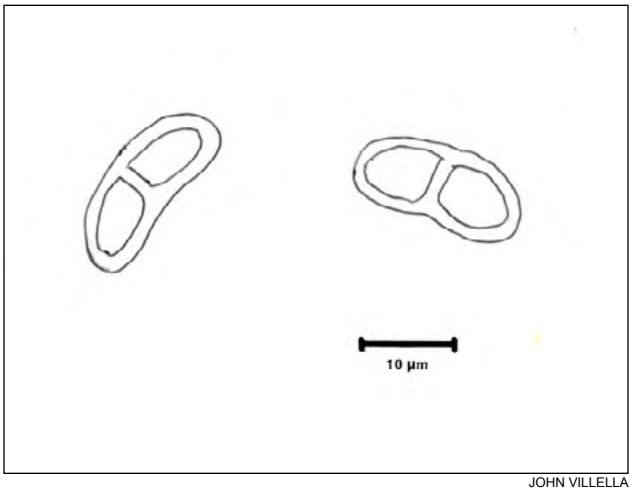
Another interesting feature of the sites visited during this study is that every population was found to have the lichenicolous fungi *Arthonia circinata* Th. Fr. growing on some thalli within the population. This can be recognized in the field as a series of reddish spots on the upper surface of *Umbilicaria* lichens occurring in a distinctive concentrically arranged pattern (Figure 5). This species has single septate spores that are 11-13 x 4-6 µm (Figure 6) and orange red granules that are K+ red-violet. Our material fits well into the species description found in Grube et al. (1995), who state that this species is well developed only on very old thalli of *Umbilicaria*. *Arthonia circinata* is reported from Norway and Austria on other species of *Umbilicaria* and on *U. hirsuta* in Spain (J. Hafellner 17654). The K+ red pigment associated with *A. circinata* is thought to be a response to infection produced by the host *Umbilicaria* rather than by the parasite (Grube et al. 1995). This species does not currently appear in the Checklist for North America Lichens (Esslinger 2014) and so here we are reporting it as new to North America.

STEVE SHEEHY

Figure 4. *Umbilicaria hirsuta* associated with trickle line on a large rock out crop.

STEVE SHEEHY

Figure 5. Concentric ring pattern of *Arthonia circinata*.



JOHN VILLELLA

Figure 6. Single septate spores of *Arthonia circinata*.

Acknowledgments

Thanks to Bruce McCune for reviewing the manuscript. We give special thanks to Kerry Knudsen for clarifying the southern California locations and to Jana Kocourková for suggesting the identification of *Arthonia circinata*. Armand Rebischke is gratefully acknowledged for granting a permit to collect in the Cascade-Siskiyou National Monument.

Literature Cited

Grube, M., M. Matzer, J. Hafellner. 1995: A preliminary account of the lichenicolous Arthonia species with reddish, K+ reactive pigments. - Lichenologist 27(1): 25-42

Hestmark, G. 2004. *Umbilicaria*, pp. 548-556, *in* T. H. Nash III, B. D. Ryan, P. Diederich, C. Gries, & F. Bungartz (eds.), Lichen flora of the Greater Sonoran Desert region, Vol. 2. Lichens Unlimited, Arizona State University, Tempe.

Kofranek D., and B. McCune 2008: Umbilicaria hirsuta (lichenized ascomycetes) new to Oregon. - *North American Fungi* 3(1): 1-3.

McCune, B., & L. H. Geiser. 2009. Macrolichens of the Pacific Northwest. Second Ed. Oregon State University Press, Corvallis.

McCune B., R. Rosentreter, T. Spribille, O. Breuss & T. B. Wheeler. 2014. Montana Lichens: an Annotated List. Monographs in North American Lichenology 2:1-183. Northwest Lichenologists Corvallis, Oregon.

Ryan, B. 1994. Eastside lichen report for Oregon and Washington. http://www.icbemp.gov/science/scirpte.html. Accessed 21 Feb 2015.

Stone D. 2009. Species Fact Sheet For *Umbilicaria hirsuta*. Available from the Forest Service region 6 website. Accessed on February 21, 2015: http://www.fs.fed.us/r6/sfpnw/issssp/documents/planning-docs/sfs-li-umbilicaria-hirsuta-2009-07.doc.

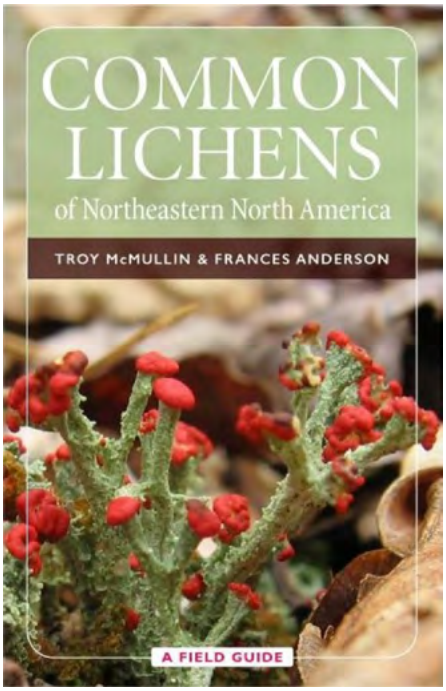
ORBIC. 2013. Oregon Biodiversity Information Center. Rare, Threatened and Endangered Nonvascular Plant and Fungi Species of Oregon. http://orbic.pdx.edu/documents/2013-nonvascs.pdf accessed on December 3, 2014.

Thompson, J. W. 1984. American Arctic lichens. 1. The macrolichens. Columbia University Press, New York. 504 pp.

A new lichen field guide for eastern North America: A book review

Kerry Knudsen
kerryknudsen999@gmail.com

Book Reviewed: Common Lichens of Northeastern North America by Troy McMullin & Francis Anderson. 2015. Memoirs of the New York Botanical Garden 112. New York Botanical Garden. 184 pp.



They see the trees, the rocks, the flowers, the sky, the birds. But most people do not notice lichens. That is why truly common names are so rare. Lichens are just not a part of most people's experience of nature. That is why books like *Common Lichens of Northeastern North America* are so valuable. They open one's eyes to another aspect of nature, the ubiquitous lichens which occur in most undisturbed habitats.

This field guide to lichens of eastern North America illustrates 138 common species with both a color picture and an image of a diagnostic character combined with a simplified description and practical notes on identifying the species. It is similar in size to Sharnoff's recent California lichen guide and easily fits in a backpack for use in the field. Like Sharnoff's book, there are no keys and the idea is to introduce the general reader to a wide range of common lichens that can be identified at least to genus easily by sight.

The fastest way to become familiar with lichens is to learn the common genera by sight. Most of the genera in this book occur in California, but not most of the species. Nonetheless many of the species illustrated are relatively rare in California and not included in Sharnoff's field guide, like *Pertusaria macounii, Melanelia panniformis* or *Collema subflaccidum.*

The authors, Troy McMullin and Francis Anderson, are Canadian lichenologists. Both have been especially active in Nova Scotia. Troy McMullin has been supported in his research by a CALS grant. He has published a lichen checklist for Prince Edward Island.

Amazon offers the book for 39 dollars. It can be ordered directly from New York Botanical Garden Press http://www.nybgpress.org/. This is the third important lichen book published by NYBG. Recently they published *The Lichens and Allied Fungi of Great Smoky Mountains National Park, An Annotated Checklist with Comprehensive Keys*, J. C. Lendemer et al. and *The Machrolichens of New England* by J. Hinds & P. Hinds. The latter book as well as *Lichens of North America* can be used to further identify species included in the field guide. All three books should be in any American lichenologist's library. Yale University Press will soon be publishing keys to the North American lichens by Brodo, which could also be used with this book. Next time I am back east, I plan on carrying a copy of *Common Lichens of Northeastern North America.*

On Wood: A monograph of *Xylographa* A book review

Kerry Knudsen
Department of Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences, Prague
Kamýcká 129, Praha 6 - Suchdol, CZ–165 21, Czech Republic
kerryknudsen999@gmail.com

Book Reviewed: Spribille, T., P. Resl, T. Ahti, S. Pérez-Ortega, T. Tønsberg, H. Mayrhofer & H. Thorsten Lumbsch. 2014. Molecular Systematics of the wood-inhabiting, lichen-forming genus *Xylographa* (Baeomycetales. Ostropomycetidae) with eight new species. Symbolae Botanicae Upsalienses 37:1–87 pp.

Abstract

Spribille et al. treat 20 species of *Xylographa* from around the world, 8 new for science. *Xylographa hians, X. pallens, X. rubescens* and *X. trunciseda* are reported in this monograph from California. Other possible species of *Xylographa* that could occur in California are briefly discussed in this review as well as report of *X. soralifera*. This monograph is an essential addition to lichenological libraries and university libraries.

Discussion

Monographs are always an event, a time to get out specimens and check old identifications. This is a monograph led by Toby Spribille (Herbarium GZU, University of Graz) of the common wood-loving genus *Xylographa* (for instance see Sharnoff 2014). Twenty species from around the world are treated, eight new for science. All of the species are illustrated with valuable color pictures. The keys are easy to use and only a few species will need TLC for verification. It is an excellent example of the synthesis of phylogenetic studies with taxonomic work that is developing in lichenology and is the future of mycological studies of lichenized fungi.

California herbaria were not sampled for this study, though several California collections from other herbaria were studied, including Arizona State

TOBY SPRIBILLE

Xylographa trunciseda

University (which has the extensive California collections of Tom Nash and Bruce Ryan). Only four of the species of the twenty in the book are reported in this monograph from California: *Xylographa hians, X. pallens, X. rubescens,* and *X. trunciseda.* New discoveries for the state are expected using this monograph. And maybe a rediscovery.

Earlier reports of *Xylographa opegraphella, X. parallela, X. pruinodisca* and *X. vitiligo* for California need to be revised (Hutten et al. 2013; Tucker 2014). For users of Sonoran Lichen Flora, *X. pruinodisca* and *X. crassithallina* are treated as probable synonyms of *X. difformis.* Only 40 collections of *Xylographa* are documented from California in herbaria (CNALH 2015; UCR 2015). *Xylographa* is rare in southern part of state. The genus apparently becomes frequent in the Sierra Nevada Mountains (Hutten et al. 2013) and more common in the northern portion of California (CNALH 2015). Previously most specimens in California would have been identified as *Xylographa vitiligo* if sorediate, *Xylographa parallela* if fertile. *Xylographa vitiligo* is reported from Oregon and Arizona and is expected in California. Eight sorediate or isidiate species are described in this monograph, but no sorediate specimens were examined by Toby Spribille from California. The sorediate *Xylographa soralifera* was previously reported from Yosemite (Lendemer et al. 2010). The fertile *Xylographa parallela* is apparently a more northern species, with only two records reported from Alaska and Montana, and may not occur in California. Two members of *parallela* group are reported in this book from California: *Xylographa pallens* and *X. rubescens*. (for the latter species see also Hutten et al 2013). Of the remaining species treated, *Xylographa hians* and *X. trunciseda* are reported from California. It is still possible to discover the unknown in California with so many thousands of kilometers of unexplored mountains, wilderness areas, and reserves. Monographs such as this one make new discoveries possible. While skyping with the reviewer, Toby Spribille said Bruce Ryan probably collected another taxon new for science in California that may be rediscovered in future studies in the state.

The book is an important addition to a serious lichenological library or university science library. It is accessible to beginners or professionals with good keys and pictures. For classes and CALS study groups, a lot can always be learned about the science studying a monograph. My only complaint is the reproduction of the color of some species is dull, though in the PDF of the book the color is excellent, so the fault lies with the publisher. The book can be ordered from Uppsala University Library (acta@ub.uu.se) but worth the trouble. The author Toby Spribille bought 150 copies for distribution and contacting him may be an easier way to obtain a copy. For authorities of species refer to Mycobank http://www.mycobank.org/Biolomics.aspx?Table=Mycobank

Literature Cited

CNALH. 2015. Consortium of North American Lichen Herbaria. http://lichenportal.org/portal/ Accessed Feb., 2015.

Hutten, M., U. Arup, O. Breuss, T. L. Esslinger, A. M. Fryday, K. Knudsen, J. C. Lendemer, C. Printzen, H. T. Root, M. Schultz, J. Sheard, T. Tønsberg & B. McCune. 2013. Lichens and lichenicolous fungi of Yosemite National Park, California. North American Fungi 8 (11): 1-47.

Lendemer, J. C., K. Knudsen & A. M. Fryday. 2010. New and interesting lichens, lichenicolous and allied fungi from Yosemite National Park, California, U.S.A.. Opuscula Philolichenum 8: 107-120.

Sharnoff, S. 2014. A Field Guide to California Lichens. Yale University Press. 424 pp.

Tucker, S. 2014. Constancea 85: Catalogue of Lichens, Lichenicoles, and Allied Fungi in California. Accessed April, 2014. http://ucjeps.berkeley.edu/constancea/85.

UCR. 2014. University of California, Riverside. http://ucr.ucr.edu/lichensflat_index.php accessed Feb., 2015.

News and Notes

Report on Recent Lichen Events

The monthly lichen workshops at the Regional Parks (Tilden) Botanic Garden in Berkeley, hosted by Irene Winston and Bill Hill, continue to offer opportunities for lichen enthusiasts to learn about lichens in the California native plants garden. We are preparing some lichen materials for a series of rotating displays for the Regional Parks Botanic Garden bulletin board in the Visitor Center.

The workshops at College of Marin, hosted by Bill Hill, also have been continuing, but with much less attendance than the Tilden Park workshops. We had moved from the old science building to the (new) Science Math Nursing building, room 112, and had continued to set them on the first and third Friday evenings. This may have been somewhat problematical as some folks are already busy with weekend activities. Mikki McGee often came with her microscopical expertise and we had looked at *Nostoc* in lichens in one session. Some other attendees brought material to show us and work on identifying, in particular Miko Nadel came a couple times with very interesting material he had collected at the Sao Tome and Principe islands near Africa, especially *Usnea* specimens. He is currently working on them at San Francisco State University for his thesis. In the last couple months the 3rd Friday evening of the month has become an 'open (botany) lab' as well where lichen enthusiasts are always welcome. Doris Baltzo has furnished us with interesting specimens on several workshop occasions, some of which we brought to exhibit at other occasions.

California Lichen Society volunteers again exhibited a lichen display at the Mycological Society of San Francisco (MSSF) Fungus Fair on December 6 and 7, 2014. We were busy answering questions all day and were gratified by introducing some new people to the fascinating world of lichens.

California Lichen Society volunteers also exhibited another lichen display at the Jepson Herbarium at the University of California, Berkeley, for the annual open house, CALDAY, on April 18, 2015. We again had a children's table with crayons, paper, and many specimens for these budding nature artists to draw. We had many displays. One showed photos of the 14 CALS lichens of conservation concern. Another consisted of three panels displaying specimens of foliose, fruticose, and crustose growth forms. Additionally, we presented a display on *Lichens and Air Pollution* which Barbara Lachelt had made several years ago. Many folks lingered for quite a while absorbing the exhibit information.

We were invited by Katie Colbert, a naturalist and interpreter at the Sunol Wilderness Park, to visit the Park on May 16, 2015, and identify lichens for a lichen walk she is preparing for visitors at the Park. We also planned a field trip to the Lava Beds National Monument in the northeast corner of California; it was held the last weekend in May. Keep an eye out for that trip report in the next issue of the bulletin.

By Bill Hill and Irene Winston

Ted Robertson shows the CALS *Usnea* model to a visitor at the Mycological Society of San Francisco (MSSF) Fungus Fair.

Xanthoria parietina gets name placard at Regional Parks Botanic Garden, Tilden Regional Park

The Regional Parks Botanic Garden is located in Wildcat Canyon in the north Berkeley Hills. The garden was founded in 1940 and is devoted to the collection, growth, display, and preservation of California's native plants. Plant species representing many of California's vegetation communities have been artfully landscaped into a compact area. The garden is divided into ten geographically-based sections and can be viewed in a day at a leisurely pace.

Until recently, the garden's rule for labeling specimens was that only vascular plants received placards displaying the species name, family, accession number, and location for where the collection was made. Lichens and mosses found in the garden went unlabeled. This year the first lichen placard was installed, calling attention to *Xanthoria parietina*. One of the gardeners has taken an interest in lichens after attending a lichen workshop given by Tom Carlberg. The gardener took it upon himself to label a particularly showy patch of *X. parietina* growing on a group of aspen trees found in the garden's Sierra section. Irene Winston and Bill Hill, organizers of the regularly occurring Tilden lichen workshops, hope this is a precedent-setting occasion and are excited about the potential to add a few more lichen signs.

By Shelly Benson

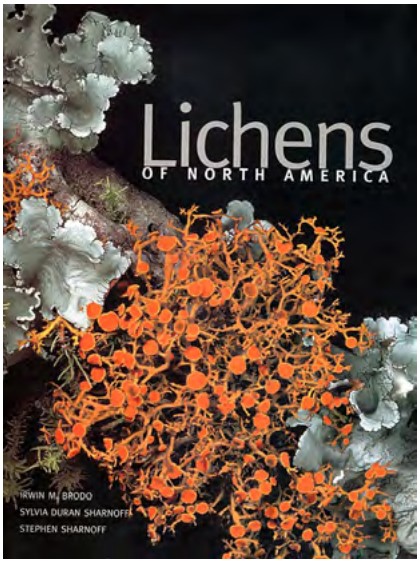
Bill Hill and Irene Winston with the newly accessioned and labeled *Xanthoria parietina* at the Regional Parks Botanic Garden in Tilden Regional Park.

Xanthoria parietina is the first lichen at the Regional Parks Botanic Garden to receive an accession number and name placard. Note: The 'native here' comment on the sign is questionable as some lichenologists think that this species was introduced to North America.

Need a copy of *Lichens of North America*?

CALS has several extra copies of *Lichens of North America* by Brodo, Sharnoff, and Sharnoff. This lichen guide has easy to follow keys and amazing photographs. We'd like to see these books put to good use. All you need to do is send us a message and tell us how this book would help you. The CALS Board of Directors will review the submissions and select recipients for the books based on need. Preference will be given to education, interpretation, or research based projects or activities.

Send your submission to President@californialichens.org by September 1, 2015.



Submit your photos: I♥Lichens!

Do you have a photo that shows how much you love lichens? How about one where lichens seemingly show you their love (see below)? Please submit your favorites to Sarah@californialichens.org for inclusion in an upcoming issue of this publication.

2015 Annual Membership Gathering

The 2015 annual member's field trip was held on Saturday January 31, 2015 at Edgewood Park and Natural Preserve in Redwood City, CA. We had a great turn-out for the event: a total of 32 lichen enthusiasts. Several CALS members are docents at the preserve, so we were shown the best of the best lichen microhabitats the park has to offer.

Edgewood Park supports a diversity of habitats including wetland, serpentine grassland, rock outcrops, oak woodland, and chaparral. The cool, wooded gullies of the eastern slope of the park are rich in ferns and mosses, and a thick layer of woody and herbaceous plants. The central portion of the park is dominated by a prominent ridge about 800 feet in elevation, affording outstanding views of Skyline Ridge, Huddart Park, the San Andreas Gulf Zone, the Crystal Springs Lakes and the San Francisco Bay. The warmer west-facing slope of the ridge supports chaparral and the cooler east-facing slope hosts oak woodland. We documented 47 lichen species at the preserve (Table 1). All identifications were made on site in the field because we did not obtain a collection permit for this event.

Table 1. Lichen of Edgewood Park and Natural Preserve. CALS annual member's field trip, January 31, 2015.

Caloplaca sp
Candelariella sp
Chrysothrix xanthina
Cladonia chlorophaea
Cladonia fimbriata
Cladonia furcata
Cladonia sp
Cladonia squamosa
Collema furfuraceum
Collema nigrescens
Dermatocarpon intestiniforme
Evernia prunastri
Flavoparmelia caperata
Flavopunctelia flaventior
Heterodermia leucomela
Hypogymnia sp
Lecanora muralis
Lepraria sp
Leptochidium albociliatum
Leptogium palmatum
Leptogium saturninum
Niebla cephalota
Ochrolechia sp
Parmelia sulcata
Peltigera membranacea
Peltula euploca
Pertusaria amara
Physcia adscendens
Physcia dimidiata
Physcia millegrana
Physcia tribacia
Physconia enteroxantha
Physconia isidiigera
Punctelia jeckeri
Ramalina canariensis
Ramalina farinacea
Ramalina leptocarpha
Ramalina menziesii
Ramalina puberulenta
Scytinium lichenoides
Teloschistes chrysophthalmus
Thelomma occidentale
Usnea intermedia
Usnea sp.
Xanthomendoza sp.
Xanthoparmelia sp.
Xanthoria sp.

After the field trip we convened at the local community center for the annual awards ceremony, pot-luck dinner, and evening speaker. This year the CALS Board of Driectors awarded Boyd Poulsen and Mikki McGee the *Ramalina menziesii* Award of Excellence. This award was established to recognize members who give outstanding service to CALS and who are dedicated to advancing the society's mission: to promote the appreciation, conservation, and study of California lichens. This award is named *Ramalina menziesii* because this lichen is the image that represents CALS as our logo and we proudly recognize recipients of this award as members who honorably represent the society.

Boyd Poulsen is a long-time member of CALS. He has shown broad support for the society's projects and programs. Boyd served on the CALS Board of Directors for two terms as vice-president from 2002-2006, and on the conservation committee during the same time period. In 2005 the conservation committee was formulating the protocols for designating rare lichens. Boyd's input helped to create the sponsorship process that is in place today. Boyd stewarded *Peltigera gowardii* through the sponsorship process, and his efforts helped that species gain conservation status in 2014.

Boyd enjoys being in the field observing and collecting lichens. He is an avid learner and has attended many CALS field trips and workshops. Boyd's lichen collection includes specimens from throughout California, and we are happy that it will reside at the California Academy of Sciences, thereby contributing to our knowledge of species distributions.

Mikki McGee joined CALS in 1994, the year the society was created. Whether attention to detail comes naturally for Mikki or she developed it during her professional training in science, she has used this skill to investigate lichens for the past 21 years. She enjoys examining lichen structures and understanding their function more than actually putting a name on the specimen itself. Mikki has a passion for microscopy and teaching. She taught many CALS members proper technique for making thin sections, staining specimens, and calibrating microscope reticles. Mikki instructed CALS workshops at San Francisco State University and College of Marin. She also led lichen walks to San Bruno Mountain, where she spent many years exploring the mountain's lichen microhabitats. Mikki's generosity through mentorship has helped CALS live up to its mission—to promote the appreciation and study of lichens.

This year the board awarded the first *Letharia* Achievement Award to Hanna Mesraty, Ken-ichi Ueda, and Tom Carlberg for their work on the *Ask A Lichenologist* project. The award recognizes members whose actions bring the society to new heights. Recipients are motivated individuals who have been inspired by lichens and who have channeled their inspiration into a unique project for the society. The award is named *Letharia* because members of this genus are bright and showy, and are most often found thriving at higher elevations. This award expresses our gratitude toward members who really stand out for elevating CALS to new heights.

Ask A Lichenologist is a project within iNaturalist—a web-based platform for documenting naturalist observations. Ken-ichi, co-developer of iNaturalist, and Hanna Mesraty, CALS outreach coordinator, hatched an idea to link naturalists with experienced lichenologists online. They created the project and encouraged CALS members and iNaturalist users to participate.

Through the *Ask A Lichenologist* project, naturalists get assistance identifying lichens online. Some of this assistance and education comes from organized discussions that are recorded and posted on the project home page, but the lion's share of online identifications are the result of the dedicated efforts of Tom Carlberg.

Over the last two years, 859 lichen observations have been posted to the project which has 85 members. The identifications cover 89 different taxa. Tom provided over 1,700 individual lichen identifications for iNaturalist users, including many identifications outside of the *Ask A Lichenologist* project.

Thanks to the work of Hanna, Ken-ichi, and Tom, naturalists are learning more about lichens and we all have access to an ever-increasing database of lichen observations in iNaturalist.

After a scrumptious pot-luck dinner, we were enlightened by the evening's guest speaker: Tom Carlberg, CALS vice president. Tom gave an informative lecture on California's foliicolous lichens (lichens that grow on leaves).

By Shelly Benson

Upcoming Events

CRAIG SNAPP

The coast of Maine where Eagle Hill's Summer Field Courses take place.

Eagle Hill's Summer Field Courses 2015
Humboldt Field Research Institute
Steuben, Maine
207-546-2821
office@eaglehill.us; www.eaglehill.us

Taught in Steuben, Maine by experts from the United States, Canada, and Europe, our week-long courses focus on the natural history of one of North America's most spectacular and pristine natural areas, the coast of eastern Maine from Acadia National Park to Petit Manan National Wildlife Refuge and beyond. Course participants include beginning to advanced amateurs, graduate and undergraduate students, teachers, professional field biologists, university professors, and personnel from federal and state agencies and numerous environmental organizations.

Lichens and Lichen Ecology
June 21 – June 27
David Richardson and Mark Seaward

Crustose Lichens: Identification using Morphology, Anatomy, and Simple Chemistry
June 28 – July 4
Irwin Brodo

Calicioid Lichens and Fungi of the Acadian Forest
July 5 – July 11
Steven Selva

Lichens, Biofilms, and Stone
Aug 16 – Aug 22
Judy Jacob and Michaela Schmull

How to Know the Lichen Genus Cladonia and Its Parasites
Aug 30 -Sept 5
Richard Harris

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. Occasionally, there are snacks to share. 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 or 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 lichen topics of interest. If you would like to have a particular topic covered, please let us know. Please RSVP to Irene Winston if you are planning to attend:
irene@californialichens.org or 510-548-6734

CALS Research/Educational Grants Program

The California Lichen Society offers small grants to support projects pertaining to the lichens of California. No geographical constraints are placed on grantees or their associated institutions. The CALS Grants Committee administers the program. A grant is awarded only once to a project during its duration.

Applicants should submit a proposal containing the following information:

- Title of the project, applicant's name, address, phone number, email address, and the date submitted.
- Estimated time frame for project.
- Description of the project: outline the purposes, 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.
- Description of the final product. We ask you to submit an article to the CALS Bulletin, based on dissertation, thesis, or other work.
- 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 living expenses. CALS does not approve grants for outright purchase of high-end items such as computers, software, machinery, or for clothing.
- Academic status. State whether you are a graduate student or an undergraduate student. 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.
- 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 mailed separately to the CALS Grants Committee Chair.
- Your signature, as the person performing the project and the one responsible for dispersing the funds.

The proposal should be brief and concise. The CALS 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.

Review: Members of the Grant Committee review proposals once a year. Proposals are evaluated for completeness, technical quality, consistency with CALS goals, intended use of funds, and likelihood of completion. Grant proposals received by October 1 each year will be considered for that year's grant cycle.

Grant Amounts: CALS typically offers two grants of $750 and $1,000 each year. Usually, two grants are awarded to separate individuals; however ,during some years both grants are awarded to one person. Award amounts depend largely on member contributions; therefore, the size of the grants may vary from year to 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 *Bulletin fo the California Lichen Society,* 3) submit any relevant rare lichen data to California Natural Diversity Data Base using CNDDB's field survey forms.

How to submit an application: Please email applications or questions to the CALS Grants Committee Chair at *Grants@californialichens.org* by **October 1 of the current calendar year.** The current chair is Tom Carlberg.

President's Message

In 2011 Janet Doell, founding member of CALS, started a campaign to designate a state lichen for California. She nominated lace lichen, *Ramalina menziesii,* as the candidate species. Lace lichen is easily recognizable, found throughout much of California, and is a beautiful lichen. Adopting a state lichen would call attention to lichens in general and help fulfill the society's mission: to promote the appreciation, conservation, and study of California lichens. Unfortunately, the legislature didn't take up our cause that year, and Janet retired from lichenology soon after. Even in retirement, she still holds the dream that California will be the first state in the union to recognize a lichen as a state symbol.

CALS strongly believes in this campaign and the board of directors began pushing for state lichen designation again in 2014 with lichen advocate Clint Kellner at the lead. We found support from Assemblymember Marc Levine of Marin County. We are very excited to report that we have cleared the first two hurdles in the process: a bill was created and it passed the State Assembly. Now Assembly Bill 1528 moves on to the State Senate. Stay tuned for future updates. We are very hopeful that someday, in the near future, we will be able to declare that California has a state lichen!

Shelly Benson
President@californialichens.org

California Lichen Society

PO Box 472, Fairfax, California 94978

The California Lichen Society (CALS) 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 CALS 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 CALS 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

---

Back cover (clockwise from upper right):
Acarospora strigata, on sandstone, near Canyonlands, UT. Photograph by Jason Hollinger.
Umbilicaria phaea var. *coccinea* (red) and *U. phaea* var. *phaea* (brown) in Hilt, CA. Photograph by Troy McMullin.
Sequoia sempervirens cones with a display of lichens (Scale bar = 1 cm). Photograph by Rikke Reese Næsborg.
Sulcaria badia in Laytonville, CA. Photograph by Troy McMullin.
Arthonia circinata on *Umbilicaria hirsuta*; *Baeomyces rufus* in Washington state. Photograph by John Villella.


3 mm