# Bulletin of the California Lichen Society

Volume 28 No. 1 Summer 2021

Bulletin of the California Lichen Society

Volume 28 No. 1 Summer 2021

## Contents



This issue of the *Bulletin of the California Lichen Society* (ISSN 1093-9148) was edited by Jes Coyle and Justin Shaffer (editor@californialichens.org), and was produced by Jes Coyle. 

**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 email 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 (600ppi minimum for line drawings); preferred minimum width for images is 2100 pixels, but widths down to 1050 pixels may be accepted. Email submissions are limited to 10MB per email, but large files may be split across several emails or other arrangements can be made. Contact 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 https://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.

Volume 28(1) of the Bulletin of the California Lichen Society was issued on November 10, 2021.

Cover image: *Usnea intermedia* group, photographed at Jasper Ridge Biological Preserve, San Mateo County, California. Photo by Jesse Miller.

# Alkali scrub habitat in California includes a large biodiversity of biocrusts

Roger Rosentreter[1] and John Brinda[2]

[1]Boise State University, Department of Biology, 1910 University Drive, Boise, ID 83706, roger.rosentreter0@gmail.com
[2]Missouri Botanical Garden, 4344 Shaw Boulevard, Saint Louis, MO 63110, john.brinda@mobot.org

## Abstract

*The rare patches of alkali desert scrub habitat in southern California superficially look harsh and barren. In dry years they really seem empty, with only a few dead looking shrubs. However, when one looks closer it is clear that these habitats are full of life. While there are only two dominant shrub species (*Atriplex*), there are 24 species in the native biocrust community. These species are small in stature and difficult to see, but they still cover the soil surface. These biocrust communities are diverse and bind the soil together to prevent erosion and increase moisture infiltration and retention. We found 14 bryophyte and 10 lichen species making up the biocrust community. Most of these biocrust species are widespread and common with just a few regionally endemic species. These endemics include the screw moss,* Stegonia hyalinotricha*, and Pacific Scale lichen,* Psora pacifica*. Relict preserves like this intact habitat are a valuable historical reference for habitats that have been mostly degraded or converted for human use.*

## Introduction

Kern County, CA is one of the state's most significant biodiversity hotspots (Williams and Germano 1992). The county itself contains many of the diverse habitats we associate with Central and Southern California and contains a host of unique species, with many endemics to boot. Also lying in the county is a significant expanse of remnant Central Valley grasslands (Williams and Germano 1992). Here, some of California's most endangered mammals cling on, like Giant and Tipton Kangaroo Rats, Tulare Grasshopper Mouse, Nelson's Antelope Squirrel, San Joaquin Kit Fox, and American Badger. Rare birds such as Mountain Plover, Ferruginous Hawk, Prairie Falcon, Mountain Bluebird, and Vesper Sparrow survive here too in some of the last pockets of their range (Williams and Germano 1992).

The dominant vegetation is Saltbrush (*Atriplex* spp.), both spiny saltbush (*Atriplex spinifera*) and common saltbush (*Atriplex polycarpa*) are present. The dominant animals are kangaroo rats. The dominant biocrust communities contain mosses from the family Pottiaceae, the liverwort *Riccia nigrella*, and soil jelly lichens, *Collema* spp. syn= *Enchylium* spp.

This study area is believed to be some of the last remaining remnant vegetation in the southern valley of California. In 1985, Tipton kangaroo rat (*Dipodomys nitratoides*) was known to occur in only 3.7% of its historic range (Williams and Germano, 1992). This gives us an idea of how little of the historic vegetation type still exists. Both agricultural and oil wells have displaced much of the natural habitat.

This alkali desert scrub habitat superficially looks harsh and barren. In dry years, the shrubs are dormant and dead looking. However, when one looks closer these habitats are full of life. The native biocrust community is small in

stature and difficult to see but still covers most of the soil surface. These biocrusts are diverse, covering the entire soil surface and bind the soil together to prevent erosion and increase moisture infiltration and retention. Even when the shrubs are dormant for the season, they will have produced abundant seeds that are now in the seed bank. The resident rodents, kangaroo rats, (*Dipodomys* spp.) cache these seeds and survive on them during periods of drought. Kangaroo rats are keystone species within the preserve's alkali scrub habitat that is dominated by plants that can tolerate soils high in soluble salts, including saltbush, iodinebush, (*Atriplex* spp.) and seepweed (*Suaeda* spp.). Their burrows provide shelter for other species, including the endangered blunt-nosed leopard lizard (*Gambelia sila*); they provide food for carnivores, including the endangered San Joaquin kit fox (*Vulpes macrotis mutica*); and their seed-caching behavior may contribute to the dispersal and germination of some vascular plants.

Greg Warrick from the Center for Natural Lands Management (CNLM) has been studying kangaroo rat populations on their lands since 2001. "The CNLM land has both Tipton kangaroo rat and Heermann's kangaroo rats. Smaller burrows with smaller droppings in the alkali habitat would be the federally listed endangered Tipton kangaroo rat while the larger holes with larger droppings are probably Heermann's kangaroo rat" (Douglas 2018).

Tipton's is a subspecies of the San Joaquin kangaroo rat. There are three subspecies: Tipton's = *Dipodomys nitratoides nitratoides*, Fresno kangaroo rat = *Dipodomys nitratoides exilis*, Short-nosed kangaroo rat = *Dipodomys nitratoides brevinasus*.


Figure 1. Transect photos from April 2010 (left), a moist year and April 2018 (right), a dry year. Photo credit: Greg Warrick from the Center for Natural Lands Management (CNLM).

Figure 2. *Crossidium aberrans*, photo by John Brinda

Figure 3. *Sphaerocarpos texanus*, photo by John Brinda

Floristic treatments for this area are limited for crustose lichens but include Nash et al. (2002) and McCune and Rosentreter (2007).

## Study Area

Kern County, California, alkali salt desert scrub habitat or alkali sink habitat. The precise locality is not given here in order to avoid focusing any human disturbance to the site. We surveyed the area twice making small collections to voucher the species present but trying to not disturb the soil to any extent.

## Results

We found extensive biocrusts covering soil that appeared from a distance to be barren. These biocrusts are mainly found on the alkali soil in this area. An ocular estimate of the area covered by biocrusts within this preserve was about 65%. The soil was a fine-grained silt at the soil surface with sand in the soil within the top 10 inches in depth.

Twenty-four biocrust species were found at this study site (Table 1) and more could probably be discovered with further investigations. Since similar alkali scrub habitat nearby was also visited and at this other site we collected some other common biocrust species, these other common biocrusts may also occur at the study site but were not collected (*Bryum argenteum*, *Collema tenax*, and *Targionia hypophylla*). If these other three common species do occur at the study site, then the study site could have as many as 27 biocrust species present. This would be significantly greater than the perennial vascular plant diversity recorded at the site.

All the biocrust species (especially the bryophytes) are excellent soil binders and prevent wind and water erosion (Belnap et al. 2001). These habitats experience long periods of drought but can receive abundant rainfall in the winter as is typical of the Mediterranean climate. The biocrusts are critical for soil moisture infiltration and retention (Belnap et al. 2001) during these abundant precipitation events.

## Discussion

The high overall cover of biocrusts (i.e., 65%) at this remnant alkali scrub habitat shows how important biocrusts are to the ecology of these habitats. Biocrusts are often overlooked as key components of various arid habitats. Many arid

Table 1. Bryophytes and lichens found in this alkali scrub by species, common name (if there is one), local, state, and global abundance ratings as well as the number of documented voucher specimens of each species at each given scale, with remarks on their ecology and distribution (NA= North America, E= East, N= north, S= south, W= West, CA= California). Abundance ratings are: R = rare; I = infrequent; C = common (McCune et al. 2014).

| Species and Common Name | Abundance Local scale | Abundance Statewide No. of herbarium collections from CA | Worldwide Distribution No. of herbarium collections in the Consortium Database | Remarks |
|---|---|---|---|---|
| ***Bryophytes:*** | | | | |
| *Aloina bifrons* (De Not.) Delgad. aloe-moss | C | I/119 Mostly S and E CA | I /246 | Widespread, in W NA and arid sites in Europe |
| *Bryaceae* spp. Schwagrichen thread-moss | NA | NA | NA | Lots of small, sterile *Bryum* s.lat. species: nearby we found *Bryum argenteum* which is cosmopolitan |
| *Crossidium aberrans* Holz. & E.B. Bartram screw-moss | C | I/27 | I/538 | Widespread, in W NA and arid sites in Europe |
| *Didymodon australasiae* (Hook. & Grev.) R.H. Zander beard-moss | C | C/195 S CA | I/903 | Widespread |
| *Didymodon vinealis* (Brid.) R.H. Zander soft-tufted beard-moss | C | C/1471 | C/5208 | Widespread |
| *Funaria hygrometrica* Hedw. common cord-moss | I | C/1103 | C/12884 | Cosmopolitan |
| *Pseudocrossidium obtusulum* (Lindb.) H.A. Crum & L.E. Anderson beard-moss | C | I/51 | R/117 | Widespread, in W NA and arid sites in Europe |
| *Riccia nigrella* DC. black crystalwort | C | C/290 | C/450 | Widespread |
| *Sphaerocarpos texanus* Austin texas balloonwort | I | C/142 S CA | C/945 | Widespread |
| *Stegonia hyalinotricha* (Cardot & Thér.) R.H. Zander screw-moss | I | R/17 | R /21 | Southwestern US and Mexico |

**Table 1 cont.**

| | | | | |
|---|---|---|---|---|
| *Syntrichia princeps* (De Not.) Mitt.<br>brown screw-moss | C | C/1277 | C/3340 | Widespread, in W NA and Europe |
| *Tortula brevipes* (Lesq.) Broth.<br>screw-moss | C | C/379 | C/933 | W NA only |
| *Tortula brevissima* Schiffn.<br>screw-moss | I | R/6<br>S CA | R/34 SW NA | Widespread, described from the Mediterranean region and recently reported for NA |
| ***Lichens:*** | | | | |
| *Aspicilia mansourii* Sohrabi<br>soil lichen | C | Probably C, but only 4 records in CA | Probably I, but only 54 records in NA | Partially fruticose *Aspicilia* that is probably more common than records show, grows on soil and organic matter. Described recently |
| Caloplaca spp. K+red<br>syn = *Leproplaca* | C | NA | NA | A *Caloplaca* that occurs on bare soil and is not yet described.<br>Det: Ulf Arup. 2017 |
| *Collema coccophorum* Tuck.<br>syn = *Enchylium*<br>soil jelly lichen | C | C/132 | C/883 | NA, this small *Collema* is often on calcareous soil. This species is a nitrogen fixer. |
| *Heppia conchiloba* Zahlbr.<br>soil ruby | I | R/15 | R/94 | W NA, this species is a nitrogen fixer. |
| *Placidium squamulosum* (Ach.) Breuss<br>scale lichen | C | C/ 187 | C/1291 | Worldwide |
| *Psora decipiens* (Hedwig) Hoffm.<br>red scale lichen | C | C/171 | C/2770 | Worldwide |
| *Psora pacifica* Timdal<br>(Med KC+ red fleeting)<br>Pacific scale lichen | C | C/210 | NA | CA province only including Baja Mexico |
| *Thelenella muscorum* (Nyl.)<br>Coppins & Fryday<br>moss speck lichen | R | R/6 | I/196 | N Hemisphere |
| *Toninia sedifolia* (Scop.) Timdal<br>black and blue lichen | C | I/96 | C/1673 | Worldwide |

habitats in California and the entire western landscape lack remnant reference habitats (Noss and Scott 1995). This makes it difficult to know what species these communities were originally composed of, due to the extent that exotic species have invaded these habitats. This site provides an opportunity to explore which species of biocrusts may have been components of the original alkali scrub habitat.

Shifts in vegetation characteristics resulting from nonnative plants can alter availability of food resources, predation risk, and foraging efficiency (both the access to and ability to find food), each providing a potential mechanism for documented changes in animal communities and populations in invaded systems (Bachen et al. 2018). This shift in vegetation is often from extremely low growing biocrusts that are not even acknowledged by many ecologists and range managers to an annual exotic plant cover such as cheatgrass that builds up a thick layer of litter (Root et al. 2020). Some vegetation changes may also occur due to changes in climate (Bradley 2009).

Developing a mechanistic understanding may provide insights about potential management treatments and can increase our basic knowledge of how animals use the physical structure of their environment to find and acquire resources. Given that nonnative plants are found in most ecosystems and the distributions of some of these species are shifting with changing climate patterns (e.g., Bradley 2009), this information is essential for conservation.

**Acknowledgements**

We would like to thank Amy Kuritsubo and Denis Kerns with the Bakersfield Bureau of Land Management office for facilitation of the trip to this area and for their general love and caring of the California environment. We would also like to thank Drs. Rob Smith, and Ulf Arup for moss and lichen identifications, respectively. We would also like to thank Greg Warrick from the Center for Natural Lands Management (CNLM) for assisting with general information and contributing the photos of the habitat in moist and dry years.

Amy Kuristubo, biologist managing Bureau of Land Management lands impacted by oil wells. Photo near the oil pumphouse by Roger Rosentreter.

**Literature Cited**

Bachen, D.A., A.R. Litt and C.N. Gowe. 2018. Simulating cheatgrass (*Bromus tectorum*) invasion decreases access to food resources for small mammals in sagebrush steppe. Biol Invasions 20: 2301–2311. doi: 10.1007/s10530-018-1701-8

Belnap, J., J. H. Kaltenecker, R. Rosentreter, J. Williams, S. Leonard and David Eldridge. 2001. Biological soil crusts: ecology and management. USDA Bureau of Land Management, Technical Reference 1730–2. Denver, CO.

Bradley, B.A. 2009. Regional analysis of the impacts of climate change on cheatgrass invasion shows potential

risk and opportunity. Global Change Biology 15: 196–208. doi: 10.1111/j.1365-2486.2008.01709.x

Consortium of North American Bryophyte Herbaria. https://bryophyteportal.org/portal/ Accessed February 3, 2021.

Consortium of North American Lichen Herbaria, https://lichenportal.org/cnalh/. Accessed February 8, 2021.

Douglas, L. 2018. Site visit insights from Lily Douglas. Sacramento Fish and Wildlife Office. https://www.fws.gov/sacramento/outreach/site_visit_insights/site_visit_lily_douglas.php.

McCune, B. and R. Rosentreter. 2007. Biotic soil crusts of the Columbian Basin. Monographs in North American Lichenology 1: 1-105.

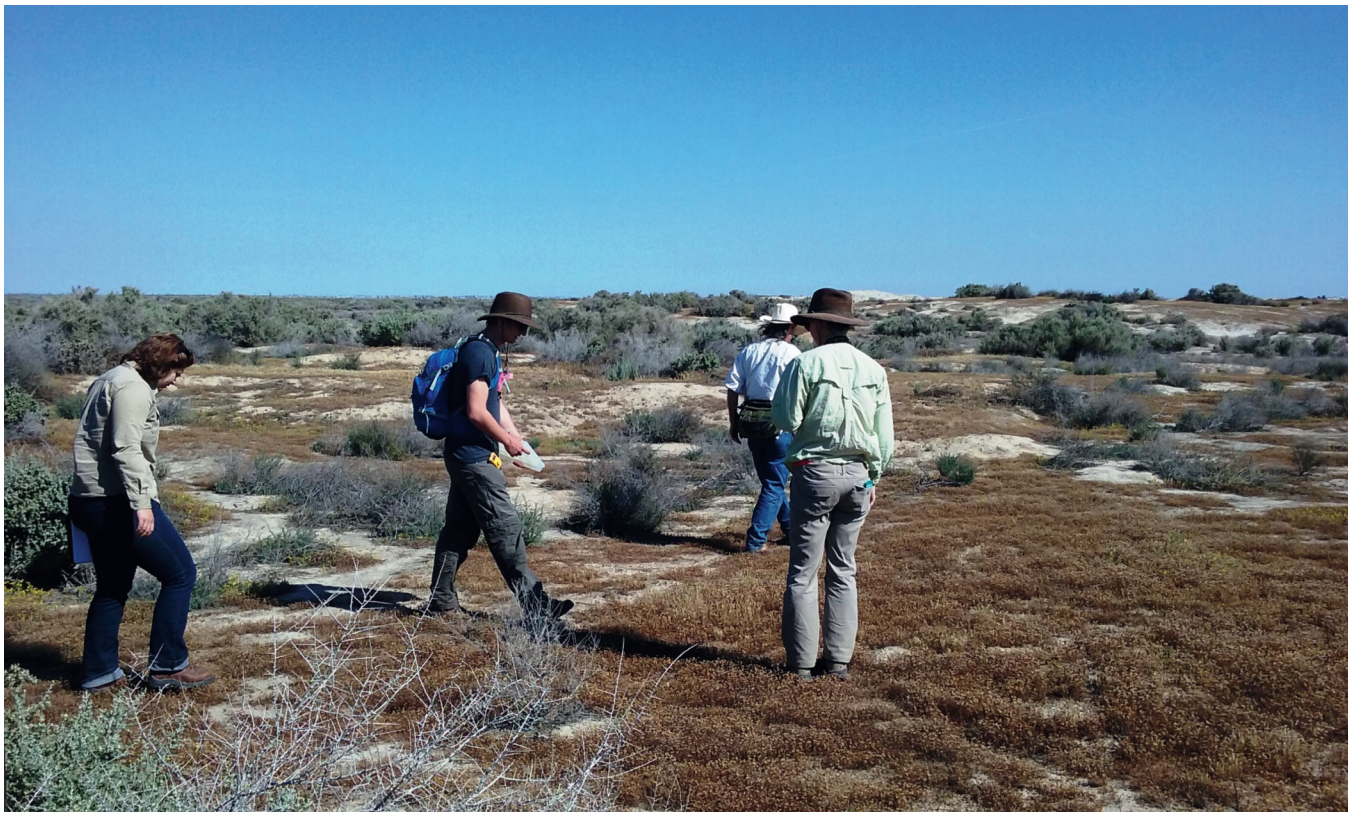
McCune, B., R. Rosentreter, T. Spribille, O. Breuss and T. Wheeler. 2014. Montana Lichens: An Annotated List. Monographs in North American Lichenology 2: 1-183.

Nash, T.H., B.D. Ryan, C. Gries, and F. Bungartz. 2002. Lichen flora of the Greater Sonoran Desert Region, vol. 1-3, Tempe, AZ: Lichens Unlimited, Arizona State University.

Noss, R.F., E.T. LaRoe and J.M. Scott. 1995. Endangered Ecosystems of the United States: A Preliminary Assessment of Loss and Degradation. U.S. Department of the Interior, National Biological Service, Washington, DC. 58 pages.

Root, H.T., J.E.D. Miller and R. Rosentreter. 2020. Grazing disturbance promotes exotic annual grasses by degrading biotic soil crust communities. Ecological Applications 30: 1-10.

Williams, D.R. and D. Germano. 1992. Recovery of the endangered kangaroo rats in the San Joaquin Valley, California. Trans. West. Sect. Wildl. Soc. 28: 93-106.



Students learning about this harsh alkali scrub habitat. Photo by Roger Rosentreter.

# A new name for a common desert lichen

Kerry Knudsen[1]*, Jason Hollinger[2], Anna Götz[3] and Eva Hodková[1]

[1]Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Department of Ecology, Kamýcká 129, Praha - Suchdol, 165 00, Czech Republic; *knudsen@fzp.czu.cz
[2]Herbarium, Western Carolina University, Cullowhee, NC 28723, U.S.A.
[3]Department of Biosciences, Universität Salzburg, Austria

**Abstract**

*The North America species presently called* Acarospora gyrocarpa *is found to be genetically distinct from true* Acarospora gyrocarpa *from Asia. The name* Sarcogyne oligospora *is available for the North American species. However, since there is already an Acarospora oligospora, we name the North American species* Acarospora leavittii *in honor of the Utah lichenologist Steve Leavitt.* Acarospora gyrocarpa *from Asia is currently treated as* Sarcogyne gyrocarpa *based on results of this study.*

Key words: *Acarosporaceae*, IKI reactions of hymenial gels, nomenclature, *Polysporina*

In the biological sciences our knowledge of the evolution and circumscription of species, whether elephants or lichens or lice, develops over time with new knowledge. This often means that new names have to be applied to species as they shift genera or if a single species is formed through synonymy or split apart when a species concept is discovered to be heterogeneous. People who do not understand the progression of science, and even some of us who have grown fond of a familiar name like *Polysporina*, complain about the changing of names. The story of *Polysporina gyrocarpa* is a story of changing names. The best way to understand a complicated story of nomenclature like this one is to first read the headers, the one directly below and the one in Appendix 1. These are the outlines of this story. If you are getting confused, take another look at them.

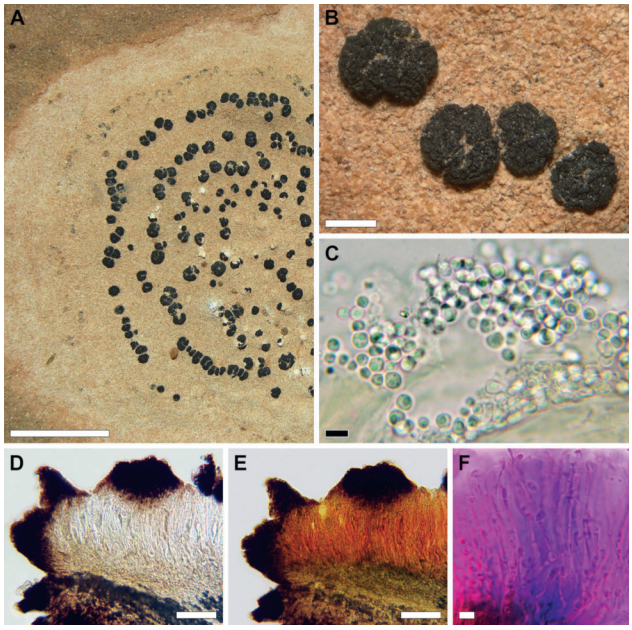
***Acarospora leavittii*** K. Knudsen & Hollinger, nom. nov. Type: USA: Utah, Wayne Co., Ekker's Ranch, 1829 m, on dry red exposed sandstone, May 1951, Flowers, s. n. (UPS – holotype! COLO – isotype!). MB838627

≡ ***Sarcogyne oligospora*** H. Magn, Acta horti götoburg 19(2): 32 (1952), non *Acarospora oligospora* (Nyl.) Arnold (1870) [MB375656]

≡ ***Polysporina oligospora*** (H. Magn.) K. Knudsen, Knudsen & Lendemer, Mycotaxon 93: 278 (2005), syn. nov.

***Etymology.*** We name the taxon *Acarospora leavittii* in honor of Dr. Steve Leavitt (BYU), curator of BYU lichen herbarium (BRY-C), especially for his dedication in studying the lichen flora of Utah. The species was originally described from his home state of Utah.

***Description.*** Thallus crustose, endolithic, causing no discoloring of rock, hyphae thin-walled, mostly 2–3 µm thick, with cells 4–6 µm in length, I-, spreading to 6 cm, usually continuous between apothecia, apothecia usually dispersed. Algal layer not readily apparent beneath apothecia but discontinuous throughout the endolithic thallus in scattered clumps of lichenized green algal cells to 10 µm




***Acarospora leavittii***. A. The circle around the apothecia is formed by an endolithic hypothallus, Utah, Hollinger 6413 (UCR), B. Apothecia, C. Ascospores. D. Hymenium, Arizona, Hollinger 488 (hb. Hollinger), E. Hymenial gel in Lugol's, F. Hymenium in phloxine B. Scale bars: A = 1 cm, B = 1 mm, D–E = 50 µm, C & F = 5 µm

in diam. *Apothecia* black, dull, carbonized, epruinose, rugulose, distinctly superficial, round to irregular especially after division of apothecia, (0.4–)1.0–1.5(–2.0) mm in diam., plane to convex, margin smooth or knobby or crenulate, disc surface rough, black, carbonized, with distinct ridges, umbos, and/or knobs, irregular, uncarbonized furrows. *Apothecia* becoming partitioned by distinct carbonized abscission fissures, splitting apart, replicating by division, and forming independent apothecia in small groups. *Exciple* of radiating hyphae 2–3 µm in diam., 50–80 µm wide, with black carbonized outer layer, reddish-orange inner layer. *Hymenium* (80–) 100–140 µm high, epihymenium 10 µm thick, conglutinate, reddish brown, hymenial gel IKI+ blue turning red (hemiamyloid). *Paraphyses* 1.5–2.0 µm wide at mid-level, infrequently branching and anastomosing, apices unexpanded or expanded to 3 µm. *Asci* 70–90 × 18–25 µm, 50–100 ascospores per ascus. *Ascospores* hyaline, simple, (3.5–) 4.0–5.0 (–7.0) × (2.0–) 2.5–3.0 (–4.0) µm, usually ellipsoid to broadly ellipsoid, sometimes subglobose Subhymenium to 60 µm thick, IKI+ blue *Hypothecium* thin, usually 10 µm, but continuous with parathecium and attaching hyphae, IKI–. *Conidiomata* not observed. *Chemistry:* no secondary metabolites.

***Distribution and Ecology.*** In western North America on siliceous rock, sandstone and decaying granite, especially in the Mojave Desert and Colorado Plateau where it is frequent (California, Colorado, Idaho, Nevada, New Mexico, Utah, Wyoming) (CNALH 2021 as *Polysporina gyrocarpa* and *Acarospora gyrocarpa*).

## Discussion

For the original description of the American species (as *Sarcogyne oligospora*) see Magnusson 1952 but Magnusson erroneously says the ascospores are 7–10 x 4–5 µm. *Acarospora leavittii* is easily identified by large (1.0–1.5 mm wide), *Polysporina*-type, lecideine apothecia, endolithic thallus, ascospores (3.5–)4.0–5.0(–7.0) × (2.0–)2.5–3.0(–4.0) µm, sometimes subglobose, IKI+ blue to red hymenial gel (hemiamyloid), and paraphyses 2 µm or slightly narrower at mid-level.

Knudsen revised *Sarcogyne oligospora* H. Magn. as *Polysporina oligospora* (H. Magn.) K. Knudsen (Knudsen & Lendemer 2005; Magnusson 1952). Knudsen & Kocourkova (2009) revised specimens of *Polysporina oligospora* (H. Magn.) K. Knudsen from North America and the Asian species *Polysporina gyrocarpa* (H. Magn.) N. S. Golubk. Both species are endolithic lichens and have similar *Polysporina*-type apothecia. Both the American

*Polysporina oligospora* and the Asian *Polysporina gyrocarpa* have ascospores (3.5–)4.0–5.0(–7.0) × (2.0–)2.5–3.0(–4.0) µm, usually broadly ellipsoid, infrequently almost globose. Therefore, the authors considered them the same species, *Polysporina gyrocarpa* (see Appendix 1).

Subsequently, the genus *Polysporina* was found to be polyphyletic (Westberg et al. 2015; or see tree in Knudsen et al. 2020). This means that all the species with *Polysporina*-type apothecia are not a genus of related taxa forming a monophyletic clade in a phylogenetic tree. The type species of the genus, *P. simplex* (Davies) Vězda, and several other species are scattered about the *Acarospora* clade while a few species were recovered in the *Sarcogyne* clade. A California specimen of *Polysporina gyrocarpa* from the Granite Mountains in the Mojave Desert was sequenced and recovered in the *Acarospora* clade (Westberg et al. 2015). The species was renamed *Acarospora gyrocarpa* (H. Magn.) K. Knudsen & M. Westb. (Knudsen et al. 2017).

Recently Anne Götz, a bachelor student from the University of Salzburg studying lichens of Kyrgyzstan, sent the first author (K.K.) specimens to identify along with ITS sequences for each specimen. One of the specimens from Kyrgyzstan (Götz UR00649) was identified by K. Knudsen as *Acarospora gyrocarpa*. Eva Hodková did a BLAST of the ITS from this specimen and it did not match the sequences of the American *Acarospora gyrocarpa* in GenBank (see Appendix 1). Since the Asian species was called *Sarcogyne gyrocarpa* H. Magn. first (1937) that means that the American taxon could not be called *Acarospora gyrocarpa*. *Sarcogyne oligospora* was the original name of the American taxon. But because it is really an *Acarospora*, and there is already a common species named *Acarospora oligospora* (Nyl.) Arnold which has much larger ascospores 10–12 × 5–7 µm and pseudolecanorine apothecia (Knudsen 2007), the name *A. oligospora* is not available. Therefore, in order to transfer *Sarcogyne oligospora* to *Acarospora* we must give it a replacement name: *Acarospora leavittii*.

Both species differ in their phylogenetic position in the family tree (Westberg et al. 2015, Knudsen et al. 2020). The American species *Acarospora leavittii* occurs in the *Acarospora* clade in both family trees as *Acarospora gyrocarpa*. The Asian *Acarospora gyrocarpa* does not occur in either family tree. Based on the BLAST of the Asian specimen collected by A. Götz and identified by K. Knudsen it belongs in the *Sarcogyne* clade in the family and its correct name should be *Sarcogyne gyrocarpa* H. Magn. (Appendix 1).

How do the two species, *Acarospora leavittii* from North America and *Sarcogyne gyrocarpa* from Asia differ anatomically? They overlap anatomically except for the paraphyses. The North American *Acarospora leavittii* typically has narrower paraphyses (1.6–2.0 µm thick), while *Sarcogyne gyrocarpa* has distinctly stouter paraphyses (2 µm to mostly 3 µm wide). A better diagnostic difference is that the hymenial gel of *Sarcogyne gyrocarpa* reacts dark blue in Lugol's (euamyloid) and *Acarospora leavittii* has hymenial gel that reacts blue to greenish before turning red in Lugol's (hemiamyloid). When Knudsen & Kocourková (2009) synonymized *Sarcogyne gyrocarpa* with *S. oligospora* the amyloidity of hymenial gel in *Acarosporaceae* was no longer used for identification because reactions reported in the literature were not reliable. Since then we have

established a standardized protocol for testing in *Acarosporaceae* hymenial gel with Lugol's (Knudsen & Kocourková 2018), and this is just one of several examples where similar species differ mainly in whether hymenial gel is dark blue (euamyloid) or hemiamyloid (blue or turning red).

## Appendix 1

***Sarcogyne gyrocarpa*** H. Magn., Meddn Göteb. Bot. Trädg. 12: 98 (1938). Type: Afghanistan: Kabul area, Sher-Derwase, 1700 m, G. Kerstain (HAL 002585L lectotype, designated in Knudsen & Kocourková 2009).

≡ ***Polysporina gyrocarpa*** (H. Magn.) Konspekt Flory Lishaĭnikov Mongol'skoĭ Naradnoĭ Respubliki (Leningrad): 138 (1981), syn. nov.

≡ ***Acarospora gyrocarpa*** (H. Magn.) K. Knudsen & M. Westb., in Knudsen, Lendemer, Schultz, Kocourkova, Sheard, Pigniolo & Wheeler, Opuscula Philolichenum 16: 40 (2017), syn. nov.

*BLAST of ITS*

Götz UR00649 *Sarcogyne gyrocarpa* H. Magn. (specimen from Kyrgyzstan, identified by K. Knudsen)

=97.5% LN810814.1 *Polysporina arenacea*
=94.14% MK503441.1 *Acarospora pulvinata*
=93.97% MN103107.1 *Acarospora insolata*
Refer to GenBank for more information.

***Discussion.*** *Sarcogyne paradoxa* Kocourk. and K. Knudsen (under the misapplied name *Polysporina arenacea*) and *Acarospora insolata* H. Magn. are in the *Sarcogyne* group in the family trees in Westberg et al. 2015 and Knudsen et al. 2020. Based on the BLAST results *Acarospora gyrocarpa* is best treated as a *Sarcogyne*. We accept the Asian species as a *Sarcogyne gyrocarpa* pending further study.

## Literature Cited

CNALH. 2021 Consortium of North American Lichen Herbaria. Accessed Jan. 2021.

Knudsen, K. 2007. *Acarospora*. 1–38, in: TH Nash III & al. (eds). Lichen Flora of the Greater Sonoran Desert Region. Volume 3. Lichens Unlimited, Arizona State University, Tempe.

Knudsen, K., J.N. Adams, J. Kocourková, Y. Wang, J. Ortañez, & J.E. Stajich. 2020. The monophyletic *Sarcogyne canadensis–wheeleri clade*, a newly recognized group sister to the European Acarospora glaucocarpa group. The Bryologist 123: 11–30.

Knudsen, K. & J. Kocourková. 2009. A taxonomic study of *Polysporina gyrocarpa* and *P. cyclocarpa* (Acarosporaceae) and a new record from Asia of P. arenacea. Bibliotheca Lichenologica 100: 199–206.

Knudsen, K. & J. Kocourková. 2018. Two new calciphytes from Western North America, *Acarospora brucei* and *Acarospora erratica* (Acarosporaceae). Opuscula Philolichenum 17: 342–350.

Knudsen, K., J.C. Lendemer, M. Schultz, J. Kocourková, J.W. Sheard, A. Pigniolo, & T. Wheeler. 2017. Lichen biodiversity and ecology in the San Bernardino and San Jacinto Mountains in southern California (U.S.A.). Opuscula Philolichenum 16: 15–138.

Magnusson, A.H. 1952. New crustaceous lichen species from North America. Acta Horti Gotoburgensis 19: 31–49.

Westberg, M., A.M. Millanes, K. Knudsen & M. Wedin. 2015. Phylogeny of the Acarosporaceae (Lecanoromycetes, Ascomycota, Fungi) and the evolution of carbonized ascomata. Fungal Diversity 70: 145–158.

# Letter to the editor: Point Reyes National Seashore Management

*Editor's note: The following letter was sent to Superintendent Craig Kenkel of Point Reyes National Seashore on Sept. 1, 2021 by eleven CALS members to express their concern about the impact of livestock grazing on the ecology and lichen flora in the park. We requested permission to reprint it here and the following text and map were supplied by Jason Hollinger.*

On behalf of the state-wide California Lichen Society (CALS) we would like to express our concern over the use of a California national park for private profit and its resulting degradation.

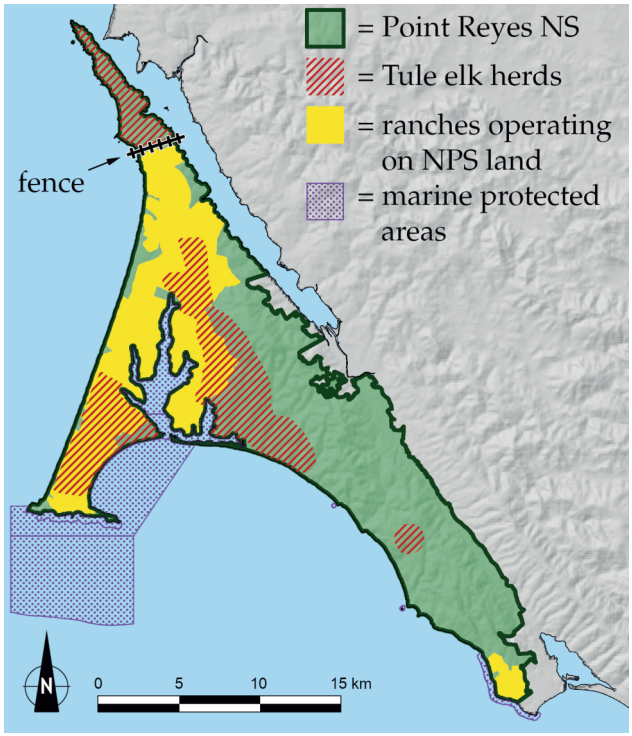
Livestock grazing in the park significantly degrades natural values which the National Park Service (NPS) is supposed to protect. This includes damage to streams, pollution of waterways, and harm to native fauna and flora.

A controversial new management plan by the NPS calls for renewal of ranchers' grazing privileges in the park for another 20 years, expansion of agricultural crop growing, and the killing of Tule elk, a rare, federally protected subspecies of elk found only in California, in order to limit competition with domestic livestock within Point Reyes. It would also permit installing a four-mile fence to separate elk from domestic cattle grazing on our public lands. It would allow ranchers to convert grasslands to commercial row crops. And it would expand the number of livestock permitted to graze within the park.

The National Park Service considers the fences part of the "cultural heritage" of the area they suggest needs to be protected. The NPS is protecting private use and the degradation of public assets to benefit a small but vocal group of ranchers and their urban supporters.

It is evident when you travel to the park where the NPS stands with regards to ranching. Interpretative signs describe ranching as "historical" (yet the park has done little to preserve the Miwok cultural heritage, including traditional indigenous land management practices, which are thousands of years older), and we are told how much milk and meat is produced to "feed the nation" and other facts designed to put agricultural use in a positive light. Where are the signs explaining how ranching and agriculture have destroyed native flora and fauna, caused the proliferation of noxious weeds and polluted watersheds?

The California Lichen Society is concerned about our lichen heritage and biodiversity. Lichens contribute directly to ecosystem health via nutrient and water cycling, soil stabilization and formation, and they support numerous other organisms as food source, habitat, shelter, camouflage, or nesting material. California is home to a diverse lichen flora, including numerous rare and endemic species. Old growth coastal scrub communities are especially important habitat for a number of threatened species, many of which occur nowhere else. These include schizidiate tube lichen (*Hypogymnia schizidiata*), a rosette lichen (*Physcia duplicorticata*), isidiate twisted beard lichen (*Sulcaria isidiifera*) and woven-spore lichen (*Texosporium sancti-jacobi*). Grazing and the replacement of rich native scrub with pastureland dominated by exotic grasses and forbs is a direct threat to these oldgrowth-dependent lichen species. Furthermore, excess nitrogen from livestock is harmful to many lichen species, particularly




Map of Point Reyes National Seashore. Elk and ranch data from NPS 2020 Appendix A.

ecologically important cyanobacterial lichens, and instead encourages a prolific and non-diverse, weedy, nitrogen-loving lichen community which can be readily seen as yellow and orange stains on barns and fences surrounding pastureland throughout the Central Valley. CALS is concerned both about the use of national public lands for private profit, and for the overall conservation values that are being harmed by livestock.

### California Coastal Commission

Recently the California Coastal Commission (CCC) issued a tentative approval to an NPS plan to expand livestock grazing in the park under the guise of preserving the "cultural heritage." The CCC 5-4 vote for its "conditional concurrence" did put some sidebars on its approval.

The NPS must come up with, in one year, a plan to reduce (but not eliminate) water pollution in the park. It specifically halts final approval of the NPS plans to extend grazing privileges until the CCC approves of the water quality proposal. And it only allows a five-year period to implement and improve water quality rather than the ten-year proposal made by the NPS. The NPS must also produce a climate action plan.

The Superintendent of Point Reyes objected to the amendments but finally agreed to produce the materials in the timeline required.

Several additional reasonable amendments failed, including one that would have prevented the Park Service from killing Tule elk. Another amendment would have prevented agricultural interests from diversifying their operations with other crops.

Point Reyes is one of the few places where native Tule elk are found in California. In 2020, approximately 300 elk were fenced in at Tomales Point, and another 300 or so free-ranging elk were concentrated at Drakes Beach area and Limantour-Muddy Hollow-Glenbrook area. By contrast there are more than 5700 cows in the park (remember, these are our public lands). Isn't there something wrong with this picture when domestic livestock outnumber native elk nearly 10 to 1 in a national park?

When you drive to Point Reyes, you pass dairy and cattle farms almost continuously. There is no shortage of cattle/cows in Marin County or Sonoma County, or California in general. California is home to more than 5 million cattle – the 4th highest in the entire country. In fact, ranching operations at Point Reyes account for only 10% of the agricultural base of Marin County. Why should we allow private individuals to graze domestic livestock, a commodity

abundant on private lands throughout the state and nation, in a national park unit?

Ironically, most of the support for continued livestock grazing in the park comes from Marin County residents who apparently believe that dairy production will collapse without the aid of the National Park Service.

## Point Reyes History

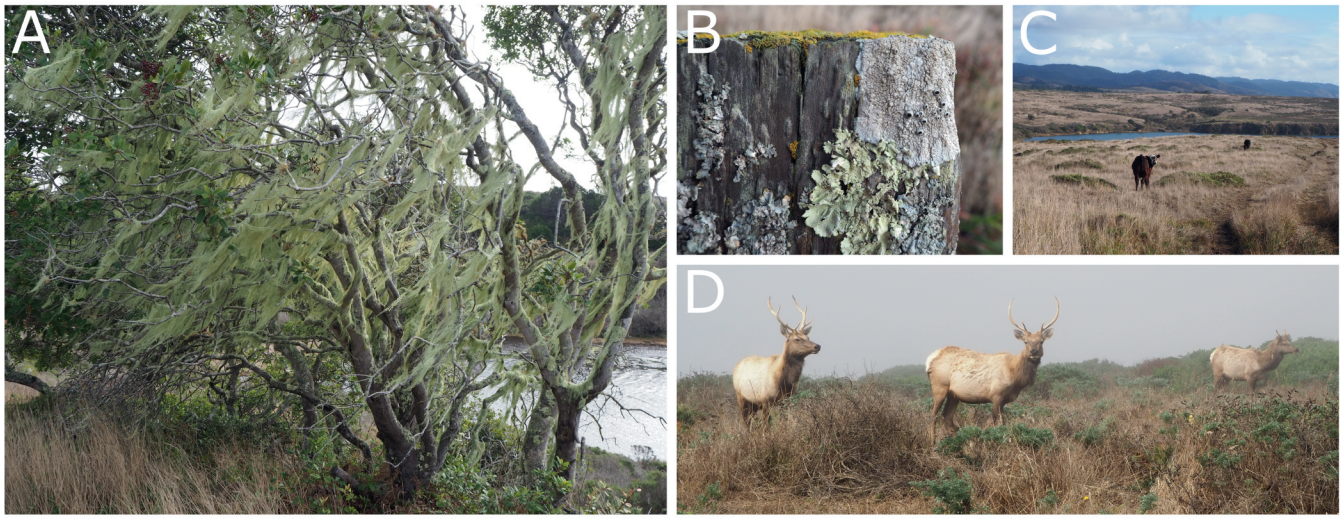
Controversy over livestock grazing in the park has existed since its inception. When the National Seashore was first conceived, the entire Point Reyes peninsula was private farmland.

Point Reyes National Seashore was created in 1962 after years of lobbying and effort by environmentalists, including Conrad Wirth, who became National Park Service director in 1951. Before he was appointed director, Wirth led a survey of the peninsula to assess its potential as a national park unit, and recommended it be protected as a national seashore.

The peninsula's outstanding biodiversity and scenic values were the prime motivation for protection efforts. Point Reyes is home to 460 species of birds, 876 plants, 167 lichens (Glacy et al. 2011), and many different marine and terrestrial mammals. This includes over a hundred rare, threatened and endangered species, an incredible diversity given Point Reyes' relatively small size.

This biological diversity prompted UNESCO's Man and the Biosphere program to designate Point Reyes as an international biosphere reserve. California also gives the marine environment special recognition through its designations of the Point Reyes State Marine Reserve & Point Reyes State Marine Conservation Area, Estero de Limantour State Marine Reserve, Drakes Estero State Marine Conservation Area, and Duxbury Reef State Marine Conservation Area.

Beginning in the 1960s, the federal government acquired the private lands that occupied the peninsula. As might be expected, the ranchers and Marin County Supervisors opposed the creation of the Seashore. Nevertheless, ranchers were paid a substantial amount of money for their properties, often millions of dollars per ranch acquisition.




The Point Reyes Estero trail skirts the east side of the Limnatour estuary. Hikers can find lichen communities on natural (A) and anthropogenic (B) substrates, and experience close encounters with cattle. The Tomales point trail on the north end of the peninsula features the native Tule elk. Photos by Jes Coyle.

In a generous concession, the ranchers and occupants of buildings on these lands were not required to leave the Seashore immediately. Indeed, they were given a reprieve of twenty-five years or upon the death of the primary owners (whichever came first) that allowed them to continue grazing and residing in the now public property. However, the intention was to sunset agricultural production at the end of that period.

But once given a reprieve, the entrenched ranchers successfully lobbied to extend their occupation and the twenty-five-year grace period was extended several times.

This plan is in direct violation of the law creating the Point Reyes National Seashore. The legislation requires that Point Reyes "shall be administered by the Secretary without impairment of its natural values, in a manner which provides for such recreational, educational, historic preservation, interpretation, and scientific research opportunities as are consistent with, based upon, and supportive of the maximum protection, restoration, and preservation of the natural environment within the area" (90 Stat. 2515, section 4a.)" Permitting continued livestock operations in the park unit is not consistent with the stated legislative goals.

The word "shall" is essential. "Shall" does not give the NPS discretion to favor the ranchers' interests over protecting the natural environment.

About one quarter of the 71,000-acre National Seashore is designated a "pastoral zone," where 15 ranch operations graze approximately 5700 cattle (more than 10 times the number of Tule elk) on 18,000 acres of parkland.

Also, many buildings, homes, and other structures used by the ranchers (which are owned by the public) are within the Seashore. We, the taxpayers, pay for the maintenance of fences and roads on these properties. The NPS (i.e., taxpayers) receives about $500,000 in revenues from the ranch leases—less than half what the Park Service spends to maintain them. These leases do not include the grazing of livestock, but the occupation of homes, use of barns, and other buildings. When you consider how much housing in Marin County costs, the 24 ranch operators are getting a substantial public subsidy.

This lease arrangement with ranchers came to a head when drought conditions from 2012 to 2014 caused the death of half of the elk population who were trapped behind a fence constructed to keep elk confined to a small, waterless 2000-acre parcel of the Seashore. The native Tule elk are sequestered on 2000 acres, while domestic livestock is given free rein on over 18,000 total acres. And this pattern continues to repeat itself. Last year a third of the herd died, and this summer volunteers are presently carrying in water by hand to save the elk.

Against this backdrop, in 2020 the NPS released its final plan, which would give ranchers another twenty years of grazing, allow them to expand livestock operations to include chickens, pigs, goats, and sheep. Also, for the first time, ranchers will be permitted to operate bed and breakfasts as well as farm stands—using public property. And finally, in another concession to private business interests, the NPS plans to shoot Tule elk annually to maintain a population that will not compete with livestock operations or antagonize ranchers.

The collateral damage from livestock operations includes pollution of the park's waterways. Indeed, one stream in the park has some of the highest coliform bacteria counts found along the entire California coast. For instance, a recent survey found *E. coli* bacteria concentrations up to 40 times higher than state health standards. Enterococci bacteria were up to 300 times the state health standard at Kehoe Lagoon.

A 2013 Coastal Watershed Assessment asserted that the principal threats to water quality at Point Reyes were bacterial and nutrient pollution from ranches and dairies. In particular, the Drakes Bay, Limantour, Kehoe, and Abbotts Lagoon areas were significantly polluted — remember, these are state-protected marine zones, all surrounded by ranches operating entirely on national park lands.

Ranch operations also help spread exotic plants (noxious weeds), and livestock consumes forage that would otherwise support native herbivores, including the Tule elk.

Another NPS study confirms that the livestock operations at Point Reyes are responsible for the vast preponderance of greenhouse gas emissions at the park.

The California Lichen society urges the reconsideration of this management decision.

Sincerely,

Dr. Roger Rosentreter, Boise State University
Dr. Bruce McCune, Oregon State University Alumni Association Distinguished Professor
Dr. Daphne Stone, Oregon State University
Dr. Rikke Naesborg, Curator of Lichens, Santa Barbara Botanic Garden
Dr. Jesse E. D. Miller, Stanford University
Dr. Justin Shaffer, University of California, San Diego
John Villella, Senior Lichenologist, Siskiyou BioSurvey LLC
Lise Peterson, Secretary, California Lichen Society
Jason Dart, member, California Lichen Society
Jason Hollinger, Independent Lichenologist
Nastassja Noell, Independent Lichenologist

## References

Glacy, L.A. S.D. Leavitt and L.L. St. Clair. 2011. A checklist of the lichens collected during the 2008 sixth International Association of Lichenology field trip at Point Reyes National Seashore and selected locations in Marin and Sonoma counties, California, USA. Evansia 28(1): 18-26.

NPS 2020. General management plan amendment final environmental impact statement, Appendices. USDA National Park Service, Point Reyes National Seashore. 646 p. Available from: https://parkplanning. nps.gov/

## Postscript

On Monday, September 13, the National Park Service issued their record of decision: Ranchers and dairy farmers will be allowed to continue operations and diversify into other types of agriculture on 18,000 acres of our public park land for another 20 years. And it authorizes the killing of Tule elk to "manage the population". But perhaps it's not all bad news: At least on paper there are stronger restrictions on grazing in sensitive riparian and estuarine habitats. And the NPS signed an agreement with the Federated Indians of Graton Rancheria which intends to incorporate Native American traditional ecological practices into the management of the Tule elk and ranchlands in the park.

*~ Jason Hollinger*

# CALS Grants Committee Report for the 2020 Grant Cycle

Dear CALS members,
In 2020, the CALS Grants Committee received three grant applications, for a total of $5040. All three applications were excellent, but since CALS budget is $1750 we had some tough decisions to make. The projects spanned from an inventory of macrolichens to exploring lichen diversity in fire refugia to an ecological assessment of a rare lichen.

Since all three projects were well researched and would contribute important information about the biodiversity and ecology of California lichens, the Grants Committee evaluators decided to prioritize the student applicants, and two of the projects were recommended for funding. The Board agreed to these recommendations and a short summary of the two awarded projects appear below.

It is very satisfactory to observe the growing interest in lichens in the younger generation and I sincerely hope we can continue to spark interest and support research into different aspects of lichenology.

*Rikke Reese Næsborg, Grants Committee Chair*

Eli measures the height above ground of a *Sulcaria isidiifera* specimen. Photo by Nishanta Rajakaruna.

## An Ecological Study of an Endangered Lichen from Central California, *Sulcaria isidiifera*, the Splitting Yarn Lichen

Principal investigator: Elijah Balderas
*Graduate Student, Biological Sciences Department, California Polytechnic State University, San Luis Obispo, CA 93407*
Funding provided: $690.00

**Summary:** Splitting yarn lichen (*Sulcaria isidiifera*) is an epiphytic, fruticose lichen that is endemic to San Luis Obispo County. *Sulcaria isidiifera* is characterized by its longitudinally split branches that reveal dark brown-tipped isidia. The branches are non-hollow, and the thallus is a yellowish-white to brownish-red or dull orange color. This lichen occurs in maritime chaparral communities on trees and shrubs. *Sulcaria isidiifera* is listed on the International Union for Conservation of Nature and Natural Resources (IUCN) Red List as Critically Endangered. This designation was justified based on the very narrow geographic range and continued decline in population size. Current threats include destruction and fragmentation of the undisturbed maritime chaparral where the species occurs due to development pressures as well as changes to the fire regime and non-native invasive species.

I will provide a comprehensive ecological assessment of the species that will enable future research and legal designations, and development of conservation strategies to guarantee its protection. To this end, I will design and implement field research methods to collect the following data on *S. isidiifera*: 1) Assess abundance and distribution by searching potentially suitable habitat in the region and carefully conduct population surveys; 2)

characterize preferred substrate, vegetation communities, and microclimate factors by applying accepted vegetation community definitions and gathering abiotic microclimate data such as temperature, humidity, light intensity, slope and aspect; and 3) conduct a translocation trial to determine viability of restoration potential in suitable habitats lacking the species.

### Macrolichen Inventory of Horse Mountain Botanical Area, Six Rivers National Forest

Principal investigator: Sarah Norvell
*Graduate Student, Biology Department, Humboldt State University, Arcata, CA 95521*
Funding provided: $1000.00

**Summary:** The Horse Mountain Botanical Area on the Six Rivers National Forest of Humboldt County is one of complex geology and thus several unique coniferous occurrences including the southern extent of the range of *Chamaecyparis lawsoniana* and an unusual stand of *Pinus jeffreyi* that survives due to its occurrence on serpentine. The North Coast of California has been found to have the highest diversity of epiphytic macrolichens in the region, but the Horse Mountain Botanical Area has not been inventoried for lichens before and it will fill an immense floristic information gap in the lichen flora of Humboldt County, as well as provide curated voucher specimens that will serve to enrich future studies of macrolichen communities and forest management practices alike.

My goal is to complete a stand-level macrolichen inventory of the Horse Mountain Botanical Area in the Six Rivers National Forest of Humboldt County. In order to conduct this study, I will divide the area into several stand-types (late seral Douglas-fir forest, Jefferey pine stands, mixed evergreen forest, etc.) and randomly select three disjunct 0.4-hectare plots per stand-type to inventory. The survey protocol includes whole-plot ocular assessments across multiple strata supplemented by microplots along belt transects. Each plot will be visited a minimum of four times, and species accumulation curves will be used to determine when each plot has been thoroughly inventoried. For each specimen collected, data will be recorded on substratum, canopy cover, and occurrence rate. Additional ecological data including stand age and disturbance history, land aspect, and tree species richness will be recorded for each plot and added to voucher specimen records.

Sarah taking notes during field surveys at Horse Mountain Botanical Area. Tom Carlberg in the background is helping with the survey. Photo by Caitlyn Allchin.

# California Lichen Society Grants Program

The California Lichen Society offers small grants to support research pertaining to the lichens of California. No geographical constraints are placed on grantees or their associated institutions, but grantees must be members in good standing of the California Lichen Society. The Grants Committee administers the grants program, with grants awarded to an individual only once during the duration of a project. Grant proposals should be brief and concise.

**Grant 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 Bulletin of the California Lichen Society, based on the results of your work.
- Budget. Summarize intended use of funds. If you received or expect to receive other grants or 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 capital equipment or high-end items such as computers, software, machinery, or for clothing.
- Academic status (if any). 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.
- Two letters of support from sponsors, academic supervisors, major professors, professional associates or colleagues should be part of your application. These should be submitted directly from the author to the committee Chair.
- Your signature, as the person performing the project and the one responsible for dispersing the funds. All of the information related to your application may be submitted electronically.

**Review:** Members of the Grants Committee conduct anonymous evaluation of grant proposals once a year based on completeness, technical quality, consistency with CALS goals, intended use of funds, and likelihood of completion. Grant proposals received by November 1 each year will be considered for that year's grant cycle. The Grants Committee brings its recommendations for funding to the Board of Directors of the California Lichen Society, which has final say regarding approval or denial.

**Grant Amounts:** CALS typically offers two grants of $750.00 and $1000.00 each year. Typically grants are awarded to two separate individuals, however depending on the quality of the applications and the amount of funding available, the committee maintains the option to disburse funds as appropriate. All grants are partially dependent on member contributions, therefore the amounts of these awards 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 an article to the Bulletin of the California Lichen Society. 3) Submit any relevant rare lichen data to California Natural Diversity Data Base using NDDB's field survey forms. See http://californialichens.org/conservation for additional information.

**How to submit an application:** Please email submissions or questions to the committee Chair at grants@californialichens.org **by November 1, 2022**. The current Chair is Rikke Reese Næsborg.

# News and Notes

### Early-Breaking News – Northwest Scientific Association Annual Meeting

Dates: March 15th-18th, 2022
Location: Arcata, CA

As has happened so frequently in the past ~1.5 years, the Northwest Scientific Association's annual meeting (which has always included a strong lichen component) was cancelled in 2021, to the disappointment of all who have looked forward to the presentations, field trips, dinners, workshops and general camaraderie this event has engendered. After all, how often do lichenological conferences focused on the northwestern U.S. come around?

However, plans are being laid for their meeting in 2022, to be held in Arcata, CA on March 15th-18th. The last time NWSA came to California was twenty years ago – I remember excellent student and other presentations, a field trip to Lanphere Dunes and another to an oak woodland on Bald Mountain, and a really great time hanging out with lichen folks.

This is still very early news, so there are not many details on the NWSA website, and there is always a level of uncertainty these days, but you might want to pencil it in and start making some free time for next spring!

*Tom Carlberg*

### CALS Annual Meeting Returns

Dates: March 19th, 2022
Location: Arcata, CA

After a two year hiatus, the California Lichen Society plans to hold their annual meeting on Saturday, March 19th, 2022 in Arcata, CA. Savvy readers will notice that this is the day after the planned Northwest Scientific Association's meeting - and that is by design! The NWSA meeting often has a strong lichen presence, usually including a session on lichenology and bryology. Check prior meeting topics at: www.northwestscience.org/past-meetings. CALS meeting attendees are encouraged to consider coming early to participate in both meetings. Stay tuned for more details about the CALS annual meeting on the CALS website and email listserv.

*Jes Coyle*

### New Email Listserv and Outreach

The California lichens listserv has been defunct since yahoo groups shut down, but it is now back as a google group! The listserv is a place to discuss lichens and lichenicolous fungi in California and neighboring regions. Anyone can join--you don't need to be a CALS member.

To join the listserv, send an email to: california-lichens+subscribe@googlegroups.com and then follow instructions in the email you receive.

Find updates, events and interesting lichen-related news on the CALS facebook page: www.facebook.com/californialichens. If you'd like to add a post, send an email to outreach@californialichens.org.

*Jesse Miller*

### Lichen CitiSci Community Science Experience

Do you like hiking in California wilderness areas managed by the US Forest Service? Are you curious about lichens and interested to learn more about air quality? Combine these passions by collecting lichens for the USFS to help us learn more about air quality in wilderness areas! Join Lichens CitiSci and get trained on how to identify and collect lichens for air quality



Left and Right: *Letharia vulpina*, also known as wolf lichen, being collected for air quality monitoring. Center: Beautiful mountain landscape visited while participating in this community science experience.

monitoring while also exploring beautiful wilderness. Volunteers will learn all of the details while moving through our online digital training toolkit at their own pace and connecting with other volunteers.

Most of the mountains in California have an abundance of wolf lichen (*Letharia vulpina*). By sustainably collecting small quantities of the wolf lichen we can measure the concentrations of pollutants present in its tissue to learn about pollutants that are present in the air.

Picture this: while on your hike in the wilderness you stop for lunch and see some trees just dripping with wolf lichen. Then you take an extra 30 minutes to collect, record the location, put things away in your backpack and you're done! Interested in getting involved? Get in touch for more information!

https://lichenscitisci.org/
lichencitisci@gmail.com
@lichencitisci

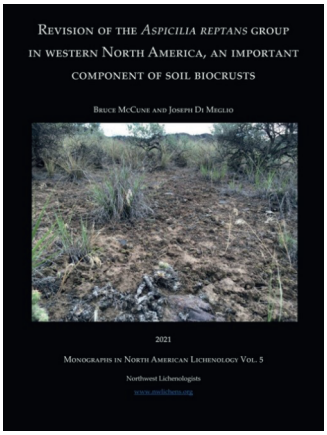
*Lichens CitiSci Team*
*Adrienne Kovasi + Hanna Mesraty*

## California Lichen Society Grants Program

Would you like to investigate some aspect of lichen ecology, perform an inventory of lichens, study the finer details of lichen anatomy, or dive into the molecular biology of lichens? Perhaps you have been thinking of something that is completely new and exciting, but you don't have enough funds to afford the transportation to your study site. Maybe you can't afford to rent the right equipment or purchase the inexpensive supplies you need. Do you need to pay for laboratory services or salaries? THE CALIFORNIA LICHEN SOCIETY GRANTS PROGRAM MAY BE ABLE TO HELP YOU! Each year, we offer grants between $500 and $2500. If this sounds interesting, please check out the Grants Flyer in this issue and if you have any questions concerning the grants, please contact Rikke Reese Næsborg (grants@californialichens.org).

*Rikke Reese Næsborg*

## New monograph from Northwest Lichenologists




Beginning in 2007, Northwest Lichenologists has published a series of monographs related to lichenology in the Pacific Northwest. Most of these are available at a very reasonable cost, and the most recent publications in this series can be obtained as free Adobe .pdf downloads from their website. The first publication was Biotic Soil Crust Lichens of the Columbia Basin (McCune & Rosentreter), followed by Montana Lichens: an Annotated List (McCune et al.2014); The Lichens of the Coastal Douglas-Fir Dry Subzone of British Columbia (an updated reprint of Willa Noble's essential 1982 dissertation); and Corticolous Crustose Lichens on Forest Inventory Plots in Northern Idaho (Haldeman 2020). Volume 5 has just been released and is available as a .pdf at no charge (https://northwest-lichenologists.wildapricot.org/resources/Documents/McCuneDiMeglio2021MonogrNAmLich5-AspiciliaReptansGr.pdf. If you prefer having a paper book in your hands or on your lab table, please email to nwlichenologists@gmail.com and indicate your interest; they may issue a limited print run. Happy lichenizing!

*Tom Carlberg*

McCune, B. & J. Di Meglio. 2021. Revision of the Aspicilia reptans group in western North America, an important component of soil biocrusts. Monographs in North American Lichenology 5: 1-92. ISBN: 978-0-9790737-5-5

> *Aspicilia* in the broad sense is one of the most common and speciose genera of saxicolous lichens in the world. It is also a common genus in the biological soil crusts of arid and semi-arid parts of North America, as well as on other continents. Analysis of DNA sequences and morphology from *Aspicilia* in soil crusts revealed previously unrecognized species that are ecologically, geographically, morphologically, and genetically distinct. Six previously unrecognized species are described. The new species are mostly infertile, primarily terricolous, and are separable in most cases by a key to subtle differences in morphology, anatomy, and secondary chemistry.

## What's in a name?

My first child was born in June and as a result I've been thinking a lot about names, especially during the months leading up to her birth. Should I commemorate a favorite relative? Or perhaps I could go the more descriptive route and name her after her birth month. With a little help from a fellow lichen-loving friend, I eventually decided to go an even nerdier option and settled on the name Everna.

"Is that a family name?" people often ask. "No," I reply, "but it is a genus name." Or, almost a genus name. My daughter is named after *Evernia prunastri*, oakmoss lichen, which is a beautiful and abundant species here in northern California. It is also the star of my current research program. But, after I named my daughter I began to wonder, how did *Evernia* get its name?

To find out, I began by reading the clues in the full name of the species, including the authority (which is the person who named the taxon):

*Evernia prunastri* (L.) Ach.

"(L.)" tells me that the species was first described by Linneaus, who originally placed all lichens into the plant genus Lichen. "Ach." indicates that the current genus name was given by the "father of lichenology", Eric Acharius. But in which of his publications could I find the original description of the species? Next I searched Index Fungorum (www.indexfungorum.org) and discovered that this species was described in *Lichenographia universalis*, published in 1810. In this book, Acharius describes 41 different genera of lichens, one of which is *Evernia*. Several digitized versions of this historically important book are available online as pdfs through Google Books, which allowed me to quickly find the original description of the genus and the etymology of the name (p. 85). The antique script was a bit difficult to decipher, but I believe it said:

> Nomen Generis ab ευεργης, ramosus s. pulchrum habens stipitem ob thallum ramosum et coloratum apud singulas species.

My single year of high school latin wasn't up to the task of reading this description, so I turned to Google translate:

> The name of the genus is from ευεργης [Greek word likely meaning "beneficial"], a branched stem having a beautiful branched and colored thallus in each species.

That seemed fairly accurate. *Evernia prunastri* has been a staple of the perfume industry since at least the 1600s and may have been the major component of "splanchon", an arboreal fruticose lichen that was important in ancient Greek medicine (Crawford 2015). In modern times, we know that *E. prunastri* contains at least 70 different secondary metabolites (Joulain and Tabacchi 2009), some of which have antimicrobial properties.

Everna's eponym is serendipitously fitting- she may not be branched, but she's certainly beautiful and beneficial (or at least becoming more so). After discovering the origins of one genus, I'm curious to explore other lichen names and hear from other CALS Bulletin readers who have done the same.

Crawford S.D. 2015. Lichens Used in Traditional Medicine. In: Ranković B. (eds) Lichen Secondary Metabolites. Springer, Cham. doi: 10.1007/978-3-319-13374-4_2

Joulain, D. and R. Tabacchi. 2009. Lichen extracts as raw materials in perfumery. Part 1: oakmoss. Flavour and Fragrance Journal 24: 49-61. doi: 10.1002/ffj.1916

*Jes Coyle*

Everna (right) and her namesake *Evernia prunastri* (left) both enjoy a northern California outdoor lifestyle.

# President's Message

Dear CALS members -

Welcome to your long-overdue copy of the summer 2021 Bulletin! Sorry for the extensive delay, which is my fault entirely; I was procrastinating, then feeling guilty, then waiting for the resolution of a Board item that has only been resolved in the past few days. By my choice, the Board has agreed to replace me with a new president, acting outside of our normal election process. This is an action that is provided for in our bylaws. It is by my choice because over the past year I have felt that you would be served better by someone with more energy and enthusiasm than I have felt in a while. The past 1.5 years have taken a lot out of me and I am happy to hand my duties over to Jesse Miller, who has agreed to take on this awesome responsibility. I will continue on the Board as a member-at-large, and hope to maintain a low profile. Those of you who have met Jesse already know about the high-energy enthusiasm and sharp talent he brings to his endeavors.

He has worked with lichens since 2007 as a field botanist and lichenologist in Oregon and California. He completed a PhD in plant ecology at the University of Wisconsin-Madison, where he studied grassland plant and lichen communities in the Ozarks. He now teaches ecology at Stanford and studies the effects of larger, hotter wildfires on plant and lichen diversity in the Sierras, and he also documents California lichen diversity. If you want more, go to jesseedmiller.com

There are a few other changes; our vice-president Hanna Mesraty has also chosen to relinquish her office after 8+ years of service to you and the Society, filling not only the vice-presidency, but also serving as a member-at-large, and chairing our Outreach Committee. Her most notable and popular achievement (to date; I'm sure there are others to come) has been the establishment and funding of the Air Quality Bio-Monitoring Using Lichens on the Tahoe National Forest program (https://lichenscitisci.org). Julene Johnson has been dragged kicking and screaming from her member-at-large position to fill in behind Hanna. Farewell, Hanna, and many thanks, Julene!

Jesse Miller leads the pack at an annual CALS meeting. Photo by Julene Johnson.

Julene Johnson finding fog lichens high on the rocky hilltops of San Francisco. Photo by Liam O-Brien.

Another change that received only a brief mention in my last message is that during the annual meeting at the Hastings Natural History Reservation in January 2020, the Board appointed a very capable individual as a third member-at-large. Jennifer Rycenga is a powerful California naturalist and iNaturalista, as anyone who observes fungi, birds, lichens, plants, and bugs knows full well, and her 59,000+ observation bear this out. She also manages to function as president of the Sequoia Audubon Society, manages four iNaturalist projects, arranges County-wide bioblitzes, and oh yeah has a day job as a Humanities professor at San Jose State University.

What else now... Northwest Scientific Association will be holding *their* annual meeting in Arcata, CA in March of 2021. Who cares? Well, maybe you... The NWSA meeting usually has concurrent lichen presentations and field trips for the four days of the event. Think "four whole days of lichens"! News and Notes in this issue has the details, but the important part is that CALS annual meeting will take place on the Saturday, March 19. We have scaled back a bit this year, and our meeting will be only one day instead of the usual three, but we promise a fabulous lichen adventure.

Happy trails!

Tom

With a friend at Ma-le'l Dunes Cooperative Management Area. Not a lichen in sight! Photo by Julene Johnson.


Thank you Tom for your four years of service to CALS as president!

Photo by Julene Johnson

# 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

---

# Summer time is field work time!

Post-fire lichen surveys at the Quail Ridge Reserve with John Villella. Photo by Jesse Miller.

Lichen spore trap installation crew at Quail Ridge Reserve. Photo by Jes Coyle.

UC, Santa Barbara, Biocrust class on a field trip. Led by Roger Rosentreter.

Ann DeBolt, Bruce McCune, and Roger Rosentreter getting up close to the soil lichen. What the heck is it?

Lichenizing in old growth red fir forest in the upper reaches of the South Fork of the Sacramento River watershed in the Klamaths with Dominic DiPaolo. Photo by Jesse Miller.

East Bay lichen surveys with Jesse Miller and Stanford students Isabella and Eric. Selfie by Jesse Miller.