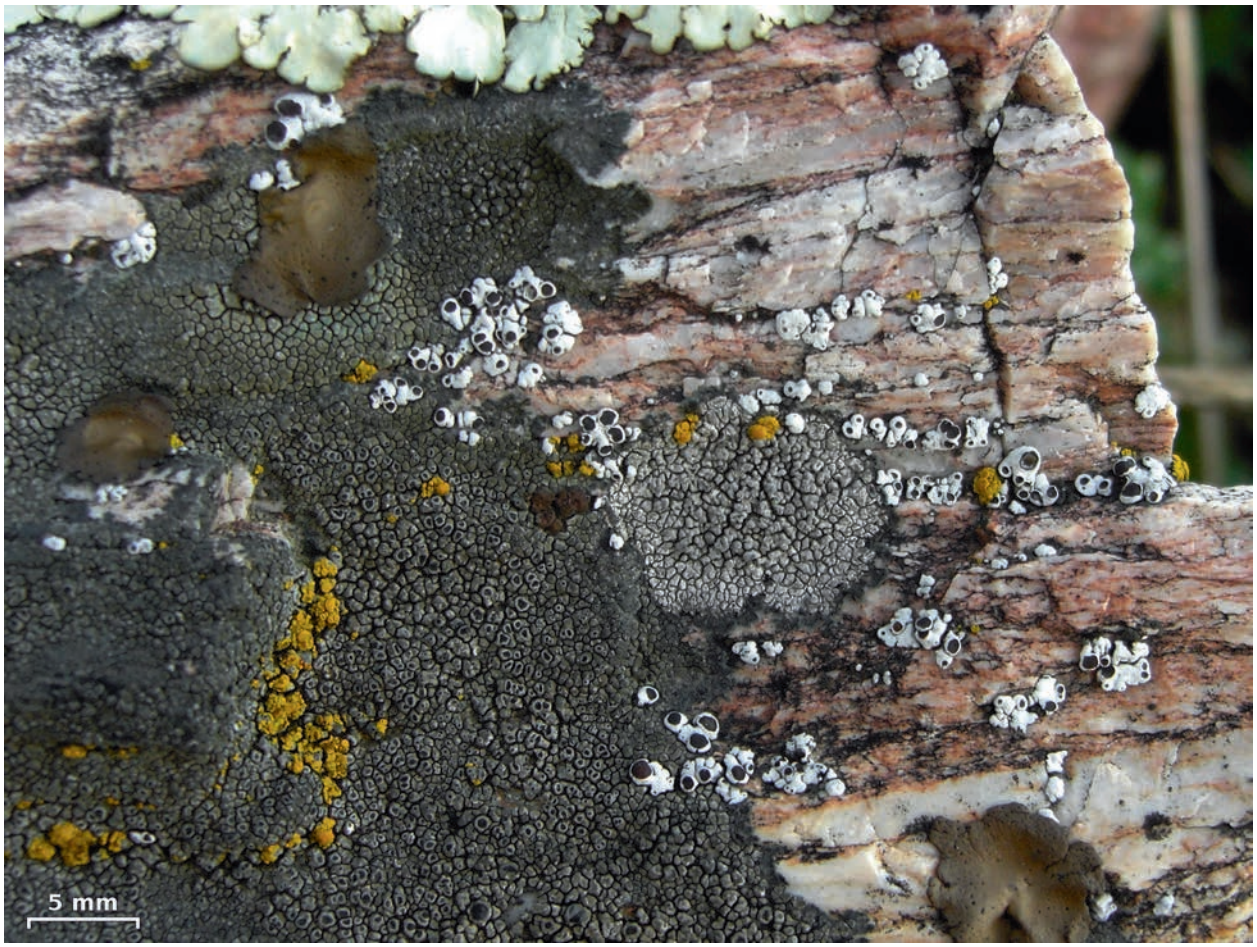
Bulletin

of the

California Lichen Society



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Contents

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Cover image: *Rhizoplaca glaucophana* on one of the rock outcrops at Blue Oak Ranch Reserve. Photo by Jason Hollinger.

Albert W. Herre's twentieth-century contributions to the study of lichens of the Santa Cruz Peninsula, California

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Introduction

Albert William Christian Theodore Herre (1868-1962) is regarded as an influential California lichenologist (Figure 1). He conducted the first comprehensive study of California lichens in the early twentieth century (Hale and Cole 1988; Tucker 2014). As discussed below, Herre identified 72 new lichens, and five lichens are named after him. Herre was a prolific writer, publishing over 200 manuscripts, books, and articles on lichens, fish, botany, and travel; he also wrote poetry and essays (Albert W. Herre Papers archive). Of these, approximately 70 publications are about lichens, and at least 20 focus on California lichens. Herre wrote a series of six publications about lichens from the Santa Cruz Peninsula (SCP), a roughly triangular region spanning five counties in California: San Francisco, San Mateo, Santa Cruz, Monterey, and Contra Costa counties. This region had special significance to him as it was the focus of his doctoral studies, and it ultimately gained him notoriety as a lichenologist early in his career. The purpose of this paper is to summarize Herre's contributions to the study of lichens of the SCP of California.

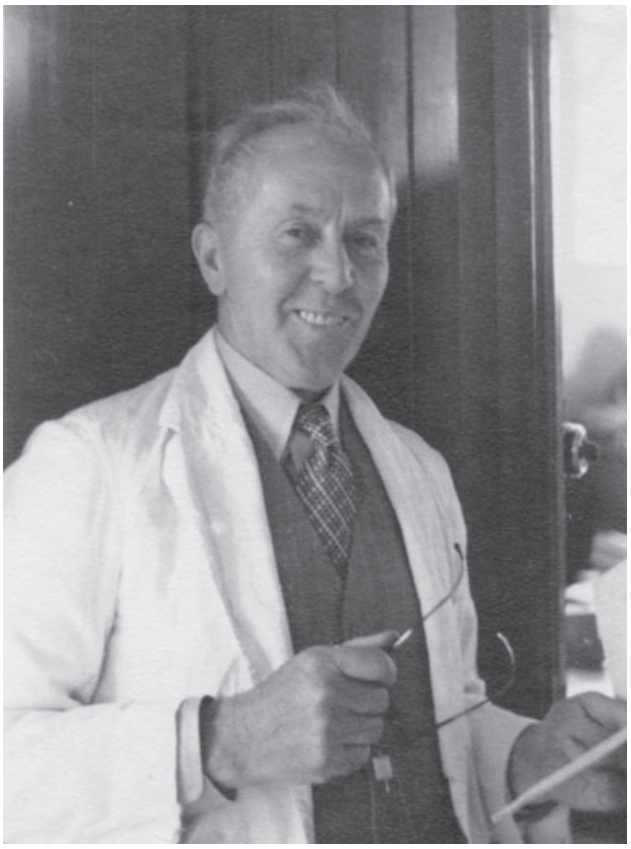

Figure 1: Photograph of Albert W.C.T. Herre, unknown date (reproduced with permission from the Albert W. Herre Papers, Special Collections, Western Libraries Heritage Resources, Western Washington University, Bellingham, WA 98225-9103).

Biographical Sketch

A comprehensive account of Herre's life is summarized elsewhere (Wiggins 1962). In addition, Herre penned an autobiography that was published posthumously in two sources: one in 1964 as "Circular Number 10" of the Division of Systematic Biology at Stanford University (Herre 1964) and another in a publication by the American Society of Ichthyologists and Herpetologists (Herre 1997). In December 1900 at the age of 32, Herre enrolled as a student at Leland Stanford Junior University (later renamed Stanford University), majoring in botany with a minor in zoology (Wiggins 1962). After just three years, he received a Bachelor's degree in botany and then continued his studies at Stanford as a graduate student where he was reported to have "plunged into graduate work, with an emphasis on lichenology" (Wiggens, 1962, p. 270). His first manuscript on lichens, published in 1904, focused on growth patterns of *Ramalina menziesii* (Herre 1904), which was named as the California state lichen in 2016.

Herre studied fish biology as passionately as he did lichens, and he is better known for his work in ichthyology than lichenology outside of these specialized fields (Brodo, 2000). In graduate school, Herre first studied with ichthyologist Charles Henry Gilbert (1859-1928) and was an assistant to David Starr Jordon (1851-1931), another ichthyologist and the founding president of Stanford University. However, after a disagreement with Gilbert, Herre studied with William Russell Dudley (1849-1911), a well-known botanist who was, at the time, Head of Systematic Botany at Stanford University (Herre 1964; Wiggins 1962). Although he is most known for his work on vascular plants, Dudley had experience in cryptogamic botany (Dudley 1898), which likely helped support Herre's study of lichens. There is a curious lack of published information about how Herre became interested in lichens and what drove his life-long passion for lichens. Although all of his writings about lichens have not yet been reviewed, there is no mention of what drew Herre to the study of lichens in his biography (Wiggins, 1962), autobiography (Herre 1964), or the six publications about the lichens of SCP reviewed in this manuscript.

Herre and the Santa Cruz Peninsula

Herre had an early and long-lasting interest in the lichens of the SCP. Apart from the obvious fact that Stanford University was conveniently located near the SCP, the region seemed to hold scientific significance to him on several levels. He spent time exploring this region, writing about how he visited every part of the SCP many times either on foot or with the aid of a bicycle, which had an old suitcase strapped to

Figure 2: The Santa Cruz Peninsula as defined by Albert W.C.T. Herre (1906; 1907), including locations significant in his papers.

its rack (Wiggins 1962). Herre also wrote about exploring most of the roads, trails, and creeks in the SCP from San Francisco south to Monterey, CA (Herre 1910; 1964; Wiggins 1962), which was an accomplishment given that his primary means of transportation was a bicycle.

As illustrated in Figure 2, Herre defined the SCP as a rough triangle of land delineated by natural boundaries, beginning in the south at the Pajaro River on the Monterey County line, extending north to the Golden Gate, and bounded on the west by the Pacific Ocean, with San Francisco Bay and the Santa Clara – San Benito Valleys as its eastern boundary. A majority of the perimeter lies at sea level, while the interior of the peninsula reaches an elevation of 3,793 feet at the peak of Loma Prieta. Herre proposed five biologic areas within the SCP: 1) maritime, which includes not only the narrow strip of land along the coast but also the entire northern tip of the peninsula, as far south as San Bruno Mountain; 2) a foothill region between the maritime region and the mountains proper, which on the Pacific side is either very narrow or non-existent, but on the eastern side of the peninsula extends as far south as Monterey Bay; 3) a belt of chaparral, defined by a combination of climatic and physiographic features, and including a xerophytic flora; 4) mountain forest, where redwood and Douglas-fir dominate the canopy in a mixed forest with oaks and madrone; and 5) mountain peak areas characterized by masses of exposed rock at the heads of heavily forested canyons, as well as the bare and rocky mountain peaks extending above the forests and chaparral (Herre 1906; 1907). In addition, he referenced the unique climate (i.e., rainfall, temperature, fog, sun) that also contributed to its distinctiveness as a biologic region. Herre also proposed that the combination of unique geography and climate influenced the species of lichens that grew in the SCP. He listed locations he thought were the "richest in numbers and rarity of species", including: 1) the mouth of Devil's Canyon that has the "largest mass of bare rock in the peninsula", 2) the cliffs of the Golden Gate, 3) the shoreline from Pedro Point to Pigeon Point, and 4) the sandstone ridges of Castle Rock (Herre 1910). He also noted that the western side bordering the Pacific Ocean was where some lichens reached "development unsurpassed elsewhere" (Herre 1910, p. 326). In 1906, Herre initially predicted that 200 species of lichens would be found in the SCP, but this prediction grew to over 400 in his later publications (Herre 1912).

Herre was not the first to explore lichens in the SCP. The British lichenologist, Archibald Menzies (1754-1842) for whom the California state lichen Ramalina menziesii is named, visited the San Francisco Bay Area, Monterey, and Santa Clara around 1792-1793 (Herre 1910; Menzies and Eastwood 1924). The lichens Menzies collected from these areas are archived in the British Museum (Hale and Cole 1988). The famous American botanist Henry N. Bolander (1831-1897) visited and lived in San Francisco from 1863-1875. The lichens he collected from the SCP were sent to Edward Tuckerman (Coppins and James 1984; Hale and Cole 1988). Approximately four decades after Bolander collected lichens from the SCP, Herre began his study of the lichens from this region.

Herre's Publications about the Lichens of Santa Cruz Peninsula

The following paragraphs describe Herre's six publications about the lichens of the SCP. The 1906, 1907, and 1910 publications were the primary publications that documented his work on lichens in the SCP. In addition, the 1910 publication fulfilled the requirements needed to

earn a doctorate from Stanford University. The 1912, 1942, and 1944 publications served as updates. In all there have been approximately 77 taxa associated with Herre or his work; of these, five were named for him and another 23 remain valid taxa (Appendix).

Herre (1906). Herre's first publication about lichens of the SCP (Herre 1906) was published just three years after he began studying lichens and while he was a graduate student at Stanford. In this 72-page manuscript titled "The Foliaceous and Fruticose Lichens of the Santa Cruz Peninsula, California", Herre summarized prior collectors in the region (e.g., Menzies and Bolander), first introduced the SCP as a unique biologic area (in general), and provided keys to 108 taxa in 22 genera of foliose (foliaceous) and fruticose lichens of the SCP. Herre noted that he wrote the keys from lichens he collected in the SCP, which focused on characteristics that were most obvious in the field; however, he also included details about chemical tests and spore measurements. Herre commented that this publication focused primarily on the foliose and fruticose lichens of the SCP, leaving the crustose lichens for a more comprehensive paper in the future (being his 1910 publication). He also hoped that the lichens would "attract the attention of the general botanist or amateur" and that it was possible to "make the study of lichens as easy as that of the Liverworts, Grasses, Compositae, or other more difficult groups" (Herre, 1906, pp. 325-326).

Herre (1907). Shortly after the 1906 publication, Herre published a short, 7-page report in the Botanical Gazette titled, "Lichen Distribution in the Santa Cruz Peninsula, California" (Herre 1907). This report emphasized the relationship between the temperate climate in California and lichen diversity in the SCP. For example, he pointed out that the SCP had a relatively limited range of average temperatures (ranging from 52.0 – 60.8 degrees Fahrenheit). He also noted that multiple biologic regions within the SCP supported both boreal and alpine lichens (e.g., *Rhizocarpon*), in addition to those characteristic of warmer climates (e.g., *Dendrographa*). In this report, Herre listed two lichens he thought were endemic to the SCP: *Dirina franciscana* Zahlbr. ex Herre (= *Dendrographa franciscana* (Zahlbr. ex Herre) Ertz & Tehler) found at Point Lobos CA and named by Alexander Zahlbruckner, and *Lecanactis zahlbruckneri* Herre (= *Lecanactis californica* Tuck.) also found at Point Lobos and named after Zahlbruckner by Herre. At this time, Herre noted that he had 200 identified species and subspecies in his herbarium, but over 100 lichens had not yet been identified.

In the spring of 1907, Herre took an extended study trip and traveled to several locations including Austria to study lichens with Alexander Zahlbruckner (1860-1938) and Victor Felix Schiffner (1862-1944), in addition to other topics (Herre 1964; Herre 1997). Herre spent two weeks in Vienna with Zahlbruckner and an additional six weeks of intensive fieldwork in the Steiermark Alps, including nightly sessions (Herre 1964). Wiggins (1962) noted that this trip "was a highlight in his life which he never tired recalling" (p. 271). Interestingly, this was the first reference to lichens in Herre's autobiography.

Herre (1910). Herre's 1910 manuscript is perhaps his most well-known publication about lichens (Herre 1910). It is a formidable 243-page manuscript written after 8 years of field and laboratory work as a graduate student (Herre 1942) and published in the Journal of the Washington Academy of Sciences; it fulfilled

the requirements necessary for a doctorate in botany from Stanford, which he completed in June, 1908. This publication received a generally positive review at the time (Ridley 1911) and is cited in contemporary literature (Ahmadjian and Hale 1973; Dibben 1980; Hale and Cole 1988; Knudsen 2004; Nash et al. 2001; Spjut 1996). It includes keys and descriptions of 307 taxa of lichens found in the SCP, including approximately 42 genera of crustose, 19 foliose, and 17 fruticose lichens. Herre again noted the importance of chemical tests and microscopic examination of spores for identification of lichens, which were included in the keys.

Herre (1912). Herre's fourth paper about lichens of the SCP was published in the Journal of the Washington Academy of Sciences several years after graduating with his doctorate and beginning his professional career (Herre 1912). From 1908-1915, he worked at several high schools and was appointed Head of Biology Department at the University of Nevada and then Head of the Science Department at Bellingham Normal School (now called Western Washington University (Wiggins 1962), which is home to the Albert W. Herre Papers archive. The 1912 paper was a supplement to his seminal 1910 publication, adding 17 new lichen taxa to the SCP lichen list. At this time, he estimated that 400 taxa of lichens might be found in the SCP. In this supplement, he marked the supposed end of his studies about SCP lichens and a broadening of his interests to lichens outside of California. In this publication, Herre wrote:

> This paper concludes my studies of the lichens of the Santa Cruz Peninsula as a separate unit. A work on the lichen flora of the Pacific Coast states is in preparation and the receipt of material from any state west of the Rocky Mountain divide would be greatly appreciated. The chief factor to be reckoned with is that of geographical distribution, and it is therefore important to have as many divergent stations represented as possible. Specimens lent to me for examination would be promptly returned, while exchange would be gladly made and unidentified material named (Herre 1912, p. 381).

Although his focus on lichens broadened, Herre published two additional updates about lichens of the SCP 30 years later in 1942 and 1944, suggesting that his interest in the SCP did not subside. His work in the interim took him to exotic locations. From 1920-1928, he worked as Chief of the Department of Fisheries of the Philippine Bureau of Science. In 1928 at the age of 60, Herre took a curatorial position at Stanford University's Natural History Museum, a position he held for 18 years until 1946 (Wiggins 1962). However, one month after starting his new position at Stanford, Herre joined the Crane Pacific Expedition for one year. Between 1932 and 1942, he traveled extensively around the world and took trips to China, Malay, Haiti, Fiji, Panama, New Guinea, and other locations, again, mostly to study fish (Herre 1964; Herre 1997).

Herre (1942 & 1944). Nearly four decades after he wrote his first publication about lichens of the SCP, Herre updated the SCP lichen list in an article published in The American Midland Naturalist (Herre 1942). He wrote that, although he had spent the last several decades in "far distant regions", he was able to "collect and study lichens only at brief and infrequent intervals" (Herre 1942, p. 752). This additional work suggested to him that the understanding of the lichens of the SCP was not complete. In this publication, he added 36 new lichens to the list

for a total of 373 taxa. The new additions to the list included one he discovered (*Sclerophyton occidentalum*) and a lichen (*Arthopyrenia litoralis*) that grows on shells of limpets, other mollusks, and barnacles. Herre wrote the 1944 short report in The Bryologist during the time he worked at the Natural History Museum of Stanford (Herre 1944). He again estimated that 400 or more species of lichens would be found in the SCP. This 1944 publication was Herre's last publication specifically devoted to the lichens of the SCP.

After retiring in 1946 from the Natural History Museum position at Stanford, Herre again focused on studying lichens from California and other regions (e.g., Alaska, Arkansas, South America, and the Philippines). In 1959, Herre was awarded a grant from the National Science Foundation titled "Monograph of the Genus *Usnea* in North America" and continued his passion for lichens. Herre wrote, "Now, on the verge of 90, my entire time is devoted to working on lichens." (Herre 1964, p. 20). Wiggins (1962) recounted an event that exemplified Herre's continued passion for lichens, writing,

> On November 21, 1961, he {Herre} wrote, 'This morning Miss Vesta Hesse – brought me a few lichens for my determination. What was my astonishment to discover among the 10 or 11 specimens three species not hitherto known to occur in California." (Wiggins, 1962, p. 274)

Wiggins (1962) also referenced an unpublished 350-page monograph about *Usnea*; however, the location of this monograph remains a mystery as it does not reside in the Albert W. Herre Papers archive at the Western Libraries Heritage Resources, Western Washington University (Tamara Belts, personal communication, March 20, 2017). In 1962 at the age 93, Herre passed. An obituary published in the Santa Cruz Sentinel recounted the highlights of his extraordinary life but with no mention of his scholarship regarding lichens (Anonymous 1962).

Since Herre's seminal study of the lichens of the SCP in the early- to mid-twentieth century, only a few inventories of lichens in the SCP have taken place. For example, a lichen inventory of the Presidio of San Francisco was published in 2012 (Benson et al. 2012). Another focused inventory within the SCP was done in the Golden Gate National Recreation Area in San Mateo county (Carlberg 2015), and a new lichen species, *Scytinium singulare*, was re-

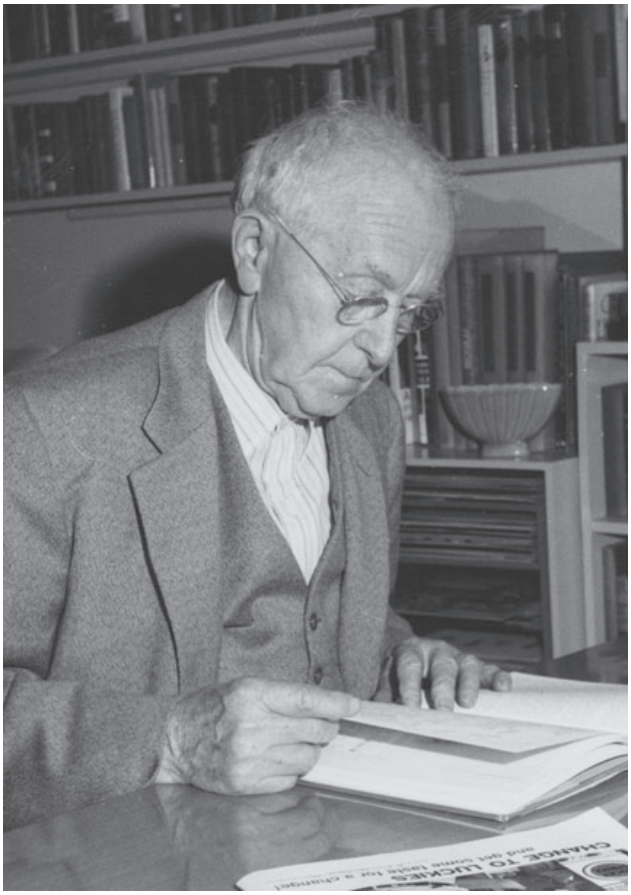

Figure 3: Photograph of Albert W.C.T. Herre, unknown date (reproduced with permission from the Albert W. Herre Papers, Special Collections, Western Libraries Heritage Resources, Western Washington University, Bellingham, WA 98225-9103).

cently discovered in the southern edge of the SCP in Big Basin Redwoods State Park (Carlberg et al. 2016). In 1997 and 2000, Doell searched for *Usnea longissima* in San Mateo county, referencing Herre's 1910 description of this lichen in the SCP (Doell 1997; 2000). In addition, the California Lichen Society has hosted multiple field trips to various parts of the SCP over the years (Bauman et al. 2006; Blauman 2004; Doell and Wright 1996; McGee 1995), but formal inventories were not typically done. Interestingly, in the 1994 edition of the Bulletin of the California Lichen Society, president Janet Doell suggested that the California Lichen Society should "re-visit A.W.C.T. Herre's (1868-1962) collecting sites to document the current status of his lichens" (p. 4). Apart from Knudsen's (2004) article about *Acarospora* in the SCP based on Herre's work, it does not appear that additional studies of lichens in locations documented by Herre have been published. Since 2016, a citizen scientist project called "Retracing Albert Herre's (1910) lichen observations" on iNaturalist.org (a web-based platform for documenting observations of nature) has been informally documenting lichens at locations where Herre visited. Given Herre's relatively detailed documentation of lichens of the SCP in the early 1900s, a thorough inventory of this region would likely provide important insights into the current status of California lichens.

Conclusions

In summary, Herre's work about the lichens of the SCP in California remains significant to the field of lichenology over 100 years after beginning this work as a graduate student at Stanford University. His dedication to this region resulted in one of the most intensive studies of lichens in a focused area of California to date. Although his scholarship about lichens often is overshadowed by his equally innovative work in ichthyology, Herre made important contributions to California lichenology that continue to be recognized in contemporary literature. As discussed above, no comprehensive inventories of the SCP have been done since Herre's work, yet several areas located within the SCP contain sensitive and vulnerable habitat. For example, the maritime and chaparral areas where Herre found multiple lichen species have been affected by development. In 1936, Herre published a stark warning about the "vanishing lichen flora" of California, suggesting that examples of California lichens should be collected and deposited in herbaria for posterity (Herre 1936). Interest in the history of California lichenology is a recent trend. Additional research about Herre and lichenology could make use of the Albert W. Herre Papers archive at the Western Libraries Heritage Resources, Western Washington University (Bellingham, WA). Information about Herre's life also resides in other archives (e.g., Ira L. Wiggins Papers at Stanford University) and could be explored. The search for Herre's 350-page monograph on *Usnea* continues. Finally, much of California remains unexplored from the perspective of lichenology, and there is an urgent need to conduct comprehensive inventories of California lichens to further document the unique lichen flora of California.

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Appendix. Lichen taxa associated with Herre (using current valid names)

#	Taxon	Association with Herre
1	*Acarospora thamnina* (Tuck.) Herre	described by
2	*Dendrographa franciscana* (Zahlbr. ex Herre) Ertz & Tehler	validly published by
3	*Endocarpon tortuosum* Herre	described by
4	*Gyalecta herrei* Vězda	named after
5	*Lecania brunonis* (Tuck.) Herre	described by
6	*Lecania dudleyi* Herre	described by
7	*Lecania shastensis* Herre	described by
8	*Lecidea pacifica* Herre	described by
9	*Lecidea truckeei* Herre	described by
10	*Leptogium nanum* Herre	described by
11	*Lopadium dodgei* Herre	described by
12	*Myriospora hassei* (Herre) K. Knudsen & L. Arcadia	described by
13	*Naetrocymbe herrei* K. Knudsen & Lendemer	named after
14	*Parmotrema herrei* (Zahlbr.) Spielmann & Marcelli	named after
15	*Peccania arizonica* Tuck. ex Herre	validly published by
16	*Peltula richardsii* (Herre) Wetmore	described by
17	*Placopyrenium stanfordii* (Herre) K. Knudsen	described by
18	*Platismatia herrei* (Imshaug) W. L. Culb. & C. F. Culb.	named after
19	*Rhizocarpon bolanderi* (Tuck.) Herre	described by
20	*Rinodina herrei* H. Magn.	named after
21	*Rinodina tephraspis* (Tuck.) Herre	described by
22	*Sarcogyne arenosa* (Herre) Knudsen & S. M. Standley	described by
23	*Solenopsora crenata* (Herre) Zahlbr.	described by
24	*Thelomma occidentale* (Herre) Tibell	described by
25	*Toninia massata* (Tuck.) Herre	described by
26	*Toninia ruginosa* (Tuck.) Herre subsp. ruginosa	described by
27	*Usnea californica* Herre	described by
28	*Zahlbrucknerella calcarea* (Herre) Herre	described by

Macrolichens of the Quail Ridge Reserve, Napa County, California

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Abstract

Surveys at the Quail Ridge Reserve in Napa county, California revealed fifty-seven species of corticolous lichens, adding to our knowledge of the lichen flora of the Berryessa-Snow Mountain National Monument. Typical of the Greater Central Valley flora, nitrophiles were the most abundant, although cyanolichens were also encountered. We discuss interesting collections and differences among substrates.

Introduction and methods

The northern Coast Ranges of California, from the San Francisco Bay to the Klamath Mountains, are an area of high biodiversity, owing to the area's wide range of climatic, edaphic, and topographic conditions (Stebbins and Hrusa 1995, Kraft et al. 2010). This pattern extends to lichens (Jovan and McCune 2004); over 900 species of lichens are found here (CNALH 2018), representing more than half the lichen flora of California (Villella 2012). Sometimes reaching high levels of biomass, lichens provide important ecosystem functions (Knops et al. 1996), and are useful for monitoring air quality (Jovan and McCune 2005). However, outside of known biodiversity hotspots such as the Point Reyes Peninsula (Glavich et al. 2005), lichens surveys have been sporadic in the northern Coast Ranges, and lichen distributions within much of the region remain poorly documented. Increasing attention has recently been given to the conservation of this biodiverse region, including the dedication of the Berryessa-Snow Mountain National Monument in 2015. Areas that have historically received less attention from lichenologists may now begin to reveal their secrets.

In spring 2017, a University of California, Davis lichenology class field trip led by Dr. Jesse Miller undertook surveys of corticolous macrolichens at the Quail Ridge Reserve in Napa County, CA, within the Berryessa-Snow Mountain National Monument (Figure 1). Located in the eastern (inner) Coast Ranges, the reserve is one of the thirty-nine reserves in the University of California's Natural Reserve System. Its 1937 acres encompass most of a peninsula on the southern end of the Berryessa Reservoir. The geology of this part of the Coast Range consists of sedimentary strata of the Great Valley Sequence. The area's Mediterranean climate, varied topography and soil types create a patchwork of habitats conducive to high levels of botanical diversity (Figure 2). Common vegetation types include native and non-native grasslands, chamise chaparral (*Adenostoma fas-*

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Figure 1. The next generation of lichenologists? From left to right: Tobias Mueller, Jesse Miller, Emma Hansen-Smith, Brennan Dyer, Caroline Knef, Benjamin Maples, Bethany Beyer, Lana Saykali, Christopher Adlam, Allie Weill.

ciculatum), blue oak savanna, and mixed oak woodland. Dominant trees in the woodlands include interior live oak (*Quercus wislizeni*), gray pine (*Pinus sabiniana*), blue oak (*Quercus douglasii*), and black oak (*Q. kelloggii*) (University of California, Davis 2017).

To document lichen communities at Quail Ridge, we used both formal plot-based lichen community sampling and opportunistic surveys. Our sampling procedure began with two 1-acre circular plots that were surveyed collectively by the 10 participating UC Davis students (five in each plot) following the Forest Inventory and Analysis protocol for off-grid plots (Will-Wolf 2010, USDA Forest Service 2017). These plots were both located in mixed oak woodland areas at the bottom of a north-facing slope. Next, one of the authors (CA) spent two additional days opportunistically surveying the entire reserve for species that were not found in the plots. Areas of chamise chaparral, blue oak savanna, and black oak stands were investigated. Lastly, two days of intensive sampling in chaparral took place in February 2018, involving the authors and four additional surveyors. All lichen species found on branches and boles above 50 cm were collected. Voucher specimens were deposited at the UC Davis herbarium, with some additional specimens deposited at the Oregon State University and UC Berkeley herbaria.

Results and discussion

Fifty-seven species of macrolichens were collected. The lichen flora of the Quail Ridge Reserve is not only diverse but also abundant, often covering many tree and shrub surfaces. Most species typical of the Greater Central Valley area were found (Jovan and McCune 2004),

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Figure 2. View of the Quail Ridge Reserve, showing patchwork of chaparral, blue oak savanna, and mixed oak woodland.

most of which are nitrophiles (*Candelaria pacifica*, *Polycauliona* spp., *Melanelixia californica*, *Parmelina coleae*, *Physcia* and *Physconia* spp.). Except for *Collema* spp., cyanolichens were rare, although *Lobaria anthraspis* was somewhat abundant on black oak. Some infrequently reported species include *Leptogium milligranum*, *Fuscopannaria leucostictoides*, *F. mediterranea*, *Physconia californica* and *Hypogymnia gracilis*. The latter is endemic to California and adjoining NW Mexico, and is here close to the northern end of its range (CNALH 2018). We found it to be restricted to mature chaparral, where it was fairly abundant.

We noted significant differences between substrates. *Vulpicida canadensis* was found commonly on gray pine, but on no other substrates. *Kaernefeltia merrillii*, known to favor chaparral (Knudsen 2006), was collected only on gray pine and chamise. *Lobaria anthraspis* was common on black oak, but not any other substrate. Several other species were collected only from black oak (*Lobaria anomala*, *Scytinium lichenoides*, *Fuscopannaria leucostictoides*, *F. mediterranea*, *Normandina pulchella*), highlighting the disproportionate importance of this species as a substrate for locally rare lichens. *Physcia dimidiata*, a species rarely collected in the Coast Ranges north of the San Francisco Bay (CNALH 2018), was found growing on blue oak despite being generally considered saxicolous (e.g. CNALH 2018, McCune and Geiser 2009). Interestingly, some common

lichen species (e.g. *Evernia prunastri*, *Flavopunctelia* spp., *Usnea* spp.) were rarely collected on buckeyes (*Aesculus californica*), while other species—particularly jelly lichens (Collemataceae)—seemed to favor them.

We collected almost all of the corticolous lichen species that had previously been noted from the nearby UC Reserve of Stebbins Cold Canyon (Robertson et al. 2012) and added an additional 40 species. Given that Stebbins Cold Canyon is less than three miles directly east of Quail Ridge, this seems like a significant change in species richness for such a short distance. Although it is possible that increased sampling effort at Stebbins Cold Canyon could have yielded some of the missing species, it appears that many species reach their eastern range limit in this part of the Coast Range at the Quail Ridge Reserve. This pattern may be due to a gradient in climate or to an increase in nitrogen deposition closer to the heavily agricultural valley floor.

Species list

Nomenclature follows Esslinger 2016; accession numbers for collections deposited at the UC Davis Center for Plant Diversity herbarium (DAV) are given in parenthesis.

Candelaria pacifica M. Westb. & Arup (222330, 222635)
Collema furfuraceum (Arnold) Du Rietz (222637, 222639)
Collema nigrescens (Hudson) DC. (222662)
Evernia prunastri (L.) Ach. (222638)
Flavoparmelia caperata (L.) Hale (222640)
Flavopunctelia flaventior (Stirton) Hale (222642-3)
Flavopunctelia soredica (Nyl.) Hale (222641)
Fuscopannaria leucostictoides (Ohlsson) P. M. Jørg. (no herbarium specimen) – On black oak.
Fuscopannaria mediterranea (Tav.) P. M. Jørg. (222687) – On black oak.
Hypogymnia gracilis McCune (222681)
Hypogymnia imshaugii Krog (222644-5)
Hypogymnia inactiva (Krog) Ohlsson (222680)
Hypogymnia occidentalis L. Pike (no herbarium specimen)
Kaernefeltia merrillii (Du Rietz) Thell & Goward (222628, 222636) – Abundant on gray pine and chamise.
Leptogium milligranum Sierk (222646)
Leptogium pseudofurfuraceum P. M. Jørg & Wallace (222693)
Leptogium saturninum (Dickson) Nyl. (222661)
Letharia vulpina (L.) Hue (222647) – A single tiny specimen on gray pine.
Lobaria anomala (Brodo & Ahti) T. Sprib. & McCune (no herbarium specimen) – On black oak.
Lobaria anthraspis (Ach.) T. Sprib. & McCune ¬(222677) – On black oak.
Melanelixia californica A. Crespo & Divakar (222666, 222648)
Melanohalea elegantula (Zahlbr.) O. Blanco et al. (222691)
Melanohalea multispora (A. Schneider) O. Blanco et al. (222634)
Melanohalea subolivacea (Nyl.) O. Blanco et al. (222649-50)
Normandina pulchella (Borrer) Nyl. (no herbarium specimen) – On black oak.
Parmelia hygrophila Goward & Ahti (222652)
Parmelina coleae Argüello & A. Crespo (222651)
Phaeophyscia hirsuta (Mereschk.) Essl. (222690, 222692)
Physcia adscendens (Fr.) H. Olivier (222658, 222659)
Physcia biziana (A. Massal.) Zahlbr. (222626)
Physcia dimidiata (Arnold) Nyl. (222688) – On blue oak bark.
Physcia stellaris (L.) Nyl. (222656, 222678)
Physcia tenella (Scop.) DC. (222632)

Physconia americana Essl. (222659)
Physconia californica Essl. (222627)
Physconia enteroxantha (Nyl.) Poelt (222670)
Physconia fallax Essl. (222676)
Physconia isidiigera (Zahlbr.) Essl. (222657)
Physconia muscigena (Ach.) Poelt (222669)
Physconia perisidiosa (Erichsen) Moberg (222671)
Polycauliona polycarpa (Hoffm.) Frödén, Arup, & Søchting (222663-4)
Polycauliona tenax (L. Lindblom) Frödén, Arup, & Søchting (222665)
Punctelia jeckeri (Roum.) Kalb (222654-5)
Ramalina farinacea (L.) Ach. (222672-3)
Ramalina menziesii Taylor (222667, 222674)
Ramalina subleptocarpha Rundel & Bowler (222633)
Scytinium lichenoides (L.) Otálora, P. M. Jørg. & Wedin (no herbarium specimen) – On black oak.
Scytinium teretiusculum (Wallr.) Otálora, P. M. Jørg. & Wedin (222660, 222686)
Tuckermannopsis orbata (Nyl.) M.J. Lai (222629)
Tuckermannopsis platyphylla (Tuck.) Gyeln. (222631)
Usnea fulvoreagens (Räsänen) Räsänen (222685)
Usnea intermedia (A. Massal.) Jatta (222689)
Usnea lapponica Striton (222682-3)
Usnea silesiaca Motyka (222684)
Vulpicida canadensis (Räsänen) J.-E. Mattsson & M. J. Lai (222668, 222675)– On Gray Pine.
Xanthomendoza fulva (Hoffm.) Søchting, Kärnefelt & S. Y. Kondr. (222694)
Waynea californica Moberg (no herbarium specimen)

Acknowledgements

We thank students from the UC Davis spring 2017 lichenology course for helping document lichen diversity at Quail Ridge. We thank the UC Reserve system for allowing us to use the Quail Ridge site for our study. We are also grateful for the help of Tom Carlberg, John Villella, and Bruce McCune for some of the identifications.

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Toninia nashii is a lichenicolous fungus

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Abstract
Toninia nashii *was originally described as a lichen but is a lichenicolous fungus growing on* Lecidella asema.

Keywords. California, Channel Islands, lichenicolous lichens, parasites.

Toninia is a cosmopolitan genus in the family Ramalinaceae with over 50 species (Timdal 1992 & 2002, Frey 2016). It is distinguished by *Bacidia*-type ascus stain. It forms endolithic, areolate or squamulose thalli, occurring on rock or in biotic soil crusts, especially in arid habitats. The genus contains eight species that are non-lichenized parasites on lichens. Two of them are frequent on the Channel Islands of southern California: *Toninia subdispersa* (Nyl. ex Hasse) K. Knudsen (syn. *Toninia talparum* Timdal) on *Lecania* species and *T. subtalparum* van den Boom on *Lecania dudleyi* Herre in soil crusts.

On Green Mountain on San Miguel Island in Channel Island National Park, Thomas Nash collected a *Toninia* with a dull ecorticate thallus, which was described as *Toninia nashii* Timdal, a lichen (Timdal 2002). The species has a dark brown epihymenium, that is N- and K-, dark brown hypothecium, and 3–7 septate ascospores, 24.5–34.5 × 3–4 µm. Timdal stated that it was possibly a parasite on a lichen but he could not identify the thallus. In ten years of exploring all eight Channel Islands, we never discovered any *Toninia nashii*. In 2015, we returned for a week to San Miguel Island. Our main aim was to find the type locality of *Toninia nashii* on Green Mountain.

We did not find any *Toninia nashii* where T.H. Nash collected it in depression on sandstone on south side of Green Mountain, but we found it abundant among crustose lichens on sandstone on east side of Green Mountain. It was parasitic on *Lecidella asema* (Nyl.) Knoph & Hertel (Figure 1). It was not a lichen. *Toninia nashii* is a pathogenic parasite, reducing the host thallus to an ecorticate dull mass of fungal tissue, a pseudo-thallus, not producing any secondary metabolites and containing scattered lichenized algal cells. Eventually in *Toninia nashii* the algal cells are destroyed and the pseudo-thallus dries up and atrophies.

Lichenicolous lichens form an independent lichen thallus morphing out of host (see picture of typical lichenicolous lichen, *Heteroplacidium transmutans*, in Knudsen et al. 2014). But in parasites like *Toninia nashii* they form a pseudo-thallus out of the degraded thallus of the host and not a new lichenized thallus. At this stage of their life cycle, while the pseudo-thallus is present, parasites like *Toninia nashii* can be mistaken for lichens or lichenicolous lichens.

JANA KOKOURKOVÁ

Figure 1. *Toninia nashii* growing on the degraded thallus of *Lecidella asema*.

Once we knew what to look for, we found in 2016 on Santa Rosa Island two apothecia of *T. nashii* on *Lecidella asema*. *Toninia nashii* is rare, known only from two locations on two islands in California. For a description see Timdal 2002. *Lecidella asema* is common on the Channel Islands and along the coast of southern California so *Toninia nashii* may not be rare.

Specimens examined. U.S.A. CALIFORNIA. Santa Barbara Co., east side of Green Mountain, 34°02’29.7”N 120°23’19”W, 218 m, on *Lecidella asema*, K. Knudsen 17634 w/ J. Kocourková and I. Williams (SBBG, UCR).

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CALS 2018 annual meeting in and around the foothills of the Diablo Range

The California Lichen Society held its 2018 multi-day annual meeting in the mountains immediately southeast of San Francisco Bay. As always, there were a variety of activities, and as (almost) always, the weather was pretty wonderful. We were lucky enough to have as our base camp and main location the facilities of UC Berkeley's Blue Oak Ranch Reserve (BORR), north of Mount Hamilton, and immediately east of San Jose, California. Secondary activities took place at Alum Rock park, a few miles north of BORR. All in all more than 32 people attended the long weekend.

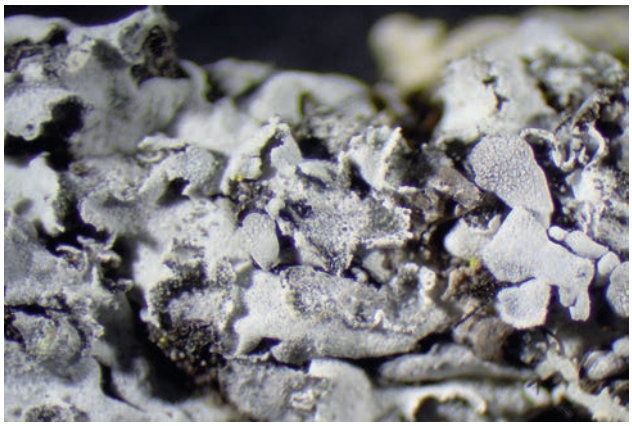
Alum Rock Park

Our first field destination was Alum Rock Park on January 26th, where 16 of us met at the Sierra Vista parking lot (Figure 1). Alum Rock Park is a natural rugged 720-acre canyon east of San Jose, California. It was designated as a public park by the California State Legislature in 1872. It had been home to a loose-knit tribe-

TOM CARLBERG

Figure 1. In the parking lot at Alum Rock Park. Clockwise from lower left are Aaron Shusteff, Parke Lewis-Deweese, Julene Johnson, Katherine Strachoda, Liam O'Brien, Steve Rosenthal, Cat Chang, Leslie Flint, Ken Kellman, Alf Fengler, Lise Peterson, and Jennifer Rycenga.

let of Native American people called the Ohlone, who called it "Aguague" or watering place. It was part of the Spanish pueblo system beginning in 1777 when Spain's King Philip II established the pueblos to provision the San Francisco presidio. It was also known as the City Reservation and Penitencia Reservation. While the park is rich in minerals, alum is not one of them, having been misidentified early in the European history of the park. The park was famous for its warm mineral springs.



TOM CARLBERG

Figure 2. The pockets of soredia in *Physconia fallax*.

The location had been scouted by CALS board member Ken Kellman, who assured us that there would be a good lichen flora. This turned out to be an understatement; there was more than enough in the park to keep us busy! After brief introductions, the group split into three in order to visit a variety of habitats. The folks I was with spent easily ¾ of our time within 500 feet of the parking area, proving once again that a lichen hike is not really a hike at all! We found a number of interesting lichens at the park, mostly on the rock outcrops along the trails. Some of these were both interesting and expected and/or ubiquitous, like the jelly lichens *Collema furfuraceum* and *C. nigrescens*, and the green algal lichens *Phaeophyscia hirsuta, Physcia tribacia,* oak-lovers *Physconia enteroxantha* and tiny *Waynea californica,* and the invasive *Xanthoria parietina*.

There were a few surprises, however; since the park has exposed soil I suppose the widespread soil lichen *Enchylium tenax* was not totally unexpected, but *Physconia fallax* is a great find! There are only 72 records of this species in the Consortium of North American Lichen Herbaria, all but 10 of which are south of Tulare County, and most are near Los Angeles and into Baja California. It's distinguishing feature is the way the upper and lower cortexes split apart and form a little pouch, within which soredia form (Figure 2).

We were fortunate to have Steve Rosenthal with us. Steve is intimately familiar with the park, and after our meeting he is now also a novice lichenologist! From just our casual inventory of the park's lichen resources, we compiled a list of 23 species, the first in the park's history. For a few of our number this was the only activity they were able to attend; the rest of us went back to BORR to socialize and dine, identify our lichens, and bed down for the night.

Species from Alum Rock Park

Collema furfuraceum
Collema nigrescens
Enchylium tenax
Dermatocarpon miniatum
Enchylium coccophorum
Evernia prunastri
Flavopunctelia flaventior
Phaeophyscia hirsuta
Physcia adscendens
Physcia alnophila
Physcia dubia
Physcia tribacea
Physconia enteroxantha

Physconia fallax
Physconia perisidiosa
Ramalina farinacea
Ramalina leptocarpha
Scytinium lichenoides (group)
Scytinium palmatum
Waynea californica
Xanthomendoza fulva
Xanthomendoza hasseana
Xanthoria parietina

UC Berkeley Blue Oak Ranch Reserve

Blue Oak Ranch Reserve (Figure 3) is one of 39 field stations of the University of California Natural Reserve System operated in conjunction with the Berkeley Natural History Museum. It is a popular field station in the heart of California's Diablo Range, which extends from the Carquinez Straits south 170 miles to Coalinga. Situated on the west-facing slope of Mount Hamilton, the Reserve includes a landscape with elevations ranging from 1,400 to 2,855 feet. The vegetation features valley oak and (surprise!) blue oak woodlands, mixed oak woodlands (blue, black, valley, and coast live), chamise chaparral, Diablan sage scrub, native and non-native grasslands, numerous stock ponds, and seasonal and perennial streams with intact riparian vegetation. The newly-completed field research station is green-constructed and

JESSE E.D. MILLER

Figure 3. One of the oakscapes at the Blue Oak Ranch Reserve.

entirely powered with solar photovoltaic cells that use a storage battery system to provide electricity after dark. The morning after Alum Rock Park dawned clear and crispy-cold (photo on back cover); quite a few tents and cars were under ice! Early rising lichenologists were undeterred and cold, and the species list for the Reserve started off with a chilly bang. We assembled in the Cedar Barn Community Center for an orientation with Zac Harlow, the station's Resident Manager. With 3,280 acres to explore on the Reserve, his overview was incredibly helpful.

He and I had performed a recon on Thursday, visiting groves of blue oaks, valley oaks, and a small stand of black oaks on the ridgetop northeast of the field station buildings. We also canvassed coyote bush thickets, some dark and relatively lichen-free mature willows in one of the creek gorges, and a couple patches of exposed soil where I thought we might find a remnant soil crust. I asked him about visiting rock outcrops on the Reserve; he replied "Yes, we have three or four rocks here and there", which made me wonder if we would find any saxicolous (rock-dwelling) lichens at all? But I had reckoned without the diligence of Jason Hollinger and Ken Kellman (Figure 4), who were easily responsible the vast majority of the species reported that day; more than ½ the species encountered came from rocky substrates, including one of the prettiest lichens I can think of: *Leptochidium albociliatum* (Figure 5).

JESSE E.D. MILLER

Figure 4. From left to right: Jason Hollinger, Jesse Coyle, Allie Weill, Ken Kellman.

KEN-ICHI UEDA

Figure 5. *Leptochidium albociliatum* on rock

During orientation, Zac suggested several destinations that would ensure we covered a variety of habitats and substrates including lakeside chaparral, blue oak woodlands, a black oak woodland on a north slope at higher elevation, and some creek canyons/ravines that might provide cooler moister air and perhaps host a different lichen flora. One group headed for an easy one-mile trail that circled Big Lake near the field station for what was intended to be a quick refresher/orientation, but proved so interesting that it occupied the entire day. A few individuals chose to hike the entirety of one of the loop roads on the reserve, racking up a total somewhere in the vicinity of seven miles.

Some of the lichen highlights from our field day include our widespread state lichen *Ramalina menziesii*, and the very sporadic *Ramalina puberulenta*; it would be interesting project to search for and map where this unusual hairy *Ramalina* shows up in the California landscape (*puberulent* means "minutely hairy"). Similarly

sporadic and unpredictable is *Leptogium milligranum*, which we also found at the Reserve.

Currently the tally is at 119 species of lichens and lichenicolous fungi for the day, with an additional 19 taxa narrowed down to genus, group, or a species pair and needing additional work. If the initial identifications are correct, 70 genera were found, with six genera *(Lecanora, Physcia, Ramalina, Rinodina, Aspicilia* and *Scytinium*) accounting for 25% of the species variation. What an incredible achievement for a single day's "work"! This is the first lichen evaluation at Blue Oak Ranch Reserve; there will be a more substantial write-up in the winter 2018 issue of the CALS Bulletin.

During the late afternoon, folks began trickling in to the community center for rest, relaxation, and in anticipation of dinner and the evening's speaker. Dinner went as one might expect, lots of food, wine both fine and not-so-fine, and of course a lot of conversation about lichens, natural resources and resource specialists.

Our guest speaker

Jesse E.D. Miller graciously agreed to make a presentation for this year's annual meeting. He has a long history of working in the field in the Pacific Northwest before he relocated to Wisconsin, to pursue a Ph.D. in the field of plant ecology at the University of Madison . He immediately returned to the West, taking a postdoc position at U.C. Davis working with ecologists from several agencies studying fire effects. His love for lichens has influenced his current interests: assessing the impact of fire on lichens, particularly in California's sagebrush steppe. His prior lichenological experience includes studying soil crust diversity, lichen ecology in sagebrush steppes, pin lichen diversity as influenced by substrate age, survey detectability of rare canopy cyanolichens, the potential for wind farms in prime soil crust habitat, the Usnea rigida group in California and the Northwest, and in this very issue of the Bulletin, an article on macrolichens in the chaparral and savannahs of Quail Ridge. Jesse is currently a lecturer in the Biology Department at A.W.C.T. Herre's alma mater, Stanford University.

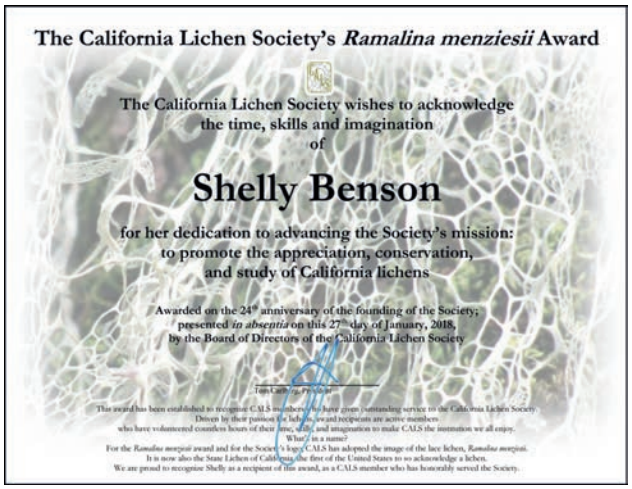
His presentation focused on two themes: how shifting fire regimes may be interacting with climate change to affect lichens, and the next generation of lichenologists. The former is very much in keeping with several of Dr. Miller's research projects, in the Coast Ranges and also in the Sierra Nevada mountains of California. His results indicate that in a high-severity fire, lichens (along with everything else) burn completely, but unlike other vegetation require a much longer time to re-establish. Surprisingly, in moderate or low-severity fires lichens persist, and (presumably) re-establish more easily; the hypothesis is that the presence of reproductive propagules makes this possible. The latter theme comes directly from the enthusiasm Jesse encountered in his students, many of whom showed tremendous enthusiasm in the courses he offered.

Shelly Benson receives the 2018 California Lichen Society's *Ramalina menziesii* Award

The California Lichen Society's *Ramalina menziesii* award was established to recognize CALS members who have given outstanding service to the CALS and who are dedicated to advancing the Society's mission: to promote the appreciation, conservation, and study of California lichens. Driven by their passion for lichens, award recipients are active members who have volunteered countless hours of their time, skills, and imagination to make CALS the institution we all enjoy.

As part of our 2018 annual meeting ceremony, we chose to honor Shelly Benson, for her love of lichens in general and her dedication to CALS' mission in particular. We only wish she had been able to attend this year's meeting so the award could have been made in person.

Shelly joined the Board of Directors of the Society as Vice-president in 2011, and served a two year term under then-President Bill Hill. When Bill stepped down, Shelly stepped up, assuming the office of President at the annual meeting in 2013, where she served for four years as President. During her first term, Shelly solicited and received the grant funding required to incorporate the CALS Lichens of Conservation Concern into the California Native Plant Society's Inventory of Rare Threatened and Endangered Plants of California.


The California Lichen Society's *Ramalina menziesii* Award

The California Lichen Society wishes to acknowledge the time, skills and imagination of

Shelly Benson

for her dedication to advancing the Society's mission: to promote the appreciation, conservation, and study of California lichens

Awarded on the 24th anniversary of the founding of the Society; presented *in absentia* on this 27th day of January, 2018, by the Board of Directors of the California Lichen Society

Tom Carlberg, President

This award has been established to recognize CALS members who have given outstanding service to the California Lichen Society.
Driven by their passion for lichens, award recipients are active members
who have volunteered countless hours of their time, skills, and imagination to make CALS the institution we all enjoy.
What's in a name?
For the *Ramalina menziesii* award and for the Society's logo CALS has adopted the image of the lace lichen, *Ramalina menziesii*.
It is now also the State Lichen of California, the first of the United States to so acknowledge a lichen.
We are proud to recognize Shelly as a recipient of this award, as a CALS member who has honorably served the Society.

In 2015, after several prior attempts by CALS' members to have *Ramalina menziesii* named California's state lichen, Shelly helped shepherd this hopeful idea into reality during her tenure as president; an official state lichen is a national first. Also during her presidency, CALS advanced into a new era of color printing, social media, credit card payments, and cloud-based lichen observation sharing on iNaturalist.

Shelly has also devoted considerable time & energy to promoting the artistic side of lichenology; the CALS annual meeting in 2016 featured the work of 12 artists, and was a financial success for CALS; Shelly's personal artistic efforts in creating lichen-based ceramic art were featured in the art show and were used as gifts for award recipients. As CALS president, she taught workshop participants to key macrolichens to genus for the central coast of California, led innumerable lichen walks, and introduced *a lot* of vascular plant aficionados through her presentations to various California Native Plant Society chapters in the Bay Area.

~Reported by Tom Carlberg & Sarah Minnick

CALS Grants Committee report for the 2017 grant cycle

Dear CALS members - One of the topics discussed in 2017 during a meeting of the Board of Directors was the chronology of the CALS grant cycle, especially how the deadline for applications fit in to the academic year for schools using the quarter system. The Grants Committee proposed moving the application deadline to 1 November to allow additional time for students on the quarter system to develop their projects and proposals, since their school year typically begins in mid- or late September. The Board agreed, and the CALS grants application deadline is now 1 November.

The Grants Committee recommended that the CALS Board fund three of the applications received during the 2017 grant cycle, for a total of $3500 dollars. The Board agreed; a short summary of each awarded project appears below. These grants would not have been possible withouth the loyal generosity of CALS members. Our grants program has been funding students and independent researchers since 2003, and has distributed more than $17,000. These awards have enhanced our understanding of California lichens, and made possible pioneering work on lichen communities as air quality indicators, research into cryptic species diversity, fundamental taxonomy of character-poor groups (*Lepraria*), artistic explorations of the symbiotic relationship that speaks to the shared reliance of systems, the antibiotic activity of lichen secondary chemistry, baseline inventory work, and investigations into the basidiomycete partner in the symbiosis.

~Reported by Tom Carlberg

Analyzing Lichen samples for Basidiomycete Yeast Presence

Principal Investigator: Kevin Ball

Undergraduate student, University of California, Davis

Funding provided: $1100.00

Summary: This project aims to discover a way to visualize lichen cortex yeasts using simple light microscopy and histologic staining. Of particular interest to this project is Diazonium Blue B (DBB) which has shown an ability to stain basidiomycete yeasts against ascomycete yeasts and algae. Analogues of this stain are currently available from chemical supply companies, but whether they can produce comparable results in lichen sections by differentially staining basidiomycete yeasts among ascomycete hyphal networks is not known. If DBB analogues prove unfruitful in this study, common mycological stains such as a modified India ink method, Grocott silver, Periodic acid-Schiff and mucicarmine stains will be tested. In this study, species of the Parmeliaceae family known to exhibit the recently discovered yeast trichotomy will be sectioned using a hand microtome, stained as described above, and results from applied stains will be analyzed and recorded using both digital illustrations and photographs. If successful, this project could facilitate discovery of new basidiomycete yeasts in lichen species endemic to California, and methods developed could facilitate further research into the ecological roles of lichen yeasts.

Post-fire chaparral lichen community recovery: implications for effects of altered fire regimes on biodiversity

Principal Investigators: Jesse E. D. Miller[1], Alexandra M. Weill[2]

[1]Postdoctoral researcher, Department of Environmental

Science and Policy, University of California, Davis. [2]Department of Plant Sciences, University of California, Davis
Funding provided: $1000.00

Summary: Chaparral ecosystems (dense, fire-prone shrublands primarily found within California) can contain highly diverse epiphytic lichen communities. However, lichen communities in chaparral, particularly in Northern California, have been little studied relative to lichens in other ecosystems in the state. There is some evidence that chaparral lichen diversity has decreased over the past 100 years in Southern California. In many parts of California, chaparral ecosystems have experienced increases in fire frequency over recent decades in comparison to historical baselines. Because chaparral fires are generally stand-replacing, the epiphytic lichen community is completely eliminated and must re-establish after fire. This raises the question of whether increasing fire frequencies could be altering landscape-level lichen diversity in chaparral systems.

We propose to sample lichen communities across a chronosequence of time since fire in Northern California chaparral stands. Study sites will be located on the UC Quail Ridge and Stebbins Cold Canyon Reserves. This study will build on a preliminary assessment of chaparral lichen diversity conducted in Spring 2017, which found marked differences in lichen communities at sites 2 and 29 years post-fire at Stebbins Cold Canyon Reserve. We will use a modified version of the Forest Inventory Analysis plot design that is better suited to chaparral. We then examine basic lichen diversity responses to time since fire, and we will use indicator species analysis to test whether specific species have affinities for different fire histories. We will also classify lichens into functional groups to test whether specific groups (e.g., cyanolichens) recover at different times. This project will formally test the hypothesis that shorter fire intervals are responsible for reduced lichen diversity in this system. This information is critical to understanding and protecting lichen diversity in California as fire frequencies shift in response to population growth and climate change.

Molecular Barcoding Lichens of Joshua Tree National Park

Principal Investigator: Julia Adams
PhD Student, Department of Botany & Plant Sciences, University of California Riverside
Riverside, CA 92521
Funding provided: $1400.00

Summary: The UCR Lichen Herbarium is an important historical collection of lichens documenting the lichen flora of Southern California. I propose to sequence lichens from the UCR Lichen Herbarium with a geographic focus on Joshua Tree National Park (JTNP). The JTNP site in the Mojave Desert provides an ideal setting for this study because 145 lichen taxa were documented via surveys by Kerry Knudsen between 2005 and 2012. I will select JTNP lichens and develop a DNA sequencing protocol. These DNA sequences will provide a baseline genetic reference library of lichens in the JTNP geographic area, including the Acarosporaceae family, one of the most diverse lichen families in Southern California. In light of the changing environmental conditions due to increased fires, aridity, and climate change, creating a genetic reference library from the UCR Lichen Herbarium will provide an important baseline that can be used for conservation efforts. In addition, this unique research could shed important insights into the phylogeny and evolutionary history of lichens in JTNP.

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 of the current calendar year**. The current Chair is Tom Carlberg.

Call for Miniguide lichen photos!

The California Lichen Society is looking for images of certain lichens to be chosen as part of the third edition of the *CALS Mini Guide to Some Common California Lichens* that will start being sold at the beginning of 2019! We would love to showcase the best photos taken by our members and other lichenophiles. Submissions are due ASAP and can be emailed to tom@californialichens.org. Other accomodations can be made for large files or large numbers of files. Please include your name, email address, phone number, and lichen name in the email. Please name the photo file as follows: GenusSpecies_Ownername_collection number (if any). We will notify you if your photo is chosen. Authors of photos will retain their personal copyrights, but CALS will require signed permission to use your image in the Mini Guide.

If you are thinking of using this list as a challenge to take some new photos (and we hope you are!), consider placing something in your photo to show scale, like a finger, hand or a common coin. Also please remember that the purpose of the Miniguide is the identification of lichens, so if the lower surface is important we might need two photos. We would love to get some quality photos of the habit and distinguishing characters of the following species:

Acarospora socialis
Alectoria sarmentosa
Bryoria fremontii
Buellia oidalea
Polycauliona bolacina
Candelariella vitellina
Chrysothrix xanthina
Cladonia furcata
Cladonia pyxidata
Collema furfuraceum
Dendrographa leucophaea
Dimelaena radiata
Diploschistes muscorum
Evernia prunastri
Flavoparmelia caperata
Graphis scripta
Hypogymnia imshaugii
Lecanora sierrae
Lecidea tesselata
Leptochidium albociliatum
Letharia columbiana
Lobaria pulmonaria
Lobothallia alphoplaca
Niebla homalea
Ochrolechia subpallescens
Parmelia sulcata
Parmotrema perlatum
Peltigera canina
Pertusaria californica
Physcia stellaris
Platismatia glauca
Lobaria anthraspis
Psora decipiens
Ramalina farinacea
Ramalina menziesii
Rhizocarpon geographicum
Rhizoplaca chrysoleuca
Sphaerophorus tuckermanii
Teloschistes chrysophthalmus
Tuckermannopsis platyphylla
Umbilicaria phaea
Usnea dasopoga
Xanthoparmelia mexicana
Xanthomendoza hasseana

News and Notes

CALS at the CNPS Conference

CALS participated in the California Native Plant Society's (CNPS) 2018 Conservation Conference hosted in Los Angeles, CA, on February 1st - 3rd. Throughout the conference CALS welcomed visitors with a table full of resources on lichens. The highlight of this year was our joint-poster on Lichens of Conservation Concern with CNPS. If you are curious to learn more about California's rare lichens, check-out the online inventory at www.rareplants.cnps.org for more details.

US Forest Service and lichens

On January 30 - 31, CALS joined the United States Forest Service (USFS) for a Lichen Center of Excellence meeting and workshop on Lichens in California; from Biomonitoring to Biodiversity, how to use them in USFS land management. The program was led by Peter Nelson, USFS (Washington Office), Air Quality Biomonitoring Coordinator, Trent Proctor, USFS Region 5 (California) Air Quality Program Manager, and coordinated by Diane Ikeda, USFS R5 Regional Botanist at the Regional Office at Vallejo, CA. The focus of the program was to discuss critical issues involving lichens in California as bioindicators for air quality monitoring and land management, to learn key morphological characteristics, and to collaborate across the state.

Nelson facilitated a dynamic workshop and group discussion encouraging collaborative approaches to thinking about lichens in California. His hands-on identification workshop highlighted methods and techniques to learn and observe the unique characteristics of lichens, from rare to common. Special thanks were given to the Cleveland National Forest for providing southern California lichen specimens for study.

The meeting also welcomed presentations led by Proctor from the USFS Air Quality division. He shared their work using lichens for air quality monitoring, highlighting the development in their processes across a few USFS air quality plots as case studies. A few USFS botanists presented checklists of lichens in their California forests which led to dialogue on lichens across the state. CALS provided reflections from previous Lichen Center of Excellence meetings noting the benefits of cross-pollination between the USFS, CALS, and other similar organizations and agencies. Such benefits of these collaborations have allowed for more of California lichens to be accounted for and documented on USFS lands, and added to critical lists, such as the recent rare lichens list with CNPS.

A huge takeaway from the program was that California lichens are unique, can be beneficial as bioindicators and biomonitors for air quality programs as well as the biodiversity of an area, and can bring together organizations and agencies from across the state, and potentially beyond.

~Reported by Hanna Mesraty

Upcoming Events

Tilden Regional Parks Botanic Garden
Lichen Identification Workshop
Dates: 2nd Saturday each month, 1:30-4:30pm
Instructors: Irene Winston, Bill Hill
Location: Junction of Wildcat Canyon Road and South Park Drive, Berkeley, CA
Fee: Free.
Registration: Please RSVP to irene@ californialichens.org, or call 510 548 6734.
Description: We often visit lichens in the Garden, and then do some keying and discuss topics of interest. If you have a topic in mind, please let us know.

President's Message

Dear CALS members – Those of you who attended already know that we had a great time during our annual meeting this year. We were fortunate to book UC Berkeley's Blue Oak Ranch Reserve, fortunate with the weather, and lucky in the participation of **Zac Harlow**, the Reserve's manager, who spent a lot of his time with us! Thanks to **Julene Johnson** for previewing the Reserve for us. Also thanks to **Ken Kellman**, who did a recon at Alum Rock Park, and **Steve Rosenthal** for expediting the permit process at Alum Rock; all of these individuals helped make the weekend special. And of course our grateful appreciation to Dr. **Jesse E.D. Miller** who came down from Davis to expand our understanding of how fire and lichens interact; important concepts for an increasingly-dry California.

Between the annual meeting weekend, the CNPS conference in Los Angeles, the USFS Air Quality meeting, Cal Day at UC Berkeley, and the Rancho Marino foray, the early months of this year was busy indeed. Thanks to **Hanna Mesraty and Sarah Minnick** for handling L.A.; **Hanna** also doubled-up with the USFS. **Julene Johnson and Kathy Faircloth** were great at Berkeley. **Jesse Miller** organized the Rancho Marino foray; a writeup of the foray will follow in the winter issue.

The Bulletin Committee is undergoing some changes, starting with the winter 2018 issue (hopefully it will arrive more timely than the issue you have in hand, a responsibility entirely mine!). Shelly Benson stepped down as Editor in February; she will certainly be missed. But it is very fortuitous that there are two interested lichenologists who are willing to fill that role. **Justin Shaffer** has a strong background working with endohyphal bacteria, forest epiphytes, and the antifungal activity of lichen compounds. He is from California but took his Ph.D. in plant pathology in Tucson. **Jes Coyle's** Ph.D. is from the U. of North Carolina at Chapel Hill. She most recently was a lecturer in ecology at Stanford University but is now an Assistant Professor of Biology at Saint Mary's College. Her special interest is the ecological drivers of species richness, including lichens. We are very happy to welcome these two unique individuals!

We also have a new manager for our WildApricot membership database: **Jason Hollinger** has agreed to assume the duties that keep your contact info current, your dues up-to-date, and your eBulletin alive. Those of you who frequent *Mushroom Observer* or *Ways of Enlichenment* must already be familiar with Jason's name and photos and expertise; his presence is ubiquitous at these sites. Mostly because for each he is a collaborator or co-developer; a highly motivated and busy individual, indeed! His photo is on the cover of this Bulletin.

Now, if I could find a Conservation Chair and a webmaster, my life would be complete...

Tom Carlberg
President@californialichens.org

On the rocks at Alum Rock Park, San Jose California. 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
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iNaturalist.org/users/cals
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Membership dues can be made payable to:
California Lichen Society, PO Box 472, Fairfax, California 94978

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

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Photos from CALS' 24th annual meeting

Clockwise from top left: a frosty morning at Blue Oak Ranch Reserve; Jes Coyle and Alf Fengler checking things out; one twig, many species; one of the larger oaks, with Reserve buildings in the background; David Nelson and Bob Siegel share a moment; Jesse Coyle, Allie Weill and Jes Coyle keying lichens; Aaron Shusteff and Tom Carlberg get in focus.


TOM CARLBERG


JULENE JOHNSON


CARLOS SELIGO


JULENE JOHNSON


JULENE JOHNSON


JESSE E.D. MILLER


JULENE JOHNSON