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Front cover: *Umbilicaria phaea Tuck.*, X5. Photography by Richard Doell

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Air Quality in California Forests: current efforts to initiate bio-monitoring with lichens

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Abstract. The primary objective of the Forest Health Monitoring Indicator Project is to develop models that use the composition of epiphytic lichen communities to detect and monitor air quality in forests. The designs of existing air quality monitoring networks in California do not provide adequate representation of rural areas to assess impacts to forests. This article is designed to provide readers with a brief synopsis of air quality monitoring in north-central California, an overview of current air quality issues in the area, and an introduction to plans for monitoring air quality in forests with lichens.

Introduction

Air quality in California has been a hot topic since the population explosion of the 1940s. Known for its overcrowding and smog, the Los Angeles area is most frequently cited in discussions of air pollution. While less infamous, air quality in parts of the north-central region of the state (area North of Santa Barbara) are also poor and have the potential to affect forests regionally. At the present time, however, there is surprisingly little means in California to monitor air pollution in forests.

Our best estimates of air quality in forests come from two complementary air quality networks: the California Air Resources Board (CARB) dry deposition network and the National Atmospheric Deposition Program (NADP) wet deposition network. Monitoring in north-central California is subdivided into 9 districts or "air basins" (Figure 1). The design of the CARB network consists of over 100 monitors and allows efficient monitoring in many urban centers. However, few of the monitors occur in rural areas, which is necessary to detect the displacement of pollutants to forests. Most NADP monitors are rural, although there are only 11 total active sites for all of California.

The purpose of the Lichen Indicator Project is to provide a medium that is better suited for monitoring forest air quality. The premise is to use epiphytic lichen community structure to indicate air quality, a strategy that has been effectively implemented elsewhere in the United

Figure 1: Map depicting air basins

States (see McCune et al, 1997, McCune et al, 1988). Sampling lichens is inexpensive compared to the costs associated with CARB and NADP monitors. Thus, sampling intensity in rural areas can be improved and sites will be better distributed across the landscape. After a brief overview of air quality concerns in the study area, a description of the scope and mechanics of the lichen project is presented.

Air Quality in North-Central California

Despite their shortcomings, NADP and CARB data do provide a broad perspective on air quality in the state. According to CARB data, ozone (O_3) levels consistently exceed state and federal standards in many air basins in north-central California (Table 1). High ozone is known to damage plants and possibly lichens at high concentrations (Nash & Sigal, 1979; Sigal & Nash, 1983). Compared to many cities in the Eastern U.S., ambient levels of sulfur dioxide (SO_2) are relatively low in this region although the effects on human and forest health in the state remain unclear (Table 2). There is a large body of research documenting the detrimental effects of acidic deposition on lichens (i.e. Gilbert, 1970; Hawkswoth & Rose, 1970), which includes the extirpation of the most acid-sensitive species.

Table 1: Number of days ozone level exceeded state and federal standards in 2001; ozone statistic is the daily maximum 1-hour value

Air Basin	State (.09 ppm)	National (.12 ppm)
Lake Counties	0	0
North Coast	0	0
Northeast Plateau	0	0
North Central Coast	3	0
San Francisco	15	1
South Central Coast	34	2
Sacramento Valley	46	2
Mountain Counties	49	1
San Joaquin Valley	123	32

Data extracted from CARB database

Table 2: Annual arithmetic means of SO_2 concentrations for 2001

Site	ppm	$\mu g/m^3$
Sacramento	0.0019	4.96
Stockton	0.0024	6.29
Nipomo	0.0025	6.46
Bakersfield	0.0026	6.72
Fresno	0.0027	7.01
Cleveland, OH	0.0060	15.72
Pittsburgh, PA	0.0080	20.96
Erie, PA	0.0100	26.20
New York, NY	0.0140	36.68
Indianapolis, IN	0.0160	41.92

Data extracted from EPA AIRS data base

Deposition rates of ammonia (NH_3) and ammonium (NH_{4+}), pollutants implicated in the eutrophication (nutrient-enrichment) of both terrestrial and aquatic ecosystems, are high in the agricultural areas of the Central Valley. Deposition is probably comparable to some agricultural areas of the Midwest although there is little data for this pollutant in California (Table 3). Elevated nitrogen levels in forests from

Table 3: Wet deposition of ammonium in 2001; based upon precipitation-weighted means

Site	mg/L
Sequoia NP	0.10
Yosemite NP	0.14
Davis	0.60
Wooster, OH	0.46
Clayton County, IA	0.61
Lake Scott Park, KS	0.74

Data extracted from NADP database

compounds like ammonium are thought to promote the establishment of nitrophilous (nitrogen-loving) lichens such as species in the genera Xanthoria, Physcia, Candelaria, and Physconia.

Emissions of a second nitrogen-based compound, nitrogen oxide (NO_x), are exceptionally high in California compared to most of the U.S. In cities in north-central California, atmospheric levels of a particular nitrogen oxide, nitrogen dioxide (NO_2), are similar to highly populated cities elsewhere (Table 4). Depending upon atmospheric conditions, nitrogen oxides can detrimentally impact forests by three main mechanisms: they are chemical

Table 4: Annual arithmetic means of NO_2 concentrations for 2001

Site	ppm	µg/m^3
Clovis	0.014	26.32
San Francisco	0.019	35.72
Bakersfield	0.023	43.24
San Jose	0.024	45.12
Atlanta, GA	0.022	41.36
New York, NY	0.031	58.28
Chicago, IL	0.032	60.16
Denver, CO	0.035	65.80

Data extracted from EPA AIRS database

precursors to O_3 formation in the atmosphere, they can contribute to acid rain, and they can cause eutrophication.

Countrywide isopleth (line maps of pollutant concentrations) and emission distribution maps for all pollutants discussed above are available on the web through the National Atmospheric Deposition Program and the Environmental Protection Agency:

1. http://www.epa.gov/air/data/nonat.html?us~USA~United%20States; maps of non-attainment areas (where pollution concentrations consistently exceed the federal standard); includes maps of ozone and others;
2. http://nadp.sws.uiuc.edu/isopleths/maps2001/; isopleth maps for wet deposition of sulfate, ammonium, nitrate, and others;
3. http://www.epa.gov/air/data/repsus.html?us~USA~United%20States; access to data and maps, including maps of emission distributions.

Mechanics of the Lichen Indicator Project

It is still unclear to what extent these pollutants are impacting forest and lichen communities in the region. To facilitate monitoring in forests, the primary goal of the Lichen Indicator Project is to develop multivariate models that relate information on lichen community structure (such as species diversity and the relative abundances of each species) to pollution gradients. Using an ordination technique such as non-metric multidimensional scaling (NMS; Kruskal, 1964), prominent gradients in community composition can be extracted from the dataset and evaluated for correlations with environmental variables relating to climate, stand structure, and air pollution.

The sampling design for this lichen indicator project and others affiliated with the USDA Forest Health Monitoring/Forest Inventory and Analysis Programs follow a standardized protocol. Community data is obtained by surveying lichen communities within circular, .4 hectare plots. The plots are located on a permanent, 27km by 27km sampling grid established by the EPA that covers the entire United States. The California air quality models will be based upon data collected from 1998-2001 from over 200 of these plots. Sampled plots are randomly chosen from the grid.

Field crews visit each plot once and conduct surveys of the epiphytic lichen community wherein the presence and relative abundance of all epiphytic lichen species is estimated. Sampling plots again in the future will help us to track changes in pollution levels and distributions. The crews are expected to be able to differentiate between species but not to necessarily identify them. Previous experience with lichens varies between and among field workers although participants undergo a three day intensive training course and must pass a certification exam

before conducting surveys. For the exam, a faux plot is surveyed by both crew-members and a professional lichenologist. Crew-members are required to capture 65% of the epiphytic lichen species collected by the lichenologist to pass. After the field season begins, crews are periodically audited by a professional lichenologist to ensure that species capture rates remain high.

For each community survey, a collection is made of each species encountered in the plot, which are later sent to a specialist for identification. Past specialists working for the California lichen indicator project include CALS member Doug Glavich (2000-2001), Daphne Stone (2000), Trevor Goward (1999), and Peter Neitlich (1998). Most of the collections currently reside at the McCune lab at Oregon State University and will soon be deposited in the OSU herbarium.

Vegetation crews collect data on stand structure (such as basal area estimates and tree species diversity), which is made available for the lichen community analysis. That plus data from climate models allow us to extract the influence of these factors on lichen communities and isolate the effect of pollution. For similar reasons, north-central California has been divided into three model areas: the greater Central Valley, the NW Coast, and the Sierra Nevada range. Creating models for the subdivisions enhances our ability to detect the effect of pollution by minimizing variability in environmental conditions since the Californian landscape is topographically and climatically diverse.

Central Valley Model

The first model will apply to the greater Central Valley model area, which includes the Bay area and adjacent coast south to Santa Barbara. Additional surveys were conducted in 33 urban parks this summer (Figure 2) near CARB air quality monitors to allow us to calibrate lichen community structure with direct pollution measurements. We did encounter several compromised lichen communities in our urban plots in the greater Central Valley model area. Typical telltale signs of pollution impact are low species diversity despite an abundance of suitable substrate (i.e. San Jose, at Guadaloupe River Park; Bakersfield, at Yokuts

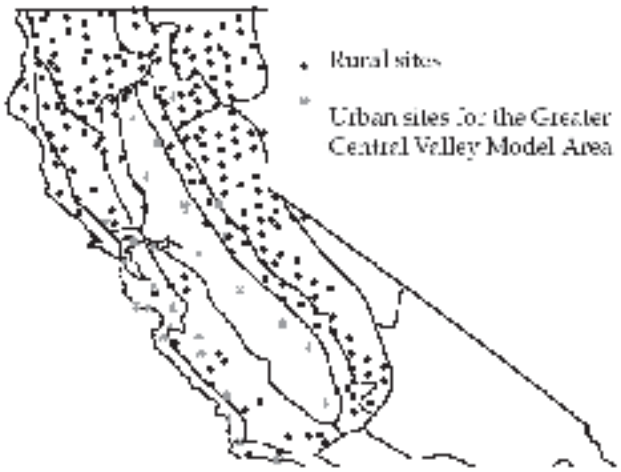

Figure 2: Map of lichen community plots

River Park), and unusually small thalli that are contorted and bleached (i.e. Goleta, at Lake Los Carneros and Nipomo at Nipomo Regional Park). In many plots only nitrophilous species were found (i.e. Modesto, at 1000 Oaks Park and Stockton, Oak Park). Without an intact gradient model, it's unclear which pollutants are affecting these sites and how other environmental factors are involved. However, completion of this first model is anticipated for January 2003, whereupon we can more confidently describe the effects of pollution in the study area.

The CARB and NADP data present us with a big picture of air quality in north-central California. With additional bio-monitoring in forests, the magnitude and sophistication of air quality monitoring in California will be truly unsurpassed. We will be able to describe pollution gradients and thus identify ecosystems at risk. Likewise, we will also be able to estimate local air quality for all sites in the bio-monitoring dataset and make estimates for new sites if lichen community data is available. Hopefully these resources will greatly inform the land use and management decisions of California residents and agencies alike.

Acknowledgements

I'd like to thank Shirley Tucker for an insightful review of this essay. Ken Brotherton also helped

with proofreading. Lichen data for all California plots are available online via the Forest Inventory and Analysis website at: http://www.wmrs.edu/lichen/

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Leptogium cyanescens (Rabenh.) Köber, new to California

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Leptogium cyanescens is the most common species of Leptogium in North America north of Mexico, according to Sierk (1964), who qualifies his statement by placing western limits at northern Colorado and the Black Hills of South Dakota, and citing collections from British Columbia and southern Alaska. Goward et al. (1994) show two collection localities in B.C. and three in southeast Alaska, and after quoting Sierk, add the caveat "...it is obviously very rare in B.C.". Geiser et al. (1994) found *L. cyanescens* on six of 257 plots in southeast Alaska, and gave the species an overall abundance estimate of "infrequent to common". McCune and Geiser (1997) list it as rare in the Pacific Northwest. There are only nine known sites on public lands in Oregon and Washington (Derr, pers. comm.). *L. cyanescens* is also known from at least five locations in Arizona, one in Apache County in the northeast corner of the state, and two each from Cochise and Pima Counties in southern Arizona (ASU Herbarium 2002). Hale & Cole (1988) have no mention of it in California.

There is a new detection of *Leptogium cyanescens* in California, in Humboldt County, on Six Rivers National Forest in the northwest corner of the state (Figure 1). The location is a 1244m ridge in the Coast Ranges separating an area of direct coastal fog zone to the west from a high (850m) shallow lake valley to the east, approximately 1.8 km south of Mad River Rock and 3.2 km east of Ruth Lake. The site has a generally east aspect, moderate (20%) slope, and 95% canopy cover in a relatively young Black oak-Douglas-fir forest with no understory and modest coarse woody debris present. *L. cyanescens* was found growing among mosses on the boles of *Quercus kelloggii*. This is a new lichen for California and represents a range extension of approximately 185km from the nearest known location in Oregon (Derr, pers. comm.)

Figure 1: Location of Leptogium cyanescens *in California.*

Leptogium cyanescens is designated a Category A lichen in the Northwest Forest Plan, according to the following criteria: 1) the species is rare and all known sites or population areas are likely to be necessary to provide reasonable assurance of

species persistence, and 2) pre-disturbance surveys are practical, because the species can be identified in the field. The objective behind the designation is to manage all known sites and minimize inadvertent loss of undiscovered sites (USDA 2001). There is no entry for *Leptogium cyanescens* in the California Department of Fish & Game's Natural Diversity Database, where eleven other lichens are listed, and as such receive some protections under state law.

The California Lichen Society's proposed list of threatened and endangered lichens does not list *Leptogium cyanescens* for California.

Leptogium cyanescens is a small gelatinous cyanolichen that is easily overlooked and easily identified when its growth is characteristic. No other Leptogium has the combination of cylindrical laminal isidia and lead-gray to blue-gray color. Immature or aberrant thalli, without isidia or with color that is not properly developed can be confused with *L. subaridum* or *L. lichenoides*, but *L. lichenoides* is typically shiny and wrinkled, and both are brown to blackish and have a lobulate to incised margin. Decrepit or decaying thalli of *L. saturninum* can resemble *L. cyanescens*, but the lobes will be much larger and some vestige of the abundant tomentum on the underside is usually evident. *L. cyanescens* may have tufts of hairs at the attachment points, but is not tomentose. (See back cover for an image of *L. cyanescens;* The California material is much less robust.*)*

The current status of species receiving federal protections under the Northwest Forest Plan is undergoing considerable flux because of a lawsuit brought against the Secretaries of Agriculture and the Interior by a group of Oregon timber operators, and it is possible that *Leptogium cyanescens* may lose its Survey & Manage designation, in which case its subsequent status is uncertain.

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Texosporium sancti-jacobi (Tuck.) Nàdv. in California

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One of the very rare lichens in California is *Texosporium sancti-jacobi*. This is a monotypic genus. It has been given the common name of the woven-spore lichen. How a so-called common name can be derived from a character that can only be seen through a compound scope at a high magnification is a bit puzzling to me. Indeed, the spores when magnified do appear to be tiny woven oval spheres.

Until recently, it was known from only three locations on mainland California. One of these was Pinnacles National Monument, another was Aliso Canyon in northern Santa Barbara County and the last was a collection from the 1960's on Kearny Mesa in San Diego, a site which has subsequently been built over. In addition it is known from two island locations, Chenetti Canyon on San Clemente Island and Bullrush Canyon on Santa Catalina Island.

This past year there have been additional locations reported for this unusual lichen. Richard Riefner found a population in the Shipley Multi-Species Reserve near Lake Skinner in western Riverside County. An upcoming article in Crossosoma will give extensive information on his collection and its location. Andrew Pigniolo found three locations within a few hundred meters of each other on a remnant portion of the Clairemont Mesa south of San Clemente Canyon and west of I-805 in San Diego.

I worked with Tom Leatherman of the National Park Service surveying particular sites in Pinnacles National Monument this spring. The first location of *Texosporium* found here was found by Dennis desJardin in 1983. The location SE of the eastern entrance road was found to have been wiped out in a flood a few years ago. This was disheartening as the location was extensive. However, two new rather small locations on the NW side of the entrance road were found in this survey. Other new populations were found near the oak grove area which is adjacent to the South Wilderness Trail and a very lush population was located in the center of the turnaround above the Chalone Creek Picnic Area. The population at the junction of the High Peaks Trail and the Condor Gulch Trail, which was found by Bruce McCune, Roger Rosentreter, Charis Bratt & Beth Kantrud in 1996, is still intact. Now that the resource personnel at the Pinnacles have seen this lichen and have learned its habitat, other populations may be found within the Monument.

The habitat that all of these locations have in common is a relatively flat open area with hardened soil, undisturbed and sparsely vegetated. *Texosporium* is found on old small mammal dung, clumps of detritus, small pieces of wood or other lichens. There is a great variation in the prominence or almost lack of the underlying white crust, as well as the intensity of color of the mazaedium rim from bright yellow to dull grey. In Oregon, at the Pinnacles National Monumenta and at the Aliso Canyon site it has beens found with *Aspicilia californica*.

With the picture included in this issue of the Bulletin (see images on back cover), it is hoped that more people will become familiar with this lichen and look for it when they are in the field.

Questions and Answers

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When talking to the general public about lichens on field trips or at workshops, I am asked certain questions which are of common interest to those attending. Three such questions are answered below. The column is meant to serve people who are new to lichens and do not have easy access to lichen literature.

1. Question: Why study lichens at all?

Answer: This question, which was asked at a recent workshop, was answered so well by Mikki McGee, longtime CALS member, that, with her permission, I am presenting her comments here:

Answer: "There are about as many answers as there can be interpretations of the question. The question itself is vast. So vast, it is impossible to be of a simple answer.

From the point of view (POV) of the "economical mind", they do have economical value. A reading of "The Vanishing Lichen" by Richardson will detail many of the economic values past and present. It (Lichen) is valued in France as a mast or base for perfumes, in Scotland (and among textile people) as a source of famous tartan dyes, dyes that moreover do not fade!! Rome reserved some dyes for Emperors, perhaps including a lichen dye. In Finland, topological (on the skin only) antibiotic preparations ("Usno", from *Usnea spp.*, and "Everno", from *Evernia prunastri)* are still available. A judge in Sussex, England was petitioned to, and then did order the owner of a new and glaring concrete grain warehouse to spray his ugly building with a mixture of horse manure and pulverized lichen scraps to remove the glare and get some lichens growing on it. Hmmn.

Poets, photographers, and painters consider lichens very aesthetic things. Aesthetics was one of the draws for my recent "Brisbane Lichen Faire" which got a good turnout.

From the scientific POV, lichens are one of the better examples of what appears to be a vital (life quality) universality: interspecific associations that are "commensal". The term means living together, and other things. Parasitism ("feeding alongside" in one interpretation) is one form. Mutualism (exchanging or sharing benefit) is another form of commensalism. Cooperation in obtaining food (or other benefit) is another. In some cases, "friendly competition" may be considered to be commensal.

In lichens, the gamut seems to be shown. And it ranges from "farming fungi" to several astonishing assemblages, with implications that challenge the understanding of scientists. For example, at least three Kingdoms are "major players" in the make up of a northern relative of our local *Lobaria pulmonaria*. There is the fungus, in one kingdom. We may call it "Fungi". *Trebouxia* (and other genera of algae) are now classified in "Protista". The lichen involves colonies of several blue green algae species, most commonly *Nostoc (muscaria?),* classified as a bacterium (Kingdom sometimes called Bacteria, sometimes called Prokaryota).

What seems to be most interesting to me (sometimes) is that the *Nostoc* colony is picked up by the lichen on the lower surface, passes through the lichen from bottom to top (in a modified form), and MAY exit on the upper surface, to again perhaps become a free living blue green algal bacterium. While within the thallus, the *Nostoc* does its normal "business as usual" of making the nitrogenous compounds, necessary for life, from atmospheric nitrogen – a rare talent. Hmmn.

To this we can add the fact that while a lichen can be disassembled and the fungus and algae

cultivated separately, no one (yet) has gotten one properly put back together again in pure culture. They don't assume the proper form of "the lichen." One implication of this, to me, is redolent of a problem in cultivation of mushrooms: a specific bacterium must be present in the compost, or the fungus doesn't fruit (no mushrooms, only "mould" is present).

Is the "community entire" necessary for the lichen to form the "typical" lichen thallus? If so, how many players are necessary?

Finally, for me, I find them cute, and interesting challenges to my skills as a "microscope nut". (Perhaps that should be a separate taxon? Don't tell the taxonomists!) I like them, they smell nice, look nice and.....for me, the world would be lacking, without them."

Thank you, Mikki. Would anyone else like to state their reason for studying lichens?

Question: Have lichen acids been synthesized?

Answer: Yes, the first one, lecanoric acid, was synthesized in 1913. By 1974 the molecular structure of over 80 other lichen substances had been established by lichenologists in Europe, Japan, India and the United States. The work continued, and new impetus in the study of the chemistry of lichen substances was provided by more rapid and improved methods for determining the structure of these compounds. "Total synthesis is now a common means of structural confirmation", according to J.A.Elix in "Lichen biology", edited by Tom Nash in 1996. The results of these investigations are used in current discussions of the origins of lichens and their relationships to one another, as well as in lichen taxonomy and systematics.

3. Question: Why do lichens come in so many colors?

Answer: This question cannot be answered in the way it can be of flowering vascular plants, i.e. to attract insects and other organisms for purposes of pollination. Colors play no such role in lichens.

Pigments are the cause of many lichens colors. If they are absent, the lichen is usually some shade of gray. In the winter when lichens are saturated the upper cortex is transparent and they look more green. This is noticeable in *Pertusria amara*, an almost white lichen when dry and common on trees in the Bay Area.

Following a long period of rain it is green and looks distinctly different. In another example, the lobes of *Lobaria pulmonaria* will change dramatically from brownish to bright green when wet.

But pigments in the upper cortex are the reason for the yellows, oranges, reds and browns that we see in lichens. As to why, rather than how, lichens come in so many colors, the pigments do provide the algae with some protection from ultraviolet light. The brightest display of color in lichens is found on rocky surfaces in exposed areas. In parts of the world with higher radiation levels you find the lichens darker than those at higher latitudes where the angle of the sun is lower and the problem of radiation less. The color of the lichen may also affect its internal temperature. The darker colors would absorb heat at higher elevations and latitudes while the production of white powdery pruina often found on desert lichens reflects the sun's rays and helps keep the internal lichen temperature cooler.

These are reasonable explanations for some of the color diversity we see. But still, there are acres of white lichens in the arctic and black lichens are not unknown in the desert – just to keep things interesting.

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News and Notes

Brooks Island Field Trip on May 12, 2002

On May 12, 2002, a group of CALS members gathered at the Richmond Yacht Club for a field trip to Brooks Island. The trip had originally been planned for January 26, but was cancelled because the weather was so stormy. So eager were the participants in May that several had gathered as much as 20 minutes early. So the first boat load took off exuberantly instead of waiting for the appointed time, which had been determined according to tide schedules. The tradition of "ladies first", not always followed in today's world, led to the first boat being largely occupied by women. Dan Seifers, a friend of the Doells and a member of the Richmond Yacht club, had generously offered transportation in his Boston whaler, and the 15 minute trip was fast and smooth. Thanks to the speed and the early departure, we arrived at the island before the tide had risen sufficiently for a proper landing on the beach, and we had to wade through the knee deep sticky dark mud for about ten feet. Dan the boatman heroically jumped in and tried to pull the boat to higher ground, but to no avail. The group was amazingly stoic about the whole thing and, shedding shoes and socks, sloshed ashore, Janet Grant cutting her foot in two places on something sharp and invisible in the slurpy depths. Thankfully, it was not serious.

We had just finished cleaning off our legs and putting our shoes back on when the second load arrived, able to power right up to the hard sand. The passengers stepped out of the boat without so much as a wet foot. So much for being too eager, and for the "women and children first" rule.

Brooks Island is part of the East Bay Regional Park District and just half a mile from the Richmond Marina. It consists of 75 acres of land and about 300 acres of water. Salt marsh and coastal strand environments are present, along with areas of natural California bunch grasses and rock formations of Franciscan chert. Many birds nest here and many more are known to visit. Wildflowers were in bloom the day we were there, the sun was shining, the breeze was pleasant – it was the perfect day for such an excursion.

The island was inhabited by the Ohlone tribe of Native Americans for 2,000 to 3,000 years until the middle of the 19th century. They were followed by pioneers who raised cattle, fruit and oysters. The rock quarry was in use early in the 20th century, providing rock for the construction of Treasure Island, part of San Quentin prison, and the breakwater protecting the Richmond marina. There is little left to show for all this activity now.

Heather, one of the two caretakers on the island, came to meet us after our landing incident. She led us past the nesting gulls and up the trail to the residence where she and Roy live. Some rocky outcrops on the way kept everyone occupied for some time en route, and the sight of picnic tables led some people to start taking out their lunches. It was not lunch time yet, however, and the group turned their attention to the *Aesculus californica* around them. These were festooned with the netted *Ramalina menziesii* and orange splashes of *Xanthoria parietina* and *X. polycarpa.* A less familiar find on the *Aesculus californicus* (California buckeye) was *Diploicia canescens,* a lobed crustose lichen without a lower cortex but with the general aspect of a foliose lichen. The small black signatures of *Opegrapha sp.* were also on the same substrate. Casting an eye on the *Baccharis pilularis* nearby we could see the black dots of *Micarea sp.* along with *Physcia adscendens* with its tiny hooded lobe tips, and the small orange fruticose *Teloschistes chrysophthalmus.* The larger *Ramalina subleptocarpa,* bare of apothecia, was also there. A look at the *Cupressus* (Cypress) near the residence revealed tiny concave apothecia of *Gyalecta herrei* along with the white crustose thalli of *Sigridea californica.*

Next, Heather and Roy organized the day's hike, each taking charge of half the group. Heather proceeded to lead her charges down the leeward trail on the island. Roy and his group went over the ridge and down to the quarry where we were all to meet for lunch. Along the leeward coast the

commonest genus was *Caloplaca*, represented by *C.brattiae, C.ludificans, C.luteominia* and *C. marina.* This being an ornithocopraphyllic lichen it is no wonder that there were so many of them on this bird populated island. The rocks were also adorned with another orange lichen, *Xanthoria candelaria*, and with the pale gray thalli of *Verrucaria muralis. Ramalina fraxinea*, a robust and heavily ridged species joined the fruited *R.leptocarpha* on the *Aesculus*, along with the orange *Xanthoria oregana* with soredia on the lower surface of the lobes. *Endocarpon pusillum,* one of the few soil lichens found on this trip, and *Gyalecta jenensis* with its small yellowish pink apothecia, were also in this area, on the dried mud bank above the beach.

At the Southeast tip of the island, at the end of the Leeward trail, the coastal rocks had a rich flora of crustose lichens, some in shades of gray like the *Aspicilia cinerea, Dimalaena radiata, Lecanora gangaleoides, Lecidella asema* and *Thelomma californicum* with its spores loosely gathered in the mazaedia.

Verrucarias seen here come in black like the marine V. *maura,* as well as in gray like the *V. muralis* which is not necessarily found near the shore. They were accompanied by the lirelliform *Opegrapha crassispora.* The rocks also bore three *Nieblas,* sturdy coastal lichens roughly resembling Ramalinas, i.e. *N. homalea, N. combeoides* and *N. laevigata;* and the gray *Lecanora gangaleoides* and the vaguely similar *Lecidella asema* which tends to grow on maritime rocks.

The tide was still high when we reached the southern end of this trail and we were unable to get around the rocky point to the trail taking us to the meeting place at the quarry. Therefore we had to walk back to where we started and then go over the ridge.

In the meantime Roy had been leading the other half of the group over that route. On the *Baccharis pilularis* (Coyote brush) they passed they found the pale, inconspicuous *Anisomeridium biforme* along with the also fairly inconspicuous *Arthonia pruinata,* its apothecia hiding beneath a thick layer of pruina. Brown *Melanelia subaurifera* was also growing on the *Baccharis* here, along with *Vermilicinia cephalota* with its bluish soredia. Cladonias seen along the trail included the common, branched *C. furcata*, and also some other Cladonias being decimated by *Diploschistes muscorum,* a small white crustose lichen which uses algae from the Cladonia as a photobiont when it is first developing.

When the two groups finally met at the quarry it was obvious that the leeward side of the island had a richer lichen flora than the central part, including the quarry area. We arrived quite late for our rendezvous, and by the time we gulped down our lunch it was time to get going up the windward trail in order to catch the tide correctly for our return to the mainland.

On the way back along the shore the breeze was cool but pleasant. Brightly colored lichens were represented by yellow *Candelaria concolor,* and the red topknots of *Cladonia macilenta* on fence posts. *Cladonia cervicornis subsp.verticillata* added a little beauty to the Lilliputian landscape with its intricate pattern of podetia growing one on top of the other.

Old wood lying around as it always does along beaches was decorated with *Flavoparmelia caperata*, an old friend, and with granular *Trapeliopsis flexuosa,* not that the latter is very decorative. Rock lichens in this area included *Xanthoparmelia cumberlandia,* foliose and apotheciate; tiny rosettes of *Physcia callosa;* frilly looking *P. tribacia*, *Hypotrachyna revoluta,* the margins of its short lobes curled downward and coarse soredia everywhere; thin and pinkish *Trapelia coarcteta* and the similar *T.involuta* on a bank of hardened soil. *Parmotrema chinense,* with its curled and sorediate lobe tips showed up on *Baccharis* beside the trail.

We all more or less walked back together along the windward trail, and Dan was soon there with his boat waiting for us.

Heather and Roy were most pleasant and helpful throughout the day, and seemed interested in our project.

CALS members present on this field trip were Marck Mencke, Bill HIll, Judy and Ron Robertson, Tim Milliken, Suzanne Alterman, Richard and Janet Doell, Loch and Janet Grant, Boyd Paulson and Peter van Arsdale, Boyd's guest.

Judy and Ron Robertson put together a great lichen list given the time we had, and are responsible for the names used in this report. A more formal list of species is available upon request by contacting me at doell4@attbi.com.

(See the last Issue of the Bulletin , v. 9, no. 1, for images taken on this trip.)

Reported by Janet Doell

CALS Field Trip to Santa Cruz Island, Santa Barbara County, August 5-9, 2002 planned and organized by Charis Bratt, Santa Barbara Botanical Garden.

The Channel Islands complex is made up of 8 islands, 4 Northern and 4 Southern, separated from the mainland by the Santa Barbara Channel. Santa Cruz Island is part of the Northern group and is the largest of the California Channel Islands. About 17,000 to 18,000 years ago, the four present-day Northern Channel islands probably were all part of one large landmass, referred to as "Santarosae".

Santa Cruz Island is 23.5 miles in length and roughly 7.5 miles wide at its widest point. It hosts the mountain of highest elevation (2470 ft.) in the island complex. The landscape is dominated by two longitudinal ridges (the North and South ridges) running in an east-west direction, divided by the Central Valley which is 12.5 miles long.

The North and South ridges and the Central Valley divide the Island into four ecological zones:
1) the coastal slopes, flats and canyons on the north side, 2) the south-facing interior slopes and canyons above the Central Valley, 3) the north-facing interior slopes and canyons on the south side of the same valley, and 4) the south-facing coastal slopes, flats and canyons on the south side.

The climate of the island is Mediterranean with mild wet winters and dry warm summers. A study found that the Central Valley was densely overcast only 7% of the time and clear 67%of the time between June and October. Coastal regions, however were partly or complete overcast as much as 50% of the time.

Not only is the landscape determined by geology, climate, and topography, human history has greatly determined what we see now on the Island as well. In the past, the island was inhabited by the Chumash tribe. These Native Americans affected changes in the plant community by their selective harvest of plants for food or other uses, altering habitats in the vicinity of their villages, and transporting plant material from the mainland to the island and between islands.

European ranchers came to the island in the early and middle 1800's, and introduced sheep, cattle and pigs. In the late 1800's, fruit orchards and grape vineyards were cultivated. In 1937, Edwin Stanton purchased the western 90% of the island, with the remaining 10% under other private ownership. Stanton tried to maintain and domesticate the sheep flocks, but was unsuccessful. Because of severe overgrazing, an effort was begun to control sheep on the island. In 1978, The Nature Conservancy acquired a conservation easement on Stanton's

Participants at the Santa Cruz Island CALS field trip on August 5-9, 2002

share of the Island and began an extensive program of fencing, trapping and hunting feral sheep. At the present time, most all of the sheep have been eradicated. Also in 1978, The Nature Conservancy began a program to remove the cattle herds from the island. In 1980, the four Northern Channel Islands and Santa Barbara Island were designated by Congress as Channel Islands National Park. The National park service is now planning to eradicate the feral pigs which are a common sight on the island.

Lichen exploration of the Santa Cruz islands can be traced back to the early 1900's to the time of island explorer and field botanist, Luella Blanche Trask. She was a resident of Santa Catalina Island. Many of her specimens deposited at the California Academy of Sciences were destroyed in the 1906 earthquake and fire. Her personal herbarium was destroyed in a large fire at Avalon on Santa Catalina Island in November 1915. She is cited in Hasse's "Lichens of Southern California" for collecting *Teloschistes villosus* now *T. californica* on Santa Cruz Island, but that lichen has not been found on this island to date although it is present on other islands. Although the Channel Islands are known for high levels of vascular plant endemism, (at least 37 of the island's native taxa are island endemics), only two lichens are endemic to the islands, both of them on San Nicolas Island.

This is a brief log of CALS trip to the island.
August 5, 2002:

Our day started at the dock in Ventura tying our packs, food boxes and other gear with pink ribbons, ready to share an Island Packers catamaran with another group heading out to Santa Cruz Island. The catamaran ride is much faster than the traditional boat and we crossed the strait in about half the regular time. We landed at Prisoners Harbor. The dock was newly built since the last CALS excursion to the island five years ago. We unloaded gear by climbing up a wooden ladder from the boat deck to the now much sturdier new wooden dock.

Pick up trucks had been left at the dock for transporting us to the UC Santa Barbara Research station located in the Central Valley about 3 miles away. We piled our gear into 2 trucks and rode through some planted eucalyptus, chaparral scrub, large oaks hanging over the trail, narrow-leaved baccharis shrubs narrowing the barely-wide enough rough dirt road. Crossing creeks with only a trickle of water, we saw invasive exotic fennel plants dominating some of the disturbed landscape. We passed the old Stanton ranch and arrived at the Research station.

The Station is made up of a central structure with a kitchen and dining area and living room area surrounded by rooms with 2 to 4 bunk beds. Other structures house 3 labs, and 6 or 7 cabin type rooms for more permanent residence, usually researchers staying a more extended time on the island.

We were very thankful that Heidi Bratt had agreed to cook our meals again this trip. And we were very well fed! Homemade muffins and scones were part of the breakfast venue and homemade foccacio, soups, cake and even sorbet accompanied the main dinner dishes of lasagne, Chicken Kiev, soup, and Mexican cuisine. Homemade cookies for lunch accompanied our camp mix, sandwiches and fruits. Her meals were definitely a highlight to the trip.

On this first day, we went out in the field. Cherie's long time friends, Darwin and Jeanette Sainz were our "chauffeurs". In two open jeeps we headed up the South Ridge Road. The dry soils create a desert like habitat for soil lichens. This area is the site of the type specimen of *Psora californica* Timdal, a lovely small soil lichen with delicate ascending, pruinose lobe tips. We stopped for a moment at the Chrisy Pines, an old Bishop Pine forest. This area had not seen the start of new pines until the sheep eradication. Now many young stands are visible. We drove down to the Valley road and east for more shaded spots to stop and collect lichens. *Parmotrema hypoleucinum* (Steiner) Hale was common on the oaks. A good number of bark and rock crusts remain to be identified. Cherie has brought many international lichenologists to the island and together with her own collection has compiled lists of the lichens collected and identified so far on the Channel Islands complex. Her list will serve as a resource to all who subsequently travel to the island in the process of completing an inventory. This article will only attempt to highlight some lichens we encountered during our trip.

On day 2 we traveled 17 miles in approximately 2 hours with stops only for camera shots. We were headed to Frazier Point at the far west end. The time it took to travel this short distance is a witness to the condition and hazardous nature of the roads and that we made the trips safely and without mishap to the skillful driving of Darwin and Jeanette.

The West end of the island is coastal prairie. We parked and walked to the very tip, noting the Chumash pits where their dwellings had been. Flat areas scoured by the winds were free of grasses and filled with small boulders covered with *Niebla* species and soil crusts filling in the spaces between. Frazier Point was a highlight of a variety of Caloplaca species, including *C. brattiae* W.A. Weber, named after Cherie, and *C. coralloides* (Tuck.) Hulting with a great variety of other coastal rock species.

We then drove a short distance east to the Wave Terrace area. We walked from the jeeps through coastal grasses to the terraced hills where we encountered many species of *Niebla* and *Vermilicinia* covering rocks and branches of small plants and shrubs. We headed for some overhang areas to see *Schizopelte californica* Th. Fr.and *Buellia capitis-renum*. Trentepohlia lichens were dominant in these areas with *Dendrographa leucophaea* (Tuck.) Darbish , *Lecanographa hypothallina* (Zahlbr.) Egea & Torrente common.

Above the wave terrace area is a flat, dry habitat rich with soil crusts. Here, the whole team of CALS participants found a lichen not listed from the Channel Islands. The group had split into 3 smaller groups and almost simultaneously we approached one another with this unusual lichen in our hands, *Solenospora "cladonioides"* B.D. Ryan & Timdal, in prep., a lovely soil lichen with black apothecia nestled in the brittle, ascending light brown squamules. This was the highlight of our day. We were later told that the lichen had been collected previously but not identified. 0ver 15 species of *Niebla* and *Vermilicinia* were collected this day and beautifully displayed in the lab that evening. On our way back to the research station, we stopped at Chrisy ranch and collected crusts on the cypress, eucalyptus and fence rails surrounding the rarely used ranch structures.

On day 3 we drove to the Sauces Canyon road. A large population of Bishop Pines occur here. We walked along the crest of the Sierra Blanca Ridge and could easily see the young pines on our left, growing well without sheep impact and the older, thicker stands on our right. The crustose lichen, *Pertusaria flavicunda* Tuck., dominated the knobby rock outcrops along the trail. The delicate green *Leprocaulon microscopicum* (Vill.) Gams ex D. Hawksw. was barely visible on the vertical soil surfaces between the rocks.

On day 4 we drove to Centinela Grade and walked down Centinela canyon toward Campo Raton. Roadcuts, oak stands, and willows, were explored for lichens. *Hypogymnia mollis* L. Pike & Hale, one of the few sorediate species of *Hypogymnia*, was collected this day. After climbing back up the grade we drove to the Lagunitas Secas road which connects the southern and northern ridges. Large flat rock surfaces were rich with *Peltula euploca* (Ach.) Poelt, *Collema* and *Lecania* species. *Teloschistes exilis* (Michaux) Vainio was plentiful on the oak branches and understory shrubs.

That evening, Lyndal Laughrin, Director of the Research Station, joined us for dinner and then gave a presentation of the History of Santa Cruz Island. Photos told the story of livestock and plant invasions and of all the measures to restore the island habitat to a more natural and original state. He explained the complex interaction of human and animal populations that must be evaluated in successfully carrying out restoration projects. Our evenings were spent in the Laboratory, processing and identifying specimens.

Day 5 brought us to our last day on the island. After packing our gear and cleaning the UC station, we piled into our 2 jeeps and toured the Stanton Ranch residence. An old Chapel with artifacts and art objects and a small museum gave us a feeling of the island history and legend. While most of us drove to Prisoners Bay to await the coming of the Island Packers boat, a few walked the road. At Prisoners Bay we explored the trail through oaks and pines towards Pelican Bay. A few swam in the Bay water and from the dock we could see rays, tiger sharks, kelp crabs and colorful fish. We packed our gear on the boat and headed back for the mainland.

This was truly a memorable experience for each of us. We thank Cherie Bratt for organizing and leading the trip, Heidi Bratt for planning, preparing the delicious meals, Darwin and Jeanette for being our drivers, and the keepers of the Research station, for their hospitality.
Participating were: Ann Weidlich, Suzanne Alterman, Boyd Poulsen, Andrew Pignolo, Ron, Judy and Kelly Robertson, Patty Patterson, Heidi Bratt, and Cherie Bratt.

Thanks to Janet Doell for editing this report.

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Reported by Judy Roberetson

Fieldtrip to Rock Springs, Mount Tamalpais
August 24, 2002

Led by Barbara Lachelt, CALS revisited the Rock Springs area of Mt. Tamalpais in Marin County on August 24, 2002. The previous time that we were there in April of 2000 the wind was sweeping a bone chilling fog through the area. This time the weather was fabulously calm, warm and sunny. Participating were Irene Winston, Michelle Lee, Janet Gothrop, Patti Patterson, Tom Carlberg, Mikki McGee, Kelly, Judy and Ron Robertson, and Bill Hill. Barbara had a checklist from previous times that she has been in the area and we compared it to what we found. We began by looking over the (coastal live) oak trees and rocks on the hillside just to the south of the parking area, as we have done before on other fieldtrips to this location. It is amazing that we never cease to find different things in this very same location every time we go there. Barbara mentioned how there had been a controlled burn in the area some years ago and some of the items on her list we did not find, but we found several lichens this time that were not on her list and that we had not noticed on our previous fieldtrips to the very same rocks. Perhaps we are getting keener eyes with age! And don't anyone ever say that Brodo and Sharnoffs' "Lichens of North America" is not a field guide – Irene brought her's and we used it 'in the field'!

On the oak we found many familiar and common inhabitants: *Parmotrema arnoldii, Flavoparmelia caperata, Flavopunctelia flaventior, Evernia prunastri, Ramalina farinacea, Sticta limbata, Lobaria scrobiculata, Hypogymnia tubulosa, Physcia adscendens* (hooded lobetips), *Physcia tenella* (simple rhizines), *Physconia americana* (squarrose rhizines, lobes on apothecia), and Judy immediately found *Hypotrachyna revoluta* which she has become very familiar with in her area.

On the rocks we especially noted: *Caloplaca cetrina* (completely sorediate), *Xanthoparmelia mougeotii, Lecanora gangaleoides* (light inside a cut apothecia while *Tephromela atra* is dark), *Umbilicaria polyrrhiza* (rhizines on underside with ball on tips, and no soredia or isidia), *Lecidea tessellata*, and many others we were not as sure of.

In the forest by the trail to the Mountain Theater were old standby's still there on the tree trunks: *Lobaria pulmonaria* (turns green when wet), *Pseudocyphellaria anomala* (stays brown when wet), *Sphaerophorus globosus, Platismatia herrei* (narrow lobed, isidiate), *Platismatia glauca* (larger lobes, sorediate here), *Leptogium corniculatum* (in moss, lobes long and hornlike, not finely dissected), and plenty of Parmotrema and Hypogymnia.

In the chapparal past mountain theater was more *Hypotrachyna revoluta* of course, and *Ochrolechia*, *Trapeliopsis flexuosa*, and on rock, *Punctelia stictica.*

The large rocks right by the parking lot hold many interesting lichens to comment about. Here reportedly seen was *Koerberia sonomensis* (tiny isidia, dark olive greenish patches), *Leptogium lichenoides* (lobe tips finely divided, on rock), *Physcia erumpens*, and *Lecania dudleyi*.

Finally in a somewhat boggy area by the trail on the way back to the parking lot, Ron Robertson

pointed out a moss that is a Marin county record – *Rhytidiadelphus triquetrus*.

The Rock Springs area on Mount Tamalpais is surely one of our prize locations for lichens in the San Francisco Bay Area.

Reported by Bill Hill

Sonoma County Field Trip on October 6, 2002

This field trip took place in Sebastapol, west of Santa Rosa, and started at the home of Darvin DeShazer, a CALS member. The emphasis for this field trip in Sonoma County was lichen ecology. We used the lichens growing on the deciduous Oregon white oak as our benchmark. The oak is common in Sonoma County. Our benchmark tree was over 75 years old with a trunk diameter of over 3 feet. We observed where the lichens were growing, the difference between those growing on trunk and twig, the name and number of species and their abundance. We speculated on the cause of the population and distribution of the lichens discussing availability of sunlight, moisture, propagule source, air circulation, bark texture and chemistry. We noted moss growth on the trunk and lower side of the branches, with lichen growth predominating on the upper side of the tree branches. We quickly counted 14 species of foliose and fruticose lichens on the oak. *Flavoparmelia caperata* (L.) Hale, *Parmotrema chinense* (Osbeck) Hale & Ahti , *Parmelia sulcata* Taylor were common on the larger branches, with *Flavopunctilia flaventior* (Stirton) Hale and *Punctilia subrudecta* (Nyl.) Krog sparsely encountered. *Hypotrachyna revoluta* (Florke) Hale and *Ramalina menziesii* Taylor were occasionally present and *Hypogymnia tubulosa* (Schaerer) Hav. rare. The twigs hosted plentiful growth of *Xanthoria polycarpa* (Hoffm.) Rieber, *Usnea arizonica* Mot., *Evernia prunastri* (L.) Ach., *Ramalina farinacea* (L.) Ach., *R. leptocarpha* Tuck. and *Melanelia subaurifera* (Nyl.) Essl.

With this tree as our standard and lots of questions in our heads we moved to Darvin's yard to look at lichen growth on other kinds of trees. The smooth bark of his birch tree had very little foliose growth but the trunk was covered with a pyrenomycete. Looking like a pyrenocarpous lichen, this was a first exposure to a growth of white paint-like thallus with black, shiny perithecia. A quick growing cypress, only 3 years old but as large as many of the other trees we observed, had no lichen growth. An ornamental deciduous tree hosted almost as many species as the native oak and we encountered our first specimens of *Teloschistes chrysophthalmus* (L.) Th. Fr. and *T. exilis* (Michaux) Vainio. Although *T. exilis* is listed on CALS preliminary Rare and Endangered list for California, the lichen species is quite common in Sonoma County. It has been recorded from Pepperwood Reserve, Annadel State Park, Howarth/Spring lake park, and has been observed at multiple other sites in the county. Darvin's pineapple guava tree hosted almost exclusively *Parmotrema chinense* (Osbeck) Hale & Ahti as the larger foliose lichen. Bird activity explained the heavy growth of *Physcia adscendens* and the presence of 3 species of *Xanthoria* (*X. polycarpa* (Hoffm.) Rieber, *X. oregana* Gyeln., *X. parietina* (L.) Th. Fr.) covering the twigs of this rather small shrub.

Sebastapol is the home of many apple orchards and we were able to compare the lichen growth on dead and live apple trees. The smooth bark of the live tree hosted many more crusts than the older, dryer, and more loose bark of the dead tree. The dead tree hosted plentiful growth of *Physcia adscendens* (Fr.) H. Olivier and *Xanthoria polycarpa* (Hoffm.) Rieber which was very sparse on the live apple.

The most encountered lichen on all types of trees was *Xanthoria polycarpa* (Hoffm.) Rieber, second was *Flavoparmelia caperata* (L.) Hale with *Parmotrema chinense* (Osbeck) Hale & Ahti and *Physcia adscendens* (Fr.) H. Olivier third and fourth. The least encountered was *Hypogymnia tubulosa* (Schaerer) Hav. This distribution is consistent with the oak woodland lichen community in Sonoma County.

We then walked to the local cemetery. The cemetery is divided into an older part that is not watered and a newer part that is. We cataloged the growth on new/old, granite/marble or limestone and artificial surfaces. First, most noticeable, was the fact that the water supply for the cemetery is highly concentrated with iron. All of the gravestones and structures on the watered side were an oxidized-

iron color of orange. We speculated about how this might effect the lichen growth and found a considerably larger amount of lichen growth on the surfaces not watered compared to those on the watered side even though the dates of the gravestones varied only slightly. In the area not watered, we looked at over a dozen granite surfaces and a similar number of limestone or calcareous surfaces. The dates on the gravestones ranged from 1882 to 1940. *Xanthoparmelia cumberlandia* (Gyelnik) Hale was the largest foliose lichen we encountered and it occurred primarily on the granite surfaces. One thallus on a gravestone dated 1883 was 40 cm in diameter. Remarkable was the greater number and variety of species on the granite surfaces compared to the limestone. The granite surfaces hosted at least 10 crustose and 6 foliose species. Crustose species included *Dimalaena radiata* (Tuck.) Hale & Culb., lobate and non-lobate *Caloplaca* sp., *Aspicilia* sp., *Candelariella* sp., *Lecanora dispersa* (Pers.) Summerf., *Lecanora muralis* (Schreber) Rabenh., *Lecidia* sp., and at least 2 additional crusts. Macrolichens included *Physcia adscendens* (Fr.) H. Olivier and *P. callosa* Nyl., *Xanthoria candelaria* (L.) Th. Fr.., *Neofuscelia verruculifera* (Nyl.) Essl., probably two *Xanthoparmelia* sp. and even a *Ramalina* species. Many individual granite surfaces hosted from 4 to 8 species of lichens. On the limestone surfaces 6 lichen species were observed. *Physcia adscendens* (Fr.) H. Olivier and *Xanthoria* candelaria (L.) Th. Fr. were the predominate foliose species with a small amount of Candelaria *concolor* (Dickson) Stein , and a rare thallus of *X. parietina* (L.) Th. Fr. *Lecanora dispersa* (Pers.) Summerf., and a *Caloplaca* sp. (both also occurring on the granite surfaces) were the primary crusts. Very few limestone surfaces hosted more than 3 or 4 species of the 6 observed. For all types of surfaces, the most plentiful growth was *Xanthoria candelaria* (L.) Th. Fr. and *Physcia adscendens* (Fr.) H. Olivier.

We then walked to the nearby Luther Burbank Experimental Farm. Luther Burbank was a Sonoma County resident from approximately 1875 to 1926. He said of the area "I firmly believe, from what I have seen, that this is the chosen spot of all this earth as far as Nature is concerned." A famed horticulturist, Burbank conducted the plant-breeding experiments that brought him world renown. His objective was to improve the quality of plants and thereby increase the world's food supply. In his working career Burbank introduced more than 800 new varieties of plants including over 200 varieties of fruits, many vegetables, nuts and grains, and hundreds of ornamental flowers. A walking tour of the grounds highlights 32 plants, many of them his hybrids including 'Paradox' Walnut, White-fruited 'Snowbank' Blackberry, Jerusalem Pear, Hybrid Nightshade, Thornless Blackberries, Chinese Quince, and Shasta Daisy. The trees are being used today to graft and develop new stocks of trees. We had a lunch under the Quince tree. We observed some of the lichen growth here, but left the cataloging of the farm for a future CALS field trip.

This was an interesting day. We came back with some good observations and many questions.

We were thankful for the help of CALS member, Earl Alexander. His knowledge of rocks and chemistry were a great help. Darvin is the local expert on mushrooms, being called to the hospital to identify possible poisonings. He pointed out some of the interesting fungi we encountered. The field trip was led by Judy Robertson. Also participating were, Shelly Benson, Elizabeth and Leonard. Rush, Lawrence Glacy, Bill Hill, Irene Winston, and Bill & Stevie Ferguson.

Reported by Judy Robertson

Informal Field Trip to Lake Tahoe and Reno, Nevada November 9th-14th 2002

At the request of Tamara Susaki, Resoure Ecologist for the California Department of Parks and Recreation CALS scheduled an informal field trip to identify lichens within State Park boundaries at Lake Tahoe.

Our president, Bill Hill asked that I take the lead in organizing this trip. Well, as it turned out, Bill needed to meet with Eric Peterson in Reno, Nevada to work on some San Margarita identifications and so the idea to combine the two projects was born. What was originally envisioned as a weekend field trip expanded into an interesting and productive five day work week.

On the weekend of November 9th, during the first

major Sierra snow storm of the season, Bill and I, taking separate routes, somehow managed to meet at Eric's house in Reno. We spent what was left of Saturday and all day Sunday working on the San Margarita specimens and being thoroughly entertained by Penny the family dog and three wonderful cats. On Monday, November 11th Bill, Eric and I headed up the hill to work on Nevada side lichens. At approximately 9:00 a.m. We meet with Gail Durham, Forest Botanist with the U.S. Forest Service, whom Eric had invited to join us. Our point of departure was the Marlet Creek Parking Lot near the lake. We planned to immediately head up the hill. But you know how lichen field trips go. About five feet from our vehicles we started seeing stuff. A very little further on Bill spotted Bryoria, which I am very interested in, as I am making a little comparative study of this air pollution sensitive genus at the Calavaras Big Trees State Park, comparing what is there now to what Professor John Pinelli found twenty-seven years ago. That was the only Bryoria we found all day.

Gail was curious to see if the sensitive water lichen *Hydrotheria venosa* was present in Marlet Creek. This species grows only in unpolluted streams. We were not able to find it. However, we were hampered by snow and did not do a thorough search. Eric, who did his doctoral thesis on the Caliciales was happy to find *Calicium adequatum*. All in all a great day, a little chilly, but no precipitation.

On Tuesday the 12th, Bill, Eric and I met with Tamara Sasaki at the California State Park Resources office in Tahoe City. Once again we started collecting in the parking lot and gradually worked up away from the lake on a fairly steep embankment, through the snow to a large rock outcropping. What a great view of Lake Tahoe. At this point we got our best shot at crustose lichens. We enjoyed this until mid afternoon when we headed out for Sugar Pine State Park. Here we collected foliose, some fructicose and more of Eric's favoricte Pin lichens. We again got a smattering of Bryoria. We were able to leave Tamara with a good starter kit of lichens.

On Wednesday the 13th Tamara joined Eric, Bill and myself in Reno for an I.D. session. Eric gave us a very good demonstration on some of his I.D. techniques. I think we all learned quite a bit.

The highlight of the week was that CALs gained two new members and we have agreed to start an unofficial "Sierra Chapter". Anyone interested in joining in?

We wish to thank Eric, and especially Adrienne Peterson for allowing us to destroy their home life for the better part of a week. Their hospitality was greatly appreciated. Thanks also to Tamara Sasaki for hosting me during the west Tahoe leg of the trip.

Reported by Boyd Poulsen

San Jose Lichen Workshop

'An Introduction to Foliose and Fruticose Lichens', September 21, 2002, San Jose State University.

Leading the workshop was Judy Robertson who had prepared a teaching set of foliose and fruticose specimens for this beginners class. Each participant had approximately 30 specimens to use for observation and identification. The samples were labeled with the morphological characters the participants would be observing but not the scientific names of the lichen. After a brief introduction about lichens we begin to look at the lichen structures represented by the samples. Comparing like structures is helpful, so we look at cyphellae vs pseudocyphellae, soredia vs isidia, tomentum vs hairs and cilia, lecanorine vs lecideine apothecia, etc. After a morning spent observing and discussing morphology, we spend the afternoon identifying the specimens. Using Irwin Brodo and Steve and Sylvia Sharnoff's *Lichens of North America* combined with *Lichens of California* by Mason Hale and Mariette Cole, we identified each specimen, again grouping the specimens into similar ones so more subtle differences could be seen.

Unknowns are also available for identification. Although we had a small number of persons at the workshop it was beneficial to all present. Participating were Shelly Benson, Boyd Poulsen, Bill Hill, Bill Ferguson and Judy Robertson.

Thank you to Bill Ferguson for arranging the use

of the San Jose campus for this workshop and also to Bill and Stevie Ferguson for hosting a mini CALS Board meeting at their home following the workshop.

Berkeley Lichen Workshop

'An Introduction to Foliose and Fruticose Lichens', October 19, 2002, Jepson Herbarium, Valley Life Science Building, UC Berkeley

Mary Ellen Colberg, Earl Alexander, Mare Staton, and Arlyn Christopherson participated in this introductory workshop held in the Conference Room of the UC Berkeley Jepson Herbarium. This workshop was originally scheduled to be led by CALS founding member Barbara Lachelt, but she was unable to do so. Judy Robertson took her place. After an introduction to lichens, we spent the morning looking at about 30 specimens of different lichens, each person having their own set. We divided them into foliose, fruticose and crustose species, then began to look at identification characters: color, reproductive structures, morphological features, comparing and contrasting like and unlike specimens. After lunch in the sun on the University grounds, we resumed using the same specimens and Hale and Cole's *Lichens of California* keys to identify the specimen to genus. We had only 2 copies of *Lichens of North America* available but we used them extensively for photos, maps and descriptions. The participants left with a good introduction to common lichens in California as well as morphological search images to take out in the field.

Bill Hill videotaped the session. Thank you to Dick Moe for reserving the conference room, coming in on a Saturday, keeping watch at the herbarium doors, and arranging for microscopes and lights as well as gathering them up and putting them away.

Reported by Judy Robertson

San Francisco Lichen Microscopy Workshop

Lichen Microscopy Workshop at San Francisco State University by Mikki McGee on 2 November 2002.

This was an excellent session for learning effective use of the microscope. Mikki must be commended for knowing her subject well and being a good teacher. Attending were Judy Robertson, Charis Bratt, Boyd Poulsen, Bill Hill, Irene Winston, Shelly Benson, Tom Chester, Tom Carlberg, Kathy Faircloth, and David Sarasua. The excellent Olympus CH30 binocular compound microscopes of the SFSU Hensill Hall student laboratory were pre-set in Kohler illumination with slides of leprose specimens mounted in glycerin to give us a preview of what the scopes can do. First came hands-on experience with proper cleaning of the eyepiece with soft brush and lens paper. Then following a quote by Louis Agassiz that "The best visual aid is a sharp pencil", we sharpened our observations by drawing what we saw. We paired up and removed Kohler illumination on one of the microscopes by lowering the substage to see the degradation of the image. Then learned how to reestablish Kohler illumination with correct adjustment of the microscope light path - lamp brightness and lamp housing aperature, substage position (specific for each objective) and finally substage aperature.

We then made our own slides of easy to mount Lepraria specimens, first in water and then in GAW (glycerine - alcohol - water) to see the difference in 'clearing' that a mountant of proper refractive index/optical density can bring to seeing details inside the cells of the specimen. Air in the specimen is a major obscurity - although fungal hyphae do absorb water, their wax coat repells water. Water mounts can be made more 'wetting' with a drop of clear detergent per cup of water, but alcohol does even better. Then Mikki demonstrated the delicate heating of a slide of GAW mount, whisking it over an alcohol lamp flame in order to 1) 'fix' cell protein structure in position without disrupting cells - and 2) drive out air bubbles in the specimen. The alcohol and water evaporate leaving a mount of higher optical density glycerine. Mikki used only materials which are easily obtainable, noting that for instance 2:1:1 proportions of GAW can be made with a 1:1 mixture of glycerine (available in any drugstore) and gin (which is already 1:1 ethanol and water)! Slides can be made nearly permanent by applying nail polish around the edge of the coverslip.

Regarding books, Mikki pointed out that most important is a laboratory notebook to keep detailed notes and an accumulated formulary of mountant media, reagents, and stains used. An old standby for her is the 1974 "Mycological Guidebook" by RB Stevens – a college teachers exchange guidebook, with one of the best and most comprehensive formularies in the back. Also good are: JD Corrington, 1941, "Working with the Microscope" and JE Saas, 1940, "Elements of Botanical Microtechnique" (McGraw Hill, NY). It turns out that HL Barnett's 1960 "Illustrated Genera of Imperfect Fungi" is useful for dispelling the confusion created by the fungal contaminants which abound in lichen preparations. She also had a "manual of methods for general bacteriology" for recognizing the bacteria found in every slide, especially if cotton blue stain is used. She showed us a paper in German regarding the ciliates (protozoa) which live under lichens and make soil - critters that abound in the ecology of lichens if you look for them, and there are others such as the tardigrades which are even specific for lichens. Along with her books Mikki has some slide trays (from Carolina Biological Supply) to keep slides flat while dehydrating. Finally, another excellent book is Peter Gray's 1964 "Handbook of Basic Microscopy" - from which she copied some pages for handouts which she gave to us.

Mikki talked about three kinds of 'subdivisioning' of specimens – smashing, teasing, and sectioning – important in order to see the interior parts without the interference of overlying or underlying structures. For sectioning Mikki uses double edge razor blades cut in half as some of the double edged blades have the best cutting edge. We spent most of the afternoon learning about sectioning.

Most of the problems people have with sectioning turns out to be because they don't 'clear' mounts properly. Due to varying contents, different lichens have different requirements to see their internal structures well. Some lichens such as Caloplaca or Teloschistes work quite well in a simple water mount. However others like Buellia and Lecanora contain crystals with a high index of refraction and waxy substances which refuse water penetration, and a better mountant is lactic acid or lactophenol. These mountants help to see through hyphae and 'clear' the specimen with a refractive index closer to that of the specimen. The index of refraction of most living tissue is 1.5, of glycerin is 1.43 and water is of course 1.00. This clearing was spectacularly demonstrated by a glass rod in a vial which disappeared in oil of the same refractive index. Thus immersion oil is used to eliminate the air/glass interface in the light path to make the image, not larger, but clearer for details. In this way one can view structures as small as 1/4 micron.

We practiced sectioning Caloplaca and Xanthoria apothecia under stereo binocular dissecting microscopes using a razor blade with a slicing motion guided by a fingernail that is holding down the specimen, barely moving back the fingernail between slices. A 50 micron handcut section is reasonable, and cutting a wedge allows a view of thick (entire tissue) and thin (interior of cells) parts in the same slice. We saw how to use forceps to measure out a small drop of detergent water onto a slide and transfer the slices to the drop of water. Then let down a coverslip by one edge first using fine pointed forceps. It takes 10 to 20 minutes for the specimen to soak up water, and if you add lactic acid or lactophenol the cell walls swell. After you see as much as you can with water, adding alcohol will dissolve the waxes. To do this, lift the coverslip by holding down one edge with a finger and lifting the other edge with needle or forceps. Further clearing is done by replacing the water with a drop of KOH. This turns everything red (in our Caloplaca or Xanthoria specimen) but also dissolves crystals allowing a thinner mount. Complete microchemical tests can be done in this way.

To make this into a lactophenol mount, the KOH is first soaked up with a twisted point of tissue paper delicately to leave the specimen in place. You can use a needle or forceps to pull or lead liquid away from the specimen, perhaps tilting the slide. Put a tiny drop of lactophenol near the specimen and draw it to the specimen with a needle. Then after about 30 seconds add a drop of water, drain off the drop of water, put one drop of lactophenol on the specimen, put on a coverslip, and heat it to drive off bubbles. Sealing the coverslip edges with nail polish makes this a relatively 'permanent' slide of a stained specimen.

An iodine test can be done after a KOH immersion

by first soaking away the KOH with a twisted tissue point, then 'rinsing' the KOH from the specimen slices with detergent water. Any KOH at all will interfere with the iodine reaction. Draw off the rinse before adding a drop of Lugol solution. The specimen turns blue. Rearrange the pieces with forceps leading the liquid back around the selected pieces. Breathing on a fresh coverslip and wiping with tissue both cleans it and dampens it to allow it to add itself better to the liquid when lowered over the specimen on the slide. In the case of our specimens, the iodine stained the tholus tip of the ascus blue. The proper concentration of the iodine is important as it can be too strong.

Participant Tom Carlberg demonstrated the use of two microscope slides as a 'microtome' to cut slices. Put the specimen to be cut in a drop of water on a slide and put the second slide over that so its edge just overlaps about half of the specimen. Then with the razorblade draw slices guided along the end of the top slide to keep the slices straight, and tilting the blade progressively ever so slightly between slices to make very thin slices.

Mikki described how she sharpens a dental scalpel to use to trim a section under the microscope: Heat it in a flame to soften it and then sharpen on a fine stone. Next alternately dipping in olive oil and heating in the flame will temper and add carbon to the steel, resulting in a tempered high carbon steel blade. This blade is then used on a plastic coverslip to slice a section of specimen without dulling the blade. All such sharp points are stored inserted into a cork.

Tom also had a neat trick. He inserts a piece of 0.2mm steel guitar string into a 'handle' consisting of a piece of hotmelt glue stick to make an accurate thickness gauge for use under the dissecting microscope. There are also guitar strings in various thicknesses.

The workshop was well paced with plenty of discussion time and individual instruction, and we left the lab feeling that we had learned so much in such a short time.

Reported by Bill Hill

Brisbane Library/CALS "Lichen Faire"

For the month of September 2002 the Brisbane Library was host to a "Lichen Faire" exhibit culminating with a hands-on demonstration on the last Saturday. Primarily developed by CALS member Mikki McGee, the Lichen Faire was considered to be a means of introducing local people to the lichens, their roles in the environment and nature, functions within nature, and some of the uses man has found for them. The display elements were composed of specimens, enlarged photos of the specimens shown, and a simple language label-discussion of the characters or features illustrated, such as bark preferences, the roles in nature, and how lichens function. The Library's display cabinet, a vertical one of four shelves, three feet wide and over a foot deep, became a display of local lichens with substrates of bark of oak and toyon, local sandstone (Franciscan Greywacke), and soil. It included a special display of the Library's recently acquired "Lichens of North America" by Brodo, Sharnoff and Sharnoff. The local fabric specialist Susan Maynard contributed a display of lichen dyed hanks of wool, silk, and other yarns.

The hands on demonstration "with living lichens and live lichenologists who are there to help you understand lichens" was done by Mikki McGee and Bill Hill, and was complete with microscopes and specimens for questions, answers and discussions. Many questions were fielded about lichens being hidden delights, their small size and intricate structure, and how to introduce lichens to selected surfaces, including manmade ones. Susan Maynard had produced a 3 by 4 foot display sign, and a number of smaller posters to advertise the event, and had a dyer's table set up at the demonstration to talk about tartans and emperors' purples.

The Library Staff found the Lichen Faire to be interesting to the public and themselves, and a modest boone to the community. In this town of Brisbane with about 5000 people, many saw the exhibit during the month and 23 came to the Saturday hands on Faire, 8 of them children – a favorable showing for this size of town. We welcome questions about setting up such an event.

Reported by Bill Hill and Mikki McGee

Upcoming Events

Field trip to Redwood Regional Park
CALS Annual General Meeting and 'Birthday' Celebration, January 11, 2003

On Redwood Road, just a few miles over the ridge from downtown Oakland, is a hidden redwood forest whose peaceful groves give little evidence of its bustling past. In the mid-1800s what is now Redwood Regional Park was the scene of extensive logging to supply building materials for San Francisco. The logging era has long since passed, and a stately forest of 150-foot coast redwoods (*Sequoia sempervirens*) has replaced those cut down.

Redwood Regional Park's 1,836 acres also contains other evergreens, chaparral, and grasslands. Wildlife within the park includes rare species such as the golden eagle and Alameda striped racer snake. Deer, raccoons, rabbits, and squirrels are often seen.

We plan to meet at the Redwood Gate on Redwood Road east of Skyline Blvd at 10am. We will follow the West Ridge Trail. Eucalyptus trees tower overhead, accompanying California bay, madrone, pine, toyon, broom, sticky monkeyflower, poison oak, coast live oak, elderberry, coyote brush, honeysuckle, common snowberry, and blackberry. Creambush and hazelnut are conspicuous. Minumum lichen collecting will be permitted for reference specimens to make a species list for the park.

The field trip will end at 3 pm and we will drive to the Brickyard Landing Clubhouse in Pt. Richmond for our CALS 'Birthday Celebration' and Annual General meeting. The Birthday Celebration will be a Pot Luck dinner so plan to bring your favorite dish. The General Meeting will follow the dinner. Contact Judy Robertson at 707-584-8099 for questions or directions.

Check out http://www.mtbca.com/redwood.html for more information about Redwood Regional Park.

An Introduction to the Foliose and Fruticose Lichens
Darwin Hall, Rm.207
Sonoma State University
February 8, 2003 10 a.m. to 4 p.m.

Foliose and fruticose lichens will be the emphasis of this workshop. We will discuss the nature and history of the lichens and then learn basic lichen morphology, using prepared specimens as examples. Spot tests will be demonstrated. Collection, preparation and preservation of specimens will be discussed. We will use a variety of keys to identify unknown specimens or specimens brought by the participants. Please bring a lunch. Coffee, tea and snacks will be provided.

Ongoing Lichen Identification Workshops
Darwin Hall, Room 201, Sonoma State University
The 2nd and 4th Thursday of every month, 5 pm. to 8:30pm.

Join us every 2nd and 4th Thursday of each month for these Lichen ID sessions at SSU. We bring our specimens, use the classroom dissecting and compound scopes and a variety of keys to identify them.

We help one another at difficult places in the keys and get feedback about our methods. This is a great time to work on those specimens you have collected but have not had time to ID, those that you have had difficulty identifying or just learning about lichens. We have snacks and enjoy hearing about the latest good collecting spot. There is no cost for our workshops but be prepared to pay a $2.50 parking fee.

Fairfield Osborne Preserve, 6543 Lichau Road, Penngrove, Sonoma County
March 1, 2003, 10 am. to 3 p.m.

Rolling hills, gnarled oaks, golden grasses, and the gentle ridge line of Sonoma Mountain describe Fairfield Osborne Preserve, a good representation of what is quintessentially Sonoma County. Aside from the influences of the Miwok people and a very few others, this land has remained relatively undisturbed for millennia. Named in honor of a pioneer ecologist known as a maverick with an irreverent sense of humor, Fairfield Osborne Preserve was established by the Roth Family in 1972. Originally a project of The Nature Conservancy, and now owned and managed by Sonoma State University, the Preserve is a non-profit organization, run primarily by volunteers, and dedicated to protecting and restoring the natural communities on the Preserve as well as fostering ecological understanding through education.

Join us for a lichen walk through part of the Preserve. We will car pool from the SSU Campus. Meet at 10 am at parking lot F on campus. The lot is directly east of the SSU Main Entrance road. Parking is free on Saturday. Bring a lunch. No collecting will be permitted. The field trip will end by 3pm. Check out www.sonoma.edu/org/preserve for more information about the Preserve. Contact Judy Robertson at jksrr@aol.com or 707-584-8099 for more information or directions.

Castle Rock State Park, 15000 Skyline Blvd. Los Gatos, Santa Cruz County
April 12, 2003, 10 am to 3 pm

Along the crest of the Santa Cruz Mountains, Castle Rock State Park embraces 3,600 acres of coast redwood, Douglas-fir, and madrone forest, most of which has been left in its wild, natural state. Steep canyons are sprinkled with unusual rock formations that are popular with rock climbers. The forest here is lush and mossy, crisscrossed by 32 miles of hiking and horseback riding trails. These trails are part of an even more extensive trail system that links the Santa Clara and San Lorenzo valleys with Castle Rock State Park, Big Basin Redwoods State Park, and the Pacific Coast. We will explore for lichens once collected by A.W.C.T. Herre. Collecting will be for reference specimens only.

The park is located on Highway 35, just 2-1/2 miles southeast of the junction with Hwy 9. Meet at the entrance at 10. Bring a lunch. Check out http://www.parks.ca.gov/default.asp?page_id=538 for more information about the Park.

Shingle Mill Preserve, Santa Cruz County
May 17, 2003, 10 am to 3 pm

Tucked away in the Santa Cruz Mountains just off Highway nine between Saratoga Gap and Boulder Creek, the Shingle Mill Preserve covers a few hundred acres of hilly, heavily wooded land, owned by a handful of individuals. Most of the parcels are used for vacation homes, although a few are occupied full time. In the forest, Redwoods predominate, with Doug Fir, Madrone, Tanbark Oak and an occasional Bay tree also present. Lichens are not especially profuse, but we have cladonias, flavoparmelias, hypogymnias, parmotremas, peltigeras, pseudocyphellarias, tuckermannopsis and a variety of usneas in good supply. The last *Usnea longissima* recorded for San Mateo County was in this preserve before a storm blew over the tree it was growing on a few years ago.

The Doell cabin in the Preserve lacks plumbing and running water but boasts a hand pump and a cistern, and electricity with the help of a small generator. This cabin is where CALS was founded by nine determined souls in 1994. We will combine a lichen walk in this lovely area and a mini-workshop in the Doell's cabin. Bring a lunch and plan to learn some new lichens this day.

For more information and directions, contact Janet Doell at 510-236-0489 or doell4@attbi.com

UC White Mountain Research Station, Inyo County
July 11-14, 2003.

The White Mountain Research Station (WMRS) is a multi-campus research unit of the University of California. WMRS was established in 1950 to provide laboratory, teaching, and housing facilities for researchers doing field work in the Eastern Sierra. While WMRS was originally used

for research in high-elevation physiology, it is now used also by scientists in such diverse fields as archaeology, astronomy, atmospheric science, ecology, geology, plant biology, and zoology.

Housing will be at the Crooked Creek Conference Center, located at the edge of the Patriarch Grove and at an elevation or 10,150 feet. The fee is $45 per night which includes room and board (and the meals are very good). We will meet Friday evening for dinner. Saturday and Sunday we will be out in the field exploring for lichens and enjoying the beautiful scenery in this high country. The field trip will officially end Sunday after lunch. Collecting reference specimens for the station will be permitted.

Check out http://www.wmrs.edu/ for more information about the station.

If you are interested in the above events, or would like more information, contact Judy Robertson at jksrr@aol.com or 707-584-8099.

Announcements

Donors

We would like to recognize the following members of CALS who subscribed since the June 2002 Bulletin at the Donor, Sponsor, Benefactor or Life membership level. As a token of appreciation, new members in these categories will receive a CALS poster. New Life or Benefactor members will also receive a mini guide.

Benefactors:
Kathleen Faircloth

Donors and Sponsors:
Irene Brown
Philippe S. Cohen
Chicita Culberson
Dana B. Ericson
Helen & Fraser Muirhead

New or Interesting Collections of Lichens in California

Fuscopannaria mediterranea (Tav.) P.M. Jørg. Collected in Colusa county 1.6 miles N of Walker Ridge and in Trinity county in the Whiskeytown Shasta-Trinity State Recreation Area by Sarah Jovan, determined by Bruce McCune. Tor Tønsberg also collected this in Humboldt county.

Fuscopannaria pulveracea (P.M. Jørg. & Henssen) P.M. Jørg. Collected in Mendocino county 1.4 mi. SW of Riverdale and Hwy. 101 by Sarah Jovan and determined by B. McCune. The type location is in Trinity county and there are historic collections from Los Angeles and Santa Clara counties. This is infrequently collected.

Hydrothyria venosa J.L. Russell Collected in Butte and Plumas counties by Shana Gross, USFS. This brings to 10 the number of counties in which this is found: Butte, Calaveras, Fresno, Kern, Lake, Madera, Mariposa, Plumas Trinitiy & Tulare.

Leptogium cellulosum P.M. Jørg. & Tønsberg Collected in Calaveras county at Tuner Park in San Andreas, in Monterey county at Garland Ranch park in Carmel Valley and in Santa Barbara county off Paradise Road in Los Padres National Forest by Sarah Jovan and determined by E. Martin. These collections would be range extensions.

Leptogium teretiusculum Wallr.) Arn. Collected in Calaveras county at Turner Park in San Andreas, in Mendocino county about 0.7 miles SW of

Farley Peak and in Shasta county about 1.8 miles NW of Dubakella Mountain by Sarah Jovan and determined by E. marin and others. The only previous collections are by Harry Thiers from Nevada and Santa Barbara counties.

Ramalina thrausta (Ach.) Nyl. Collected in Del Norte county about 1 mi. SE of Tyson Chrome Mine in Six Rivers NF by Sarah Jovan and determined by D. Glavich. A previous collection was by William Sanders in Sonoma county.

Tholurna dissimilis (Norman) Norman Collected in Fresno county about 0.7 mi. SE of Brown Cone, just N of the Kaiser Wilderness Area of Sierra National Forest by Sarah Jovan and determined by T. Goward. This is a new record for California.

List of lichens probably in California, but without known collections or published reports

By Shirley Tucker <tucker@lifesci.ucsb.edu>

In revising the lichen catalogue for California (with Bruce Ryan), we have a short list of taxa that are only reported in secondary sources (keys,general texts, etc.). If you have collected any of these or know of specimens in herbaria, please notify Dr. Tucker (at e-mail address above).

Acarospora heufleriana Körber (Ryan key for CA)
Acarospora stapfiana (Müll. Arg.) Hue (Ryan key for CA)
Aspicilia reptans (Looman) Wetm. (Ryan key for CA)
Buellia stigmaea Tuck. (in Ryan keys for CA)
Gyalideopsis athalloides (Nyl.) Vezda (Ryan keys for CA)

Hypotrachyna sinuosa (Sm.) Hale (Hale & Cole 1988; Brodo et al. 2001) Syn.:
Parmelia sinuosa
Lecidella latypiza (Nyl.) Choisy (in Ryan key for CA)
Marchandiomyces corallinus (Roberge) Diederich & D. Hawksw. Syn.: *Illosporium corallinum*
Melanelia hepatizon (Ach.) Thell (Brodo et al. 2001, p. 435)
M*obergia calculifornis* (W. A. Weber) H. Mayrh. & Sheard Syn.: *Rinodina calculiformis*, *R. platyloba* (Fink 1935)
Opegrapha ochrocheila Nyl. (in Ryan key for CA)
Phaeophyscia adiastola (Essl.) Essl. (in Ryan key for CA)
Peltigera malacea (Ach.) Funck (Hale 1979; not in Cal., fide Brodo et al. 2001, p. 513)
Porpidia speirea (Ach.) Kremp. Syn.: *Lecidea speirea* (Fink 1935)
Psoroma hypnorum (Vahl) Gray (Hale 1979, in extreme northern California; not reported for Cal. by Jørgensen [2000] or by Brodo et al. [2001, p. 604])
Rhizocarpon disporum (Naeg. ex Hepp) Müll. Arg. (TJ; Hale & Cole 1988; Brodo et al. 2001)
Solorina crocea (L.) Ach. (Hale 1979; McCune & Goward 1995; McCune & Geiser 1997, p. 268)
Toninia athallina (Hepp) Arnold Syn.: *Catillaria athallina* (Thomson 1997)
Verrucaria canella Nyl. (TJ) Syn.: *V. glaucina* subsp. *canella* (Fink 1935)

Scenes from the
Rock Springs,
Mount Tamalpias
foray of
August 24, 2002
Photography: Bill Hill

Jerry Cook

1927-
2002

Jerry Cook was one of those admirable people I consider a great honor to have known. He and his longtime friend, Don Brittingham, consistently drove two Thursday evenings each month from Ukiah, 60 miles north of Santa Rosa, to Sonoma State University to attend the CALS Lichen ID workshops.

I met Jerry on CALS' first field trip to Pepperwood Reserve in 1997. We held the field trip despite the pouring rain, and Jerry drove from Ukiah to begin his introduction to lichens. Jerry and Don joined CALS after attending a Hopland Field Station lichen workshop, and they have attended most all of the field trips and workshops north of the Bay since then.

Jerry was not only interested in lichens. They were one of the last areas of the natural world he explored. In Ukiah where he lived and taught for 47 years, his expert knowledge of wild mushrooms was so trusted, doctors would consult him to find out if ailing patients had eaten a poisonous species.

Born in Selden, Kansas, in 1927, Jerry moved to Wyoming where he graduated from the University of Wyoming and later received a Master's Degree in Botany. He and his wife moved to California in the 50's where Jerry began teaching biology at Ukiah High. He also taught courses for Sonoma State University, Santa Rosa

Junior College and Mendocino College. During the 1960s, Jerry worked summers as a naturalist at Van Damme State Park, Russian Gulch State Park and Samuel P. Taylor State Park in Marin County. He was also a member of the Native Plant Society, and of the Redwood Valley Outdoor Education Project.

He loved teaching. He taught at Ukiah High School for 32 years. During his teaching career he won grants to spend summers at universities studying everything from fungi to marine biology. After retiring in 1988, Jerry became one of the first non-Buddhists to teach at the City of 10,000 Buddhas temple in Talmage. During the next 12 years, he taught high school biology at the temple as well as science classes at the Dharma Realm Buddhist University, and became known among students for his teasing sense of humor. During his 'retirement', Don, who had been a fellow teacher at Ukiah high, and Jerry began taking 'flower, tree, shrub, and mushroom' excursions into Northern California and Oregon. When they began a flower trip, they would write the name of every flower in bloom. They would camp at least twice each summer for a week or more returning to well liked habitats or exploring new ones. They started noticing lichens and at first just wanted to identify the few visible ones. That began a serious quest for both of them.

Even during duress they continued their forays into the Mendocino Hills. On a trip to the Siskiyou Trinity mountains, their driving on the back roads resulted in 4 flat tires in 4 days. Each had to undergo cataract surgery and Don says they served as eyes for each other. When Jerry had knee surgery, Don was his legs. They called themselves the 'Road Poachers', because, like so many lichen collectors, their hunt for lichens was often along the roadsides and road cuts.

Jerry's vitality was evident to all. He led mushroom hikes for the Wine and Mushroom Festival held yearly in Mendocino County. He led walks for the Redwood Valley Outdoor Education Project, for local Garden clubs, and for any group that wanted to walk in the hills and learn the flowers or trees or lichens.

Jerry's enthusiasm and dedication to his study of lichens was made most real to me when only a few days after being diagnosed with severe lung cancer, he and Don drove from Ukiah to the last CALS SSU Lichen workshop he was to ever attend. Within 3 months and a few days after he and his wife gathered with their children to celebrate their 50th wedding anniversary, Jerry died. I cannot express how I will miss him and his vibrant presence in CALS.

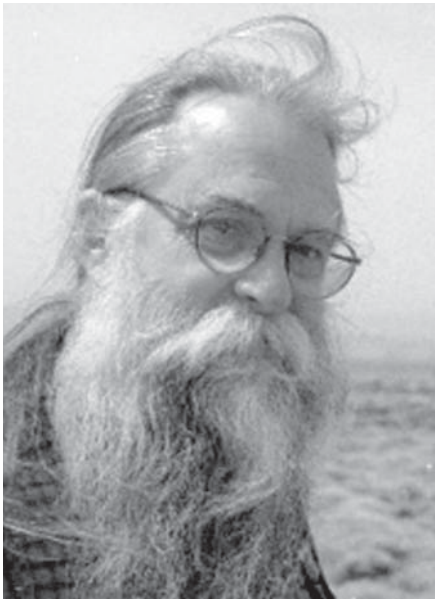
At the time of his death, Jerry had identified, prepared and written card file descriptions for almost 200 lichens. CALS is in the process of deciding where Jerry's collection would be best used.

Jerry is buried in the Ukiah Cemetery under oak trees with outstretched branches and lichens hanging over his grave.

Prepared by Judy Roberson

President's Message

More Fieldtrips, Workshops, and now CALS 'Chapters'



Hello fellow CALS members,

Writing this message has made me review what all has been happening with our California Lichen Society in the past few months – and it seems we are 'moving right along'. We have again had some nice fieldtrips this year. Besides trips to some new places, we revisited 'old friends' such as Mt. Tamalpais and Santa Cruz Island, and brought to them new people to acquaint with the lichens there. Of course we also made new lichen discoveries in these 'old' places, especially as did the observant bunch led by Cherie Bratt on the Santa Cruz Island trip this summer.

And of course with each trip comes yet another batch of specimens that we now must puzzle over to identify. It can get overwhelming. I know of members who refuse to go on any more fieldtrips because they already have many more unknowns than they can handle. Clearly something must be done about this! From just our trip to the Santa Margarita Ecological Reserve (SMER), I have a couple boxes of specimens, with many unknowns. Thinking we might get a checklist completed for SMER, Boyd Poulsen and I visited Eric Peterson for several days to work on identifications, but barely scratched the surface. So often we just said "I have no idea what this is!" and went on to the next envelope. We all have yet so much to learn.

We can help each other. Regular workshops, informal identification sessions, and setting aside a regular time of the week or month to work on collections can chip away at this backlog. While the workshops at Sonoma

State University continue, I see other local 'chapters' of CALS forming in regions other than the San Francisco Bay Area. Cherie Bratt has been holding identification workshops now in Southern California and it seems a 'chapter' may now be forming there. And when Eric, Boyd, and I took two days out from our identification marathon to see the lichens around Lake Tahoe with some others, we realized that there may be enough lichen enthusiasts in the Reno Nevada - Lake Tahoe area to begin a "Sierra/Nevada" chapter of CALS. It is encouraging to see these regional groups forming to study lichens.

Our former President and now CALS Secretary Judy Robertson has been working hard at planning fieldtrips to put in the Bulletin for the next year. We of course continue with trips near the San Francisco Bay Area – the 'core' of our membership, but I encourage you all to meet your neighbor lichen fanciers and go looking for lichens in your own area. And then meet again and try to identify the lichens you have found. Put a note out on our CaliforniaLichens email group that you want to go on a lichen hike, and find others near you who would gladly join you. We can plan just so many 'official' trips to put in the bulletin, and email is a great way to announce more spontaneous trips.

Email has also been a great way to flex the possibilities of our (still primordial) conservation committee. As many of you have seen, in just a few days we formulated via email a group response to the proposal within the Forest Service and BLM to reduce or eliminate concern for endangered species. The conservation committee plans to meet in January, finally in person, to define more precisely how we will determine and deal with the issues of 'rare and endangered' lichens in California. I keep hoping the current 'political climate' will blow over like a bad storm, and that there will be some landscape left with lichens still intact to preserve and cherish for future generations.

Finally, something I want to see in our future – a common lichen database. Many herbaria around the world have been recording their collections in computer databases. Cherie Bratt has been so proud of getting the collections in Santa Barbara cataloged into a database developed at Arizona State University. I would like to see a common database structure available to all members where we can organize our knowledge of our collections and observations. This will have ramifications throughout for us all – this database will be our 'memory' and we will begin to know a lot more about our lichen distributions and have a better idea of what is actually rare and needs to be protected.

(Notes)

The Bulletin of the California Lichen Society

Vol. 9, No. 2 Winter 2002

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Back Cover:

Figure A: *Texosporium sancti-jacobi* (Tuck.) Nàdv. A(1) X12. Late Summer, on CA Buckwheat or CA Sagebrush twigs and clay soil. A(2) X16. Late Spring on CA Sagebrush twigs and clay soil. Note the calycin in the mazaedia, and circular development patchs of calycin showing through the cortex before the apothecia/mazaedia form. A(1) and A(2) courtesy of and copyright © Rick Riefner 2002. A(3) Mazaedia on dark substrate. A(4) X8. *T. sancti-jacobi* on dried rabbit pellet. A(3) and A(4) courtesy of Charis Bratt.

Figure B. *Leptogium cyanescens* (Rabenh.) Köber X2.6. Image is of an eastern U.S. specimen, coutesy of and copyright © Steve Sharnoff 2002.

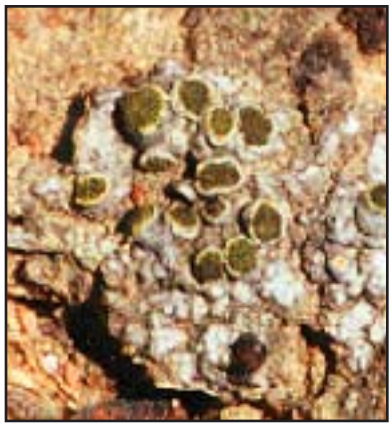

Figure A(1)

Figure A (2)

Figure A (3)

Figure A (4)

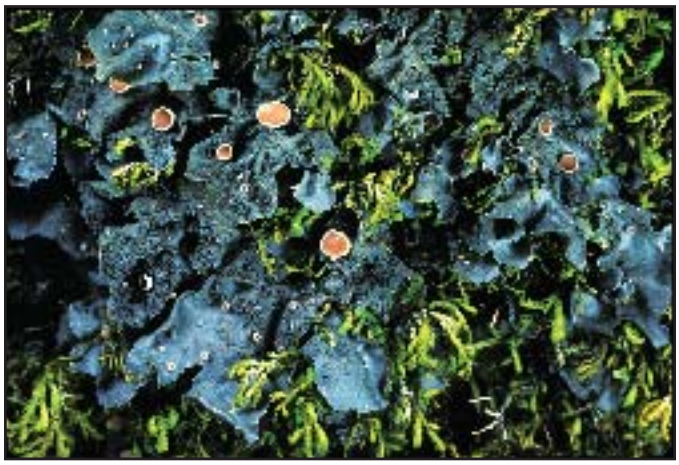

Figure B

(Figure Captions overleaf)