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Front cover: *Letharia columbiana* (Nutt.) J. W. Thomson. Near Stow Reservoir, Modoc County. X5. Photography by Richard Doell (see also article on p. 33).

## A Second Look at *Letharia* (Th. Fr.) Zahlbr

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I first discovered the genus *Letharia* (Th. Fr.) Zahlbr. at Yosemite's Crane Flat Campground in the summer of 2001. Bright yellow-green thalli littered our campsite, and it was easy to key them out to *Letharia vulpina* (L.) Hue. I did not even need a hand lens. Lately, however, I hardly look at *Letharia* without using a hand lens. I entered graduate school and began to follow the complex biogeographical, ecological, and evolutionary story unfolding in the chartreuse fruticose genus. I am writing now to spread the news that it is an exciting time to take a second look at the genus *Letharia*.

The two species of *Letharia* are easy to identify. *Letharia vulpina* is markedly sorediate-isidiate (Brodo 2001) and rarely fertile, whereas *Letharia columbiana* (Nutt.) J.W. Thomson has prominent coffee-brown apothecia trimmed with yellow-green spiny projections. Both species share a shade of yellow-green that is hard to confuse with anything else. The color and form of these lichens is so distinctive and attractive that they were chosen for the cover of *Lichens of California* (Hale and Cole 1988) and *Macrolichens of the Pacific Northwest* (McCune and Geiser 1997). Both are usually found on conifer bark or wood and commonly grow at altitudes between 5000 and 9000 feet. The photobiont of both species is a green alga from the genus *Trebouxia*.

The first person who suspected that something more complicated was going on with *Letharia* was Alwin Schade (1881-1976). I think that Schade looked more closely at the morphology of *Letharia* than anyone before or since. He was an expert on the lichens of Saxony (Germany), and he was intrigued when he ran across a tiny fragment of *Letharia vulpina* next to an herbarium specimen of *Tuckermannopsis chlorophylla* collected in 1800 (Schade 1954). *Letharia* was known in northern Europe, but it had not previously been reported in Saxony. In Dresden he studied European and North American specimens sent to him from herbaria all over Western Europe. From among the fertile specimens now known as *L. columbiana*, he delineated eight subgroups

based on morphological differences (Schade 1955). He considered himself a staunch lumper (Schindler 1979), so it is interesting that he felt strongly enough about the groups to give them names.

No one published on further morphological differences in *Letharia* until Trevor Goward (1999) briefly proposed that *Letharia vulpina* could be split into two species. Then Scott Kroken and John Taylor (2000, 2001) took an interest in the relationship between the "species pair" *L. vulpina* and *L. columbiana*. They wanted to know whether *L. vulpina* was just an asexual variety of *L. columbiana* and used genetic (DNA sequence) evidence to establish whether individuals from the two species were interbreeding. They found the following:

- 1) *L. vulpina* and *L. columbiana* are reproductively isolated lineages; they do not appear to interbreed at all.
- 2) Predominantly asexual *L. vulpina* can be further divided into two separate lineages as Goward had proposed. In California, one lineage occurs in the coastal ranges while the other occurs in inland mountains.
- 3) Predominantly sexual *L. columbiana* consists of four genetically distinct lineages.

Kroken and Taylor's study provides genetic evidence of breeding within the lineages but not between the lineages, an indication of extensive past speciation. In other words, California probably has at least six species of *Letharia*, and many of them grow together in the same forests, often on the same trees.

After finishing the genetic investigation, Kroken and Taylor went back and looked at the voucher specimens they had collected. They were able to find several morphological and one chemical difference between the lineages. Based on these differences and drawing on Schade's previous work, they gave nicknames to the six *Letharia* lineages. For example, *Letharia columbiana* 'lucida' has no isidia whereas the other three forms of

*L. columbiana* usually do have isidia. *L.c. 'lucida'* also enjoys the distinction of being the only lineage with norstictic acid absent in the apothecia (Kroken and Taylor 2001, Culberson 1969). Although Kroken and Taylor referred to the six lineages as species, they did not propose to revise the taxonomy in the *Letharia* genus beyond offering five new nicknames. Grube and Kroken (2000) argue that informal names are appropriate until a thorough geographic study using all types of taxonomic characters is available.

Where do *Letharia* lichens of the Old World fit into this picture? Recall that only *Letharia vulpina* is recognized in Europe (Linnaeus named it *Lichen vulpinus*). Kroken and Taylor confirmed that their Italian and Swedish samples fell into the same lineage as our coastal *Letharia vulpina* (Kroken and Taylor gave no nickname to the coastal form of *Letharia vulpina*). In addition, a group of researchers recently found both of Kroken and Taylor's predominantly asexual lineages, *Letharia vulpina* and *Letharia vulpina 'lupina'*, growing in Morocco (Arnerup, et al 2004). This means that both of California's predominantly asexual forms of *Letharia*, but none of California's predominantly sexual forms (the four lineages of *Letharia columbiana*) have been found in the Old World. Asexual forms are well suited to dispersal by virtue of abundant dual fungal/algal propagules (soredia/isidia). Hogberg et al (2002) attribute the low genetic diversity of European populations to a genetic bottleneck at the time of dispersal. They propose that Western North America was the original home of *Letharia* and that European populations are a result of long distance dispersal.

Green algae in the genus *Trebouxia* form the "other part" of the *Letharia* lichen symbiosis. Previously only one species of green alga was recognized as a *Letharia* photosynthetic partner. Kroken and Taylor (2000) looked for evidence of reproductively isolated groups here as well, and they found seven *Trebouxia* green algal lineages (numbered Algae 1-7). Six of the lineages are closely related to each other whereas Alga 7 is more closely related to the photobiont of *Pseudevernia furfuracea* than to any other *Letharia* photobionts. This inconsistency is evidence that, sometime in its evolutionary history, *Letharia vulpina* switched its photobiont association from

an Alga 1-6 type *Trebouxia* to an Alga 7 type *Trebouxia*, possibly from an unrelated lichen. In addition, *Trebouxia* algae were previously considered strictly asexual in the lichenized state, but Kroken and Taylor (2000) found genetic evidence of sexual reproduction within the lineage called Alga 1. This further supports the hypothesis that *Letharia* photobionts include a number of different species.

These algal findings complicate the *Letharia* story exponentially when one considers which fungal lineages are partnering with the various algal lineages. Kroken and Taylor (2000) were able to analyze 38 thalli from Southern California to Washington State for both their fungal and algal components. They found only one algal lineage and one fungal lineage per thallus: apparently *Letharia* does not commonly form mechanical hybrids. Figure 1 shows the partnership combinations that they found. Note that some fungi and algae showed many partnership combinations throughout their geographic range (e.g. 'barbata,' 'lucida,' and Alga 1), whereas others were always found with the same partner (e.g. 'vulpina' and Alga 7).

It appears that some lineages are more particular than others about the identity of their partners. Comparing the two predominantly asexual lineages of *Letharia* fungi, 'vulpina' forms a mutually exclusive partnership with Alga 7, whereas 'lupina' has been found with each of three different algal lineages. Although 'lupina' and 'vulpina' share the same reproductive strategy and are

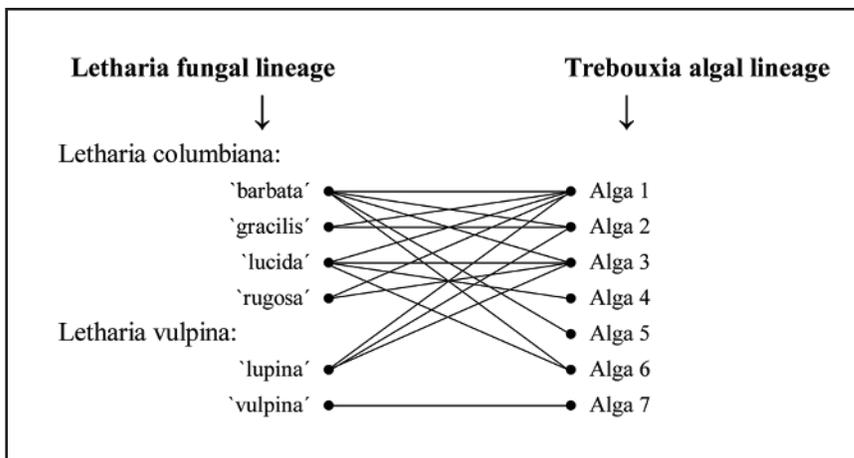


Figure 1. Fungal-Algal partnerships in *Letharia* lichens (compiled from Kroken and Taylor 2000)

morphologically similar, they do not appear to share the same algal partners, nor do they share the same level of specificity for algal partners.

The map of Figure 2 shows how the various fungal-algal partnerships are distributed throughout Kroken and Taylor's Western United States sampling area. It is important to note that any trends may be an artifact of the small sample size. Still, it is interesting to look at this map in three ways:

- 1) *From the perspective of the algae.* Some algal lineages are widely distributed, some appear to have only local distributions. Compare Alga 1 with Alga 5.
- 2) *From the perspective of the fungi.* Some fungal lineages are widely distributed, while some appear to have only local distributions. For example, '*lucida*' appears in all three states while '*gracilis*' appears in one narrow California valley.
- 3) *From the perspective of the individual partnerships.* Some partnerships, such as '*lupina*'/Alga 1, are widely distributed whereas most partnership combinations appear only once or twice.

What had appeared to be a simple two-species fungal genus with a straightforward geographic distribution, has become a network of interactions with intriguing geographic structure.

This new complexity has implications for lichen conservation. There are multiple levels of biodiversity in symbiotic systems: 1) genetic diversity within individual genetic lineages, 2) genetic diversity between lineages, and 3) the diversity inherent to different partnership combinations. All three levels may contribute to the evolutionary longevity of lichens. If different partners offer different abilities to withstand temperature, light, or moisture extremes, the ability to switch partners from generation to generation may give lichens some room to maneuver under rapid climate change. Alternative partners must be alive and available, however, in order for ecologically-driven partnership switching to remain possible. In tight symbioses such as lichens, particular *species combinations* may be as important for conservation as the individual species. As we see from the *Letharia* data, some of these combinations may be quite rare.

Are you surprised at the complexity of the *Letharia*-

*Trebouxia* symbiosis? We have only begun to explore the evolution, ecology, and biogeography of symbiotic species complexes such as this one. Detailed, high resolution genetic work on both sides of the lichen fungal-algal partnership has been crucial to this story. Much more is possible with current techniques, but not to the exclusion of more accessible practices. A hand lens will not show

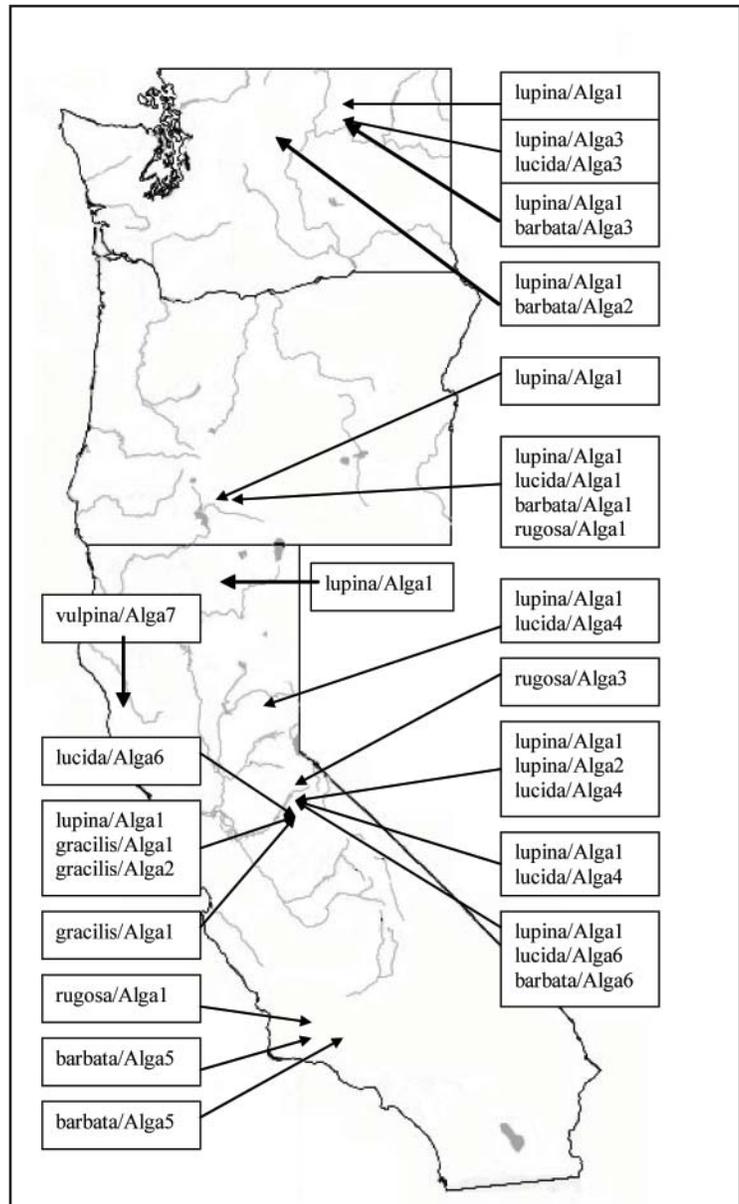


Figure 2. Each box represents a separate sampling site. Compiled from Kroken and Taylor 2000, 2001.

us all of the important differences between lineages, but if we stop looking for such characters, we will surely never find them. Before running across Schade's and Kroken and Taylor's work, I never would have noticed that the undersides of *Letharia vulpina* apothecia are sorediate whereas the undersides of *Letharia columbiana* apothecia are not sorediate. I would not have noticed that the soredia on *Letharia* thalli are often really lesions left behind by broken off isidia, nor would I have looked so carefully for the absence of isidia, a reliable character for the *Letharia 'lucida'* lineage. I sense there is still much to be seen in *Letharia* for the discerning eye. I encourage you to pick up your hand lens, and join me in taking a second look at *Letharia!*

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#### A SINCERE THANKS

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## The saga of *Usnea longissima* in California

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There is a lichen in northern California which is impossible to miss if you come across it on an excursion in that area. Sometimes called Methuselah's Beard, *Usnea longissima* hangs in pale silvery garlands as long as three meters or more, some characteristically cross draped, on conifers and other trees in older forests, becoming more abundant the farther north you go. Eventually it is very common along the western part of Oregon, Washington, British Columbia and into Alaska at least to the eastern shores of Prince William Sound (Personal observation). There is no mention of *Usnea longissima*, in John Thomson's book, *American Arctic Lichens* (Thomson 1984).

*Usnea longissima* is easy to determine even by a beginner. It is a fruticose lichen, pale greyish green in color. The long strands, which are often up to two or three meters long and have been reported at three times that length, are sparsely branched, and those branches hang down parallel to the main stem. As with all *Usneas*, the branches have a dense central cord or axis and are elastic when wet. Many short fibrils, horizontal to each other, branch out at right angles from the main stem and branches. On the main stem the cortex is crumbly or absent, which gives this lichen the silvery look. The fact that the medulla of the main stem turns blue in iodine provides simple proof of identity if you are still in doubt.

This lichen is threatened by atmospheric pollution, to which it is very sensitive, by loss of habitat to urban sprawl, and by unscrupulous elements in the logging industry. The southern limits of this species of *Usnea* in California has moved north to Sonoma County from San Mateo County over the past twenty years (Doell and Wright 1994).

*Usnea longissima* used to be present in many parts of northern Europe and northern North America,

and at high altitudes in the tropics (Herre 1910, Fink 1935). Now it is endangered or extinct in most of its European range. Those of us who live in the Northwest get in the habit of thinking that the only stands of *U. longissima* in North America are here. This is not so, as Hale (1979) in earlier times and Brodo in 2000 remind us. While working on this treatise on *U. longissima* and the protection issues we are involved in here, I wondered how this lichen was doing back east, and proceeded to enquire.

I got varying reports about *Usnea longissima* in the Midwest. The Minnesota populations are not doing well, and it has never been common there. It is rare now and will appear on the red list for Minnesota at the next revision. When found it is usually only in small pieces, the biggest clump measuring about 3 feet. Habitat loss is the greatest threat. Almost the whole state was clearcut about a hundred years ago and suitable habitats are scattered. The species seems to be limited in its ability to disperse (Wetmore 2004). Things are better in the northern Great Lakes region, where *Usnea longissima* is still fairly abundant on the north shore of Lake Superior (Brodo 2004).

In Atlantic Canada *Usnea longissima* is not particularly rare, although less common than other *Usnea* species. It occurs in hundreds if not thousands of localities in that region, in humid, mature, coniferous forests. In drier, better drained areas it is more restricted to old growth forests. It is absent from the coldest boreal areas of the northern parts of the Maritime Provinces. Widespread clearcutting has reduced the general abundance of *U. longissima* in this region, but you find fairly healthy populations on wet sites carpeted with Sphagnum in open forests of relatively low stature, in part because commercial forestry is not interested in the boggy spruce-fir stands in which it grows (Clayden 2004). The author of this e-mail,

Stephen Clayden of the New Brunswick Museum, has the impression that *Usnea longissima* is the most sensitive of the *Usnea* species to pollution, perhaps owing to its lack of a well-developed cortex.

Robert Cameron, ecologist with Nova Scotia Environment and Labour, also mentions *Usnea longissima* growing in two habitats. One is an association with old growth, which habitat is declining, mainly due to forestry; and the other is in coastal balsam fir forests, with high rainfall, where the trees seldom reach old growth. But this area is threatened by habitat loss. *U. longissima* is not protected in any way in this region. There is a new endangered species act there, but the only lichen on it so far is the boreal felt lichen, *Erioderma pedicellatum* (Hue) P. M. Jørg (Cameron 2004).

Moving south into New England, the twenty known *Usnea longissima* populations there are now restricted to old growth forests in northeastern Maine, except for one in New Hampshire. Vermont, also a historic site for this lichen, has no known populations now. As in California, the southern limits of the range is moving north. Atmospheric pollution with sulfur dioxide appears to be the main cause for this, as the sulfur dioxide gradients in New England are highest in the southwest and lowest in the north east. *U. longissima* is not protected in Maine or any New England states and does not grow in the forests of northern Maine which are managed for timber production (Jim Hinds 2004).

Apparently, in these other more eastern areas as in the west, *Usnea longissima* is having varied success and protection. We will return briefly to these reports later in this article.

The habitat of *Usnea longissima* in the west is roughly the same as the one where we find redwood trees, although *U. longissima* does not necessarily grow on that species. Douglas firs, and, further north, Sitka spruce, are frequent substrates and there are many others as well. In recent years, as the logging industry and development continued to denude California's old growth forests, lichen enthusiasts became concerned about the decimation of *U. longissima*. Soon the government agencies in charge of regulations in the forests also took note and by 1996 *U. longissima* was on the list of *Federal Survey and Manage Lichens within the Range of the Northern Spotted Owl, U.S. Pacific Northwest*, prepared for the U.S. Department of Agriculture Forest Service. *U.*

*longissima* was listed under Survey Strategy No. 4, which meant that the lichen was considered apparently secure within California but uncommon enough that its status should be monitored regularly.

In 1997 I reported in the CALS Bulletin that a population of *Usnea longissima* in the Santa Cruz Mountains was extirpated when its host tree was blown over into the adjoining canyon during a storm. That turned out to be the last reported occurrence of *U. longissima* anywhere south of Sonoma County. Concerned about what seemed to be a warning about this lichen's future, CALS member Darrell Wright and I put together a list of all reported *U. longissima* sightings in California, checking herbaria in the Bay Area and available private collections. We found only 8 collections at first, which we augmented to 21 eventually. This was an alarmingly small number. We reported this in the CALS Bulletin (Doell and Wright 2000), saying also that it was time to start a move towards protecting this species.

At about that time David Magney, a member of CALS and of the California Native Plant Society and an environmental consultant, had compiled a tentative Red List of California Lichens. *U. longissima* was added to that list and that small step appeared to help protect a threatened Humboldt County population shortly thereafter.

In May of 2000 the California Department of Forestry and Fire Protection, the enforcement agency for environmental protection regulations in the state, responded to significant environmental points raised during the timber harvesting plan evaluation process regarding a Timber Harvest Plan submitted by the Scotia Pacific Company. The Department had received 13 letters of concern about the Timber Harvest Plan, and 12 of them had to do with the lichen *Usnea longissima*. At least some of these letters were from Darrell Wright and other CALS members. The sources of the concern were not named, but the fact that this lichen was on the Preliminary Red List of California Lichens as well as on the federal list of species to be conserved as part of the habitat of the Northern Spotted Owl was a factor in getting favorable action. The response was that initially, *U. longissima* had not been considered because it was not on any pertinent lists and the area in question was not primarily old growth forest but had a number of younger timber on it. However, in

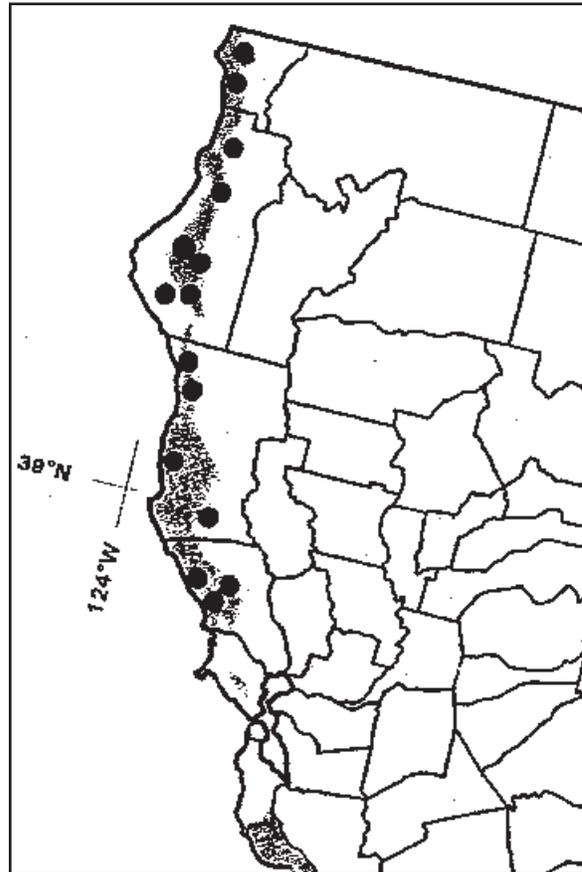
the course of the review process it was determined that *U. longissima* did have sufficient unique qualities to allow it to receive protection under the California Environmental Quality Act Guidelines. The Timber Harvest Plan was therefore revised to provide protection for *U. longissima* in terms of the potential for significant negative impacts which could result from timber operations. This referred to a 100 foot no operations buffer for the *U. longissima*, a 500 foot no burn prescription from the edge of the buffer, and a monitoring program to ensure that the lichen survived. This news was greeted as a great step forward for lichen conservation.

In 1999 David Magney called Darrell Wright's attention to the fact that the Federal Endangered Species Act had been passed in 1969. In it The Smithsonian Institute was charged with developing a list of plant and wild life species to be considered as candidates for listing as threatened or endangered. The U.S. Fish and Wildlife Service and National Marine fisheries became regulatory agencies for the Endangered Species Act. According to David Magney, the Forest Service had been criticized for not considering the adverse effect of logging on rare lichen species, he thought in Oregon, which should have been considered under the National Environmental Policy Act. Lichens could be listed under the Federal Endangered Species Act by a petition to the U.S. Fish and Wildlife Service. Lichens could also be listed under the California Endangered Species Act, which gives plants protection on private property as well (Wright 1999).

By January of 2000 there were still only 21 verified populations of *Usnea longissima* in California, all from Sonoma, Mendocino, Humboldt and Del Norte counties, confined to a narrow coastal strip corresponding to the redwood (*Sequoia sempervirens*) zone. Darrell Wright wrote to the Lichen Listserver that a proposed removal of *U. longissima* from the Federal list of species to be conserved as a part of the habitat of the Northern Spotted Owl was entirely unwarranted in light of scientific findings, especially as regards California, and asked recipients of his e-mail to fax the pertinent agencies about their desire to see these populations spared and a preserve for them created by withdrawal of timber harvest plans (Wright 2000).

In May of that year it appeared that with only 21 recorded sites, and most of them vouchered, the

species is indeed rare and it made sense to add *U. longissima* to the California Natural Diversity Data Base at rank G2S2. These ranks refer to rarity, 1 meaning the most rare, on a scale of 1 to 4. G refers to global rankings, S to the state rank. The rank given meant that there were only an estimated 1,000-3,000 individuals or 2,000-10,000 acres of this



Distribution of *Usnea longissima* in California as reported in the year 2000 (CALs Bulletin Vol.7 No.1), plotted over the distribution of the redwood, *Sequoia sempervirens*. Each dot may represent more than one population.

species. both globally (G2) and in California (S2).

By November of the year 2000 Greg Jirak, a member of both CALs and the California Native Plant Society, had formed Timberwatch, an organization devoted to keeping an eye on timber practices in California, and had persuaded the California Department of Fish and Game to call for a lichenological survey on another timber harvest plan.

A flurry of e-mails occurred that month when an employee of Sierra Pacific Industries, a logging company, sent an e-mail to the Department of Fish and Game, asking why the Department (which determines which species should be listed for protection) had written a letter to the California Department of Forestry and Fire Protection (the enforcing agency) stating: given *U. longissima's* sensitivity to disturbance and apparent rarity in the State of California, a project that threatens to eliminate a population of this species could be found to have a significant adverse effect on the environment. She pointed out that *U. longissima* was already proposed to be removed from the Northwest Forest Plan Survey and Manage list because of the moderate to high number of records in the Northwest Forest Plan area. She quoted the Environmental Impact Statement (DSEIS 12/99) as saying the number of known *U. longissima* sites had increased from 27 to 203 since 1993, with numerous other unreported sites identified, and that regulations were already in effect which would provide for suitable habitat for *U. longissima* on federally managed lands throughout the National Forest Plan area. She could not locate any evidence supporting this species' endangerment or rarity in California. She questioned the process by which this lichen was put on the Department of Fish and Game's Special Plant list and about the process in place for updating the list as more information becomes available.

This letter sparked a further discussion about what CALS' role should be in these matters and did CALS want to take an active role in California Timber Harvest Plans?

Darrell Wright of CALS and Bruce McCune of Oregon State University are quoted by David Magney as thinking *Usnea longissima* is rare enough to warrant concern and continued monitoring in the environmental review process. A question was raised about the exact location of the 203 reported *U. longissima* sites. Were they located in California or Oregon? (Magney 2000).

In November of 2000 David Tibor of CNPS, in an e-mail to David Magney and others, says information on *Usnea longissima* occurrences in California needs to be forwarded to California Natural Diversity Data Base for inclusion, which action was certainly overdue by then. David Magney says that even if the sites of the 203 occurrences of *Usnea longissima*

mentioned above are in CA it is not a large enough number for it to be taken off the Natural Diversity Data Base, but that CALS might reconsider its ranking in its Preliminary Red List of Rare CA lichens if the 203 number is correct (Tibor 2000).

Next, a quote from a California Department of Fish and Game report on a timber harvest plan surfaced on the internet in connection with this controversy. It said in part, "The lichen *Usnea longissima* has been recorded in the area and may be negatively affected by the proposed project because it is characterized by extreme sensitivity to habitat disturbance. The Department believes that *U. Longissima* meets the criteria for listing as described in section 15380 of the California Environmental Quality Act Guidelines, and that measures should be taken to assure that timber harvest operations will not significantly impact this species." A formal survey by qualified people is recommended.

So here we are at the end of 2000, with a controversy raging about whether *Usnea longissima* is rare or abundant in CA, and how much if any protection it should have in Timber Harvest Plans of the logging industry. The logging industry, formerly resistant to anyone coming in to see their *U. longissima* sites, presumably because they didn't want the hassle of having a rare lichen to worry about along with the spotted owl and other organisms, eventually came to realize that they probably have enough of it to get it off the rare and endangered lists altogether.

In July of 2003, Gordon Leppig of the Department of Fish and Game, commented on the status of *Usnea longissima* in Northern California in a report submitted to the California Natural Diversity Data Base Rare Lichen and Bryophyte Scientific Advisory Committee. Here is a summary of his remarks:

He is on the Department of Fish and Game team that oversees the implementation of the Pacific Lumber Company's (PALCO) Habitat Conservation Plan, and is the lead scientist reviewing their rare plant survey and mitigation monitoring program. PALCO manages timber on about 211,000 acres, most of it repeatedly harvested in the last 140 years.

As required by the Habitat Conservation Plan, PALCO (the timber company) has been conducting plant surveys for four years and surveying *Usnea longissima* for three years. Based on the March 10, 2003 California Natural Diversity Data Base Status

Review, Leppig finds that there are compelling reasons for *Usnea longissima* to warrant a state rank of S4, and for it to no longer meet the definition of rare under the California Environmental Quality Act Section 15380. (S4 would be a lower ranking for California than it had at that time.)

He thinks the argument that *U. Longissima* should not be down listed because so many occurrences are in one area and ownership is misleading. There is nothing special about PALCO forests in providing habitat for this species. The situation is that PALCO is actively managing their lands and conducting many surveys and reporting many occurrences. Adjacent landowners with similar habitats are either not managing their lands to this extent or not hiring botanists to conduct botanical surveys, or not reporting occurrences when found. This last is an issue with the State Parks and Federal lands as well. Available data indicate that *Usnea longissima* is much more in evidence in younger previously harvested industrial timberlands than in old growth forests in parks. If this is correct it is time to reevaluate two commonly held paradigms: that *U. longissima* is an old growth taxon, and that timber harvesting is a significant threat to this species.

Lots of *Usnea longissima* is found in watersheds that were clearcut from ridgetop to ridgetop in a period of 60 to 80 years. *U. longissima* has at least persisted or recolonized these areas after clear cutting and degradation. Present forest practice rules which limit harvesting in riparian corridors and on unstable lands, and protection for some large residual nest trees used by wildlife are much more benign than what has endured prior to the forest practice rules and other environmental regulations now in place. One occurrence has 221 host trees, many of which are festooned. A hundred host trees are in an active landslide area on which trees cannot be harvested.

Timber management is not a significant threat. Climate change, pollution and habitat conversion to non-timberlands appear to be much greater threats than timber harvesting. He thinks we need very compelling reasons to maintain *Usnea longissima* at its present rank, and a revised benchmark of what new abundance level we determine this species needs to meet to warrant down listing. Attached to his report is a list of new *U. longissima* occurrences on PALCO lands not yet in the California Natural Diversity Data Base. Adding them all up, they come to 456 trees at ten sites.

In May of 2001, to go back a bit, Dylan Keon at Oregon State University had completed his thesis "Factors Limiting the Distribution of the Sensitive Lichen *Usnea longissima* in the Oregon Coast Range: Habitat or Dispersal?", later appearing in the *Bryologist* (Keon 2002). In it he proposes that *U. longissima* does not necessarily require old growth forests to survive. His research shows that this lichen can also do very well on younger and smaller trees, and that transplants sometimes did extremely well in areas where they were not expected to. However, dispersal of this lichen is limited because it is only dispersed by fragments from one tree to another. Therefore he recommends that timber companies set aside some of the older trees as a source of propagules in order to start up new populations of *U. longissima* in adjacent more heavily logged areas.

While we are on this subject, I would like to refer back to our friends in eastern Canada. As we read earlier they found their *Usnea longissima* populations growing not only in old growth forests, as we have traditionally been taught to expect them, but also in boggy coastal environments where the trees are considerably smaller. Whether or not these populations have some remnants of old growth nearby is, understandably, not mentioned in these brief exchanges of information. But these references do seem to confirm that old growth forests are not the only place to look for *U. longissima*.

Pacific Lumber Company Lands have been harvested for 140 years and yet those lands appeared to have definitely more *Usnea longissima* on them than are recorded in parks and preserves in the area. Now this is a very interesting development. This is partly due to the fact that at least this timber company has now hired botanists to record their *U. longissima* sites on a regular basis, whereas the parks and preserves do not survey their lands to a similar extent. But another possibility is that keeping the public out of their lands accomplished what the parks and preserves could never do. People and cars are not what *U. longissima* likes. It is a nice thought that the PALCO lands should be a preserve - a preserve for this remarkable abundance of this lichen within California - but after 140 years of public use, would it still be there?

A month after Gordon Leppig's report appeared, at the end of August, 2003, a well documented report on the status of *Usnea longissima* appeared which

can be summarized as follows:

**Distribution:** The U.S. Pacific Northwest may contain the best remaining populations of this species. It appears in Sonoma, Mendocino, Humboldt and Del Norte counties in California. The center of the California distribution is Humboldt County. **Habitat:** *Usnea longissima* can grow on most kinds of available forest trees. It is found in old growth forests and other tree age classes, like 20-30 year old Douglas firs. Roughly follows redwood tree distribution. Frequently found in heavily managed forests, and does not require old growth in California. **Biology:** Disperses almost exclusively by fragmentation by wind or birds. Growth rate and viability of new populations over time need more study. **Abundance:** The California Natural Diversity Data Base became aware of *Usnea longissima* in 2000 when contacted by Darrell Wright. With only 20 occurrences it was added to the list of special plants, bryophytes and lichens, giving it the rank of G3/S2.1. Data was added in the following years and by 2003 there were 204 known sites and timber company and botanists and foresters and others asked for a review of this species' ranking. **Threat:** Worldwide from logging, air pollution and climate change. Global distribution and abundance have declined, especially in Europe. The stricter regulations of the timber industry in California make timber harvest less of a threat in California than the effects of pollution or climate change. **Conservation:** Sillett and Goward (1998) state that conservation of pendant lichens involves the protection of remaining old growth habitats and the creation of suitable habitats in managed forests. Leaving old trees on adjacent older forests would facilitate propagule dispersal in the regenerating forests. Logging and forest lichen conservation may be compatible given a dedication to sensitive management of the ecosystem. California Forest Practice Rules may contribute to the conservation strategies put forth by Sillett and Goward (1998) to help conserve epiphytic lichens. **General comment:** Continue monitoring *Usnea longissima* in various management regimes and ecological situations to ensure it is not declining over time. Encourage forest management practice to foster the species, and most importantly, not cutting groups of occupied trees, with preferably permanent set-asides of high quality populations.

Finally, the California Natural Diversity Data Base staff recommended that *Usnea longissima* be

assigned the rank of S4, which means over 50-80 viable occurrences. This was a very controversial recommendation and a compromise was eventually reached as we shall see.

With 200 occurrences *U. longissima* was way over the usual limits imposed for the California Environmental Quality Act standard of listing. Having something protected under this act with that many occurrences jeopardized the credibility of the entire list and of the judgment of the California Natural Diversity Data Base and the Conservation Committee, according to some.

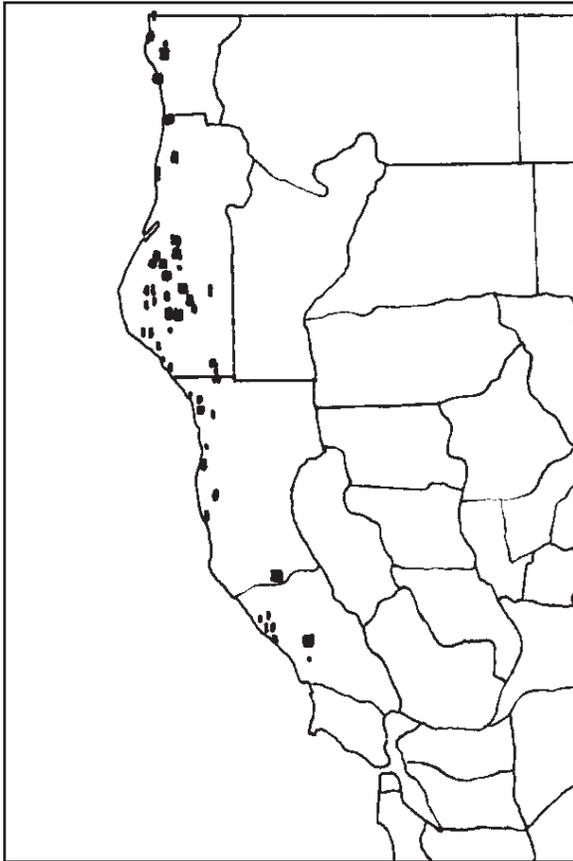
Emotions are rising and accusations start flying as the end of the year 2003 approaches. Darrell Wright e-mails from New Zealand that he doubts the accuracy of the PALCO reports regarding the abundance of *U. longissima* on their lands (Wright 2003).

The situation continued to warm up when Eric Peterson, Chairman of the CALS Conservation Committee, wrote on November 7 of 2003 that the Committee is involved in the *U. longissima* debate. He reported that the Committee had voiced concern to the California Department of Fish and Game that there is an incentive for Pacific Lumber Company (PALCO) to inflate the number of *U. longissima* populations on their lands, that misidentification is common, and that the definition of population may be questionable. On the other hand he also said that the Committee had good relations with the Department of Fish and Game person who makes "listing" decisions for lichens. Eric said PALCO botanists had not collected and produced vouchers but that they were using iodine tests in their determinations. He also states that the species is not as common as PALCO indicates, and the Committee recommends the rank of S4.1 (.1 meant very threatened) and agreed that there are enough *Usnea longissima* to keep it off of California Environmental Quality Act lists (Peterson 2003).

So now that all these thoughts had been exchanged between the leading players the stage was set for the next step.

Early in 2004 Eric Peterson called for a meeting of representatives of all groups interested in the fate of *Usnea longissima* in California, to take place in Redding, preceded by a visit of a limited group to some *U. Longissima* sites on PALCO lands. The field

trip took place on Saturday, March 20<sup>th</sup>, the group visiting 8 locations in at least 3 watersheds. *Usnea longissima* was indeed abundant, the upper dryer slopes not as populated with this species as some of the more riparian areas were. This field trip was informal and no technical data were collected.



Distribution of *Usnea longissima* in California in the year 2004. Larger dots represent more populations at that site.

On March 21 the larger group met in the Redding Offices of the California Department of Fish and game.

Present were:

Eric Peterson, Bill Hill, Boyd Poulson, Sara Blauman and Patti Patterson from CALS, Greg Jirak and Lori Hubbard from CALS and The California Native Plant Society, Roxanne Bittman, Gordon Leppig and Pete Figura from the California Department of Fish and Game, Maralyn Renner from PALCO, Cameron

Williams from Humboldt State University, and Tom Carlberg from the Six Rivers National Forest.

The meeting began with a description of the ranking process, and a discussion about the appropriateness of the current ranking system for *Usnea longissima* and the question of whether *U. longissima* in the understory or on short lived trees constitutes a viable population for lichens. The subject of vouchers came up and it turned out that PALCO did not collect them but will in the future. New occurrences of *Usnea longissima* had been found the previous day, and it was agreed that all sites visited did indeed contain that lichen.

There was concern that if *Usnea longissima* were dropped out of the California Environmental Quality Act the threat might increase so it would have to be reinstated, which would be expensive and counterproductive to the intent of the California Natural Diversity Data Base. There are currently 208 occurrences of *U. longissima* in the Data Base and the group estimated a total number of California occurrences at around 300, once all are reported. A discussion of listing methods followed.

Ensuing discussion subjects included, but were not limited to, PALCO's habitat conservation plan, access and monitoring, the number of *U. longissima* listings on the data base from PALCO lands, future development, the drafting of an informal agreement outlining a monitoring program, and the process of carrying a plan from the planner to the logger.

Finally the group tentatively agreed to change the rank for *Usnea longissima* from G4/S2S3 to at least G4/S3.1. This represents a small lowering of its protected status because the number of occurrences had gone up. It reflects the apparent lack of threat globally, (G4), the increasing number of sites found in the state (S3) while acknowledging a high level of threat there (.1). "An informal agreement to monitor the sensitive lichen *Usnea longissima* on the Pacific Lumber Company ownership in Northwestern California" is currently in draft form. It deals primarily with arrangements for the monitoring of the species by CALS on PALCO lands.

The field trip of the day before did confirm that there were a large number of *U. longissima* populations on PALCO lands, but the eventual tentative agreement was not arrived at on the basis of this information alone. It was the culmination of years spent helping

organizations understand the intricacies of the ranking system on the one hand, and the special factors that applied to *U. longissima* on the other, such as the small size of many occurrences, the paucity of establishment sites, particularly after logging, and the lack of knowledge regarding long term viability following timber harvest. That the group in Redding managed to put together a draft of an agreement which took into account the main concerns of both sides is an interesting and commendable development in this ongoing struggle between conservationists and the timber industry.

Before ending this account, let's not omit what the U.S. Forest Service was doing all this time. The Forest Service can only deal with species on Forest Service land. They have no involvement in what goes on in private holdings such as PALCO. On April 26, 2004, *U. longissima* was officially listed on the Sensitive Species list of the Forest Service for Region 5 (California). Species on this list are considered sensitive within every forest where they occur or have suspected habitats. All occurrences of *U. longissima* on Forest Service lands in California are in Del Norte County on Six Rivers National Forest land. These locations are among the most easterly in California, and despite the extensive survey of more than 4000 acres between 2002 and 2004, only twelve sites are known (Carlberg 2004).

So ends this saga of this interesting lichen. It goes from finding that it is endangered and losing ground in California, to fighting to put it on endangered species lists to protect it from urban sprawl and the timber industry, and lastly to discovering that what may be the best populations of *Usnea longissima* in California are actually within the timber company lands. It appears that the lands of a well managed timber company with modern harvesting plans, an interest in the environment they control and a willingness to follow the regulations already in place is not such a bad place for a lichen to be.

If a lichen hangs in the forest and no one sees it, who will list it?

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**Literature Review: Lichen Flora of the Greater Sonoran Desert Region, Volume II. Edited by Thomas H. Nash III, Bruce D. Ryan, Paul Diederich, Corinna Gries, Frank Bungartz. Lichens Unlimited, Arizona State University. Tempe, Arizona. July 2004. 742pp., 22 plates.**

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Volume II of the Lichen Flora of the Greater Sonoran Desert Region is a truly impressive volume in more ways than one. Physically, it is almost twice as large as Volume I. The first two volumes together cover over 1500 lichens and lichenicolous fungi, which is about a third of those reported for the United States and about equal to the number of taxa covered by Brodo in the *Lichens of North America* in far less depth. The authors of the treatments in Volume II, 65 lichenologists from around the world, include both many of our most eminent scientists as well as many who will lead the field in the future. The combined scholarship of the editors and the writers is a monument to lichenology as a science. The twenty-four pages of color photographs of 96 species add an aesthetic dimension that was lacking in Volume I. And, not least impressive, is the price for the two volumes, about seventy-five dollars. Or that a third and final volume is in preparation covering at least an additional 25 genera.

The actual study area of the flora includes Arizona, southern California (excluding the Mojave Desert) through Santa Barbara County, Baja California and Sonoran Mexico. One should reject the impression, reinforced by the flora's title, that this is a desert flora. Many of the species covered occur in the mountains and on the coast and in relictuall microhabitats and are temperate species. Thus many occur in central and northern California. The authors of many treatments utilized the historical collections of Hasse, specimens from the Santa Barbara Botanical Gardens collected by Cherie

Bratt and Shirley Tucker; many authors collected on the Channel Islands, increasing the coverage of California. Because a majority of the collections vouchering the flora were done in Arizona and Baja, a number of species listed as not occurring in California can be found in our state too such as the common new species *Miriquidia mexicana*.

Volume II completes the description of all the macrolichens except *Usnea* in the flora's study area, most of the cyanolichens, and over half the crustose genera.

Over a hundred lichen genera and over seven hundred species are covered in Volume II. Some very important genera are covered with many species in California: *Rinodina*, *Lecanora*, *Lecidea*, *Lecania*, *Rhizocarpon*, *Ramalina*, *Niebla*, *Phaeophyscia*, *Xanthoparmelia*, *Collema*, *Lepraria*. Even if you are familiar with a genus, the diversity of most genera can be surprising. The treatment of *Leptogium* by P.M. Jorgensen and T.H. Nash III describes 26 species in depth. This is typical.

Fifty-seven new species are described in Volume II for the first time, including *Punctelia cedronensis* which is not on the list in the introduction. Many more new species, described in the journals in the last decade, are now for the first time easily accessible in the flora.

To key out specimens, one will need both volumes, as most of the keys are in Volume 1. The keys to

the genera of crustose discolichens are in Volume 2, and are based on the spores. It is not hard to get to most genera and is one of the easiest crustose keys I have used. One must be careful in using the key for multiseptate spores as the choice based on whether a hymenium stains red or blue with iodine is problematic; some hymenia in this group can stain red instead of blue if too much of iodine is used. But no one can construct keys that are absolutely perfect and I am sure there are other leads one must weigh carefully.

The *Lecanora* treatment is the centerpiece of the flora and Bruce Ryan's work on the placodioid species is an important part of the 119 pages which he co-authored with Lumbsch, Messutti, Printzen, Sliwa, and Nash. The treatment covers one fourth of the known members of this genus. The *Lecanora* descriptions and keys are not easy to use because of the necessity of utilizing chemotaxonomy in lichen classification. Nonetheless, because of the depth of technical descriptions, one can utilize morphological characteristics and reasoning to identify most specimens rather accurately after some practice. The *Lecanora* keys use the identification of crystals in the epihymenium and amphithecium with polarized light. This is an important step and cannot be by-passed with most specimens. It is easily done at home (see *Lichens of North America*.)

The comments on the *Lecanora* keys highlight both the value and limitation of the flora for users without easy access to a university lab or herbarium specimens. This is a solid and professional scientific work. Most of the treatments are on the cutting edge of lichenology. Lichen identification to species in many genera will always be the work of experts. But even if users utilize other keys or less complete floristic works, the Sonoran flora's technical descriptions can be used to verify their identifications.

The individual genus keys vary with the authors, with most of the ones I have used being easy to navigate. J.W. Sheards' key for *Rinodina*, the culmination of a lifetime of solid work, is the best in the flora and easily accessible to all users. The *Lecidella* key is the worst in the book, the author making no attempt to make a key that can be used without TLC in a genus that has been made accessible in other books. Fortunately, that is

an exception. *Lepraria*, of course, will always be impossible to identify without TLC, especially with still many more undescribed species expected to be discovered in California.

The *Xanthoparmelia* key by Nash and Elix is the most brilliant in Volume II. Though chemotaxonomy is an important part of *Xanthoparmelia* classification, the key is based on thallus morphology and chemical leads can be eliminated easily by checking the descriptions. Except for a few rare species, one can be accurate in determining most specimens, allowing all users to enjoy the diversity of this species-rich genus.

Volume II is actually two books. The second one is 97 pages long and is a flora of lichenicolous fungi with its own keys edited by Paul Diederich. Over 100 species are covered in 53 genera, with eight new species described. This area of mycological study, which has grown out of the study of lichens, is fascinating because many of these taxa may have once been lichenized. The symbiotic relation of some lichenicolous fungi to their lichen hosts may be an indicator of long-term ecological relationships and undisturbed habitats, though more taxonomy and floristics still needs to be done before this dimension can be fully explored and understood. Though the journals carry many articles on lichenicolous fungi and several important articles on their occurrence in North America have been published in the U.S. and in Germany, there has not been a comprehensive work until now in English which explains their biology and individual taxonomy in depth. The authors did an excellent job. This second part of the book is worth the cost of the whole book alone.

Volume II is published in memory of Bruce Ryan. The whole project would have been impossible without his work both as a taxonomist as well as his comprehensive and untidy compilation and revision of references on the lichens of North America, which formed the foundation for the flora. Many of you are familiar with these compilations and revisions from the CDs of his files he distributed. He is the author or co-author of 26 treatments in Volume II. Bruce was also a productive collector of lichens, making over 30,000 from around the world. His collections, with the over 40,000 equally-global collections by Tom Nash, supplied the bulk of the raw material for the flora. Bruce worked on the flora

right up to his death. Meeting him in the weeks before his death, I was impressed with the peace, joy and meaning his work on the flora gave him in his last days. The wonderful picture of Bruce from a Santa Cruz Island expedition by Stephen Sharnoff in Volume II captures this spirit.

Of special interest to CALS members is the description of the "CALS *Xanthoria*" as *Xanthoria pollinarioides* L. Lindblom and D.M. Wright *sp. nov.* Another CALS member Cherie Bratt is honored in the naming of the new species *Lecania brattiae* and *Lecanora brattiae*. The beautiful color plates were published through a donation by CALS member Shirley Tucker.

I was in Tempe at the Lichen Herbarium several times during the editing of this volume and I was impressed with the work of Tom Nash as the lead editor of this volume. With Bruce Ryan, his long-time collaborator, dying during the last phase after the *Lecanora* treatment's major draft was completed, and co-editor Frank Bungartz involved deeply in completing the final months of his doctorate before returning to Germany, Nash was responsible for the bulk of the editorial work. I counted at least three major edits of the whole flora and each one, from the

draft treatments I saw, was a definite improvement over the last. And one cannot under-estimate the amount of work necessary to bring together the work of 65 lichenologists. Ultimately, when this the trilogy is completed it will be the culmination of Nash's career as a lichenologist, and I am sure he will be able to retire in peace, spending more time on his hobby stamp collecting than collecting lichens.

The first two volumes of the Sonoran lichen flora will be on the bookshelves of all who are interested in lichenology as a reference. The Sonoran lichen flora trilogy will not make up for the lack of a California flora, but with its ultimate coverage of approximately fifty per cent of the lichen and lichenicolous fungi species of North America, it is invaluable in understanding the state's lichen biodiversity.

To order: <[http://ces.asu.edu/ASULichens/sonoran/flora\\_2.html](http://ces.asu.edu/ASULichens/sonoran/flora_2.html)>. \$39.95 + postage or both volumes together at a special price.

ABLS <<http://www.unomaha.edu/~abls/PublicationsforSale.htm>> (credit cards accepted.)

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### Memorial Fund Notice

A Bruce Ryan Memorial Fund has been formed to support the publication of color pictures in Volume III of the Lichen Flora of the Greater Sonoran Desert Region. Many donations have already been made. Bruce's final lichenological years were devoted to the production of the Greater Sonoran Desert Lichen Flora and the final volumes will be dedicated to Bruce. As a way to honor his great contribution to lichenology, a memorial fund has been established for the production of color photographs in Vol. III. For people with US accounts, checks can be made out to Arizona State University and sent to Thomas H. Nash III. For those of you in Europe please do not hesitate to contact <[tom.nash@asu.edu](mailto:tom.nash@asu.edu)>, who will, of course, send appropriate receipts.

<<http://ces.asu.edu/ASULichens/profiles/bruce.html#Memorial>>

## News and Notes

### LICHEN FORAY ON THE CAMPUS OF UNIVERSITY OF CALIFORNIA, SANTA CRUZ MAY 15-16, 2004

CALS members received an invitation to make a lichen survey of the campus of University of California, Santa Cruz, Santa Cruz County, and several members participated on a two-day foray May 15-16, 2004. The invitation came from Tonya Haff, Senior Museum Scientist, Museum of Natural History Collections at the University, and Susi Altermann, graduate student in Biology, whose Ph. D. research is a study of variation in *Letharia*, the Wolf lichen. Participants were Susi Altermann, Tonya Haff, Bill Hill, Jean Langenheim, Boyd Poulson, Ron and Judy Robertson, and Shirley & Ken Tucker. Dr. Langenheim is advisor on the *Letharia* project and was enthusiastic about adding to knowledge of lichens on the campus, which includes extensive natural areas.

The campus is unique among all University of California campuses in that the buildings are unobtrusive, most of them tucked into the forest of redwoods, Douglas-fir, and oaks that cover most of the campus. Students were everywhere, on bicycles, on foot, or just enjoying the fine weather on the weekend. This branch of the University of California was founded in 1965 on 2000 acres of the historic Cowell Ranch. Beginning in the 1850's, the ranch had a highly successful limestone processing business. Limestone was used in mortar and plaster, vital to the San Francisco building trade. The Cowells had limestone quarries and abundant forest wood for the limestone processing. By 1906 the limestone kilns had closed, partly due to exhaustion of the wood fuel, as well as competing use of the property for cattle production. Remnants remain, as cattle still graze on a great meadow at the base of the campus. The lime kiln and two large quarries remain, and the secondary growth of redwood forests has flourished again throughout

the core and upper campus.

On the first morning, we collected on trees of live oak (*Aesculus californica*), box elder (*Acer negundo*), poplar (*Populus* cf. *trichocarpa*), walnut (*Juglans californica*), and California bay laurel (*Umbellularia californica*) close to the campus entrance road. Ron Robertson collected bryophytes and lichens on rock while the rest of us took the easier task of exploring barks. Unusual crusts on bark included species of *Arthonia*, *Arthopyrenia*, *Arthothelium*, several *Caloplaca* including the rarities *Caloplaca stanfordensis*, *Opegrapha umbellulariae*, *Ramalina dilacerata*, and *Topelia californica*, a species related to *Gyalecta*. *Topelia californica* was first collected by Albert Herre on the campus of Stanford University, and has seldom been collected since that time. *Xanthoria parietina* was the dominant gold foliose lichen on bark and twigs at Santa Cruz, quite unusual since *X. polycarpa* is far more common in California. On rock, Ron Robertson found several unusual lichens: *Caloplaca bolacina*, *Collema fuscovirens*, *Lecania brunonis*, *Sarcogyne regularis*, and *Protoblastenia rupestris*. The latter was also found later in a quarry on campus, and is a new state record.

Old wooden fences and a wooden barn near the blacksmith shop on campus yielded a wealth of interesting and colorful lichens. Included were *Cyphelium tigillare*, *Niebla cephalota*, *Ramalina puberulenta*, *Schismatomma rediunta*, *Tephromela atra*, *Thelomma californicum*, *Trapeliopsis flexuosa* and *T. granulosa*, as well as several species of *Caloplaca*.

After a picnic lunch at the Louise Cam Gatehouse, the group made brief stops to look at the abundant and showy macrolichen flora on large live oaks (*Quercus agrifolia*): common species of *Flavoparmelia*, *Flavopunctelia*, *Punctelia*, *Ramalina*, *Parmotrema*, *Teloschistes*, and *Usnea*, as well as a rarity, *Physcia erumpens*. We then explored the Upper Quarry,

where the rocks bore abundant black patches of *Placynthium nigrum*, *Aspicilia contorta*, an unusual *Leptogium* (*L. millegranum*), *Neofuscelia verruculifera*, and two species of *Verrucaria*. A brief stop at the McHenry library was disappointing in that low branches of cultivated cherry (*Prunus* sp.) had been newly trimmed and removed; Susi said they had been rich in lichens. Ron Robertson made some unusual finds here: an unidentified species of fissurine *Graphis* on the cherry trunks, and *Endocarpon loscosii*, rarely collected, on the rock wall.

The next day was spent in some of the undeveloped parts of the University property, to the north of most of the university buildings. At the first stop, a deeply shaded redwood (*Sequoia sempervirens*)/madrone (*Arbutus menziesii*) forest was remarkable for abundant colonies of *Dimerella lutea* on nearly every madrone trunk. The emerald green crust and orange apothecia are unmistakable, and are quite rare in California (*vide* S.T.). Judy Robertson found *Topelia californica*, a rarity also seen the previous day, here on Douglas-fir, and Shirley Tucker found *Hypotrachyna sinuosa*, another rarity in CA, on pine. The sandy soil in drier parts that supported a scrub pine forest also was home to several species of *Cladonia*.

The group next visited two stages of evergreen chaparral that included species of *Arctostaphylos* (manzanita), *Vaccinium*, and *Ceanothus*, as well as interior live oak (*Quercus wislizenii*). The oaks supported a varied assemblage of species of *Lecanora*, *Pertusaria*, *Ochrolechia* and other crusts, plus macrolichens such as *Heterodermia leucomela*, *Tuckermannopsis orbata*, and species of *Ramalina* and *Usnea*. Several species of *Hypogymnia* were found on branches of the chaparral. Judy and Ron Robertson found some unusual lichens on rock here: e.g., *Lecidella carpathica*, *Sarcogyne regularis*, and *Xanthoparmelia mougeotii*. Ron Robertson found *Sarea resinae*, a rare species that can be found on resin on conifer bark. On mature madrone trees were found two species of *Pseudocyphellaria*, as well as *Fuscopannaria leucostictoides*, *F. pacifica*, *Koerberia bififormis*, and *Waynea californica*. A total of 164 taxa was reported.

The Santa Cruz peninsula is of special interest lichenologically, because Albert Herre (1868-1962) collected it extensively in the early 1900s and published his classic "The lichen flora of the Santa

Cruz peninsula, California" (Herre's publication listed ~ 264 taxa (exclusive of varieties), of which we recollected about 66 species. Lichen names, both genera and species, have been changed extensively since 1910, and species concepts are radically different, so that it is sometimes difficult to know exactly what Herre collected. But it is evident that additional collecting on the Santa Cruz campus would be profitable, to determine whether some species have been eliminated from the area. As examples, Herre listed seven species of *Lecidea* *sensu stricto*, five species of *Melanelia*, four species of *Niebla*, and seven species of *Rhizocarpon*. In each of these genera, the CALS group found only one species, or none. Herre found *Usnea longissima*, which is probably no longer present. On the bright side, however, 100 species were found by the CALS group (of the 164 total identified) that were not recognized or described in Herre's day.

Species lists were submitted by Shirley Tucker (ST in list) and Judy Robertson (JR in list), and Ron Robertson (RR in list). A small reference collection of the lichens has been donated to the UCSC Museum. We appreciate the invitation from Susi Altermann and Tonya Haff.

#### REFERENCES

- Herre, A.W.C.T. 1910. The lichen flora of the Santa Cruz Peninsula, California. *Proceedings of the Washington Academy of Sciences* 12 (2): 27-269, 1910).
- Lindsay, J.B. 1973. A lichen flora of the Samoa peninsula, Humboldt Bay, California. M. A. thesis. Humboldt State University, Arcata.

The list of species identified from the University of California, Santa Cruz campus foray follows:

- Amandinea punctata* (Hoffm.) Coppins & Scheid. — on poplar, Douglas-fir, ST; RR
- Anisomeridium bifforme* (Borrer) R. C. Harris — on box elder and cherry bark, Douglas-fir twigs, ST
- Arthonia cinnabarina* (Borrer) R. C. — on oak,
- Arthonia* cf. *microspermella* Willey — (stellate, fine, brown, on box elder, live oak, poplar bark) (may be what Herre called *A. radiata*), ST
- Arthonia ochrolutea* Nyl. — on cherry bark, Library, RR
- Arthonia* cf. *polygramma* Nyl. — on Douglas-fir twigs, ST

- Arthonia pruinata* (Pers.) A. L. Sm. — on redwood bark, ST, JR
- Arthopyrenia lyrata* R. C. Harris — on box elder, poplar, walnut, live oak, Douglas-fir twigs, ST
- Arthothelium orbiliferum* (Almq.) Hasse — on cultivated hardwood, ST
- Arthothelium spectabile* A. Massal. — on box elder, walnut, live oak, poplar bark (Black splotch), ST
- Aspicilia contorta* (Hoffm.) Kremp. — on rock near entrance, RR; on rock in quarry (white crust) ST, RR
- Bacidia circumspecta* (Nyl. ex Vainio) Malme — on live oak, JR
- Bacidia heterochroa* (Müll. Arg.) Zahlbr. — on oak, JR, ST
- Bactrospora spiralis* Egea & Torrente — on live oak, ST
- Buellia oidalea* (Nyl.) Tuck. — wood fence, JR
- Calicium abietinum* Pers. — on wood in chaparral, JR
- Caloplaca bolacina* (Tuck.) Herre — on rocks near entrance, RR
- Caloplaca cerina* (Hedwig) Th. Fr. var. *cerina* — on box elder, walnut bark, ST
- Caloplaca chrysopteralma* Degel. — sorediate & apotheciate, on live oak bark, ST, JR
- Caloplaca citrina* (Hoffm.) Th. Fr. — sorediate, on live oak bark, JR
- Caloplaca ferruginea* (Huds.) Th. Fr. — dark red apothecia, on wood fence, ST, JR
- Caloplaca microphyllina* (Tuck.) Hasse — sorediate, apothecia, on wood fence, JR, ST
- Caloplaca stanfordensis* H. Magn. — on live oak, California bay laurel, ST, JR (on bark, pale orange pruinose)
- Caloplaca subsoluta* (Nyl.) Zahlbr. — on rock wall, on rock in quarry, ST
- Candelaria concolor* (Dicks.) Stein — on box elder, JR
- Candelariella vitellina* (Hoffm.) Müll. Arg. — on wood & oak bark, ST
- Catapyrenium squamellum* (Nyl.) J. W. Thomson — on soil, RR
- Catillaria* cf. *subviridis* (Nyl.) Zahlbr. — black apothecia on rock in quarry, ST
- Catinaria atropurpurea* (Schaerer) Vezda & Poelt — on Douglas-fir, RR
- Chrysothrix candelaris* (L.) J. R. Laundon — on box elder, JR, ST
- Cladonia cervicornis* subsp. *verticillata* (Hoffm.) Ahti — on soil, JR
- Cladonia chlorophaea* (Flörke ex Sommerf.) Sprengel — on sandy soil, JR, ST
- Cladonia fimbriata* (L.) Fr. — on soil, JR
- Cladonia furcata* (Hudson) Schrader — on sandy soil, JR, ST
- Cladonia macilenta* Hoffm. — on sandy soil, JR, ST
- Cladonia pyxidata* (L.) Hoffm. — on soil, JR
- Cladonia squamosa* var. *subsquamosa* (Nyl. ex Leight.) Vain. — on soil, JR
- Cladonia subulata* (L.) F. H. Wigg. — on sandy soil, ST, JR
- Cladonia verruculosa* (Vainio) Ahti — on sandy soil, ST
- Cliostomum griffithii* (Sm.) Coppins — On poplar twigs, ST
- Collema furfuraceum* (Arnold) Du Rietz — on live oak, California bay laurel, live oak, madrone, RR, ST
- Collema fuscovirens* (With.) J.R. Laund. — on shaded rock, JR
- Collema nigrescens* (Hudson) DC. — on live oak, California bay laurel, ST
- Collema polycarpon* Hoffm. — on rocks near entrance, RR
- Cyphelium tigillare* (Ach.) Ach. — on wood fence, ST, JR
- Dimerella lutea* (Dickson) Trevisan — on madrone, ST
- Diploicia canescens* (Dickson) A. Massal. — on live oak & wooden fence, ST, JR
- Endocarpon loscosii* Müll. Arg. — stone wall by library, RR
- Endocarpon pusillum* Hedw. — on soil by wooden fence, ST, JR
- Evernia prunastri* (L.) Ach. — on live oak, JR
- Flavoparmelia caperata* (L.) Hale — on box elder, walnut, live oak, bark, wood fence, ST, JR
- Flavopunctelia flaventior* (Stirton) Hale — on walnut, live oak bark, ST, JR
- Flavopunctelia soledica* (Nyl.) Hale — on live oak, JR
- Fuscopannaria leucostictoides* (Ohlsson) P. M. Jørg. — on oak, madrone, ST
- Fuscopannaria pacifica* P. M. Jørg. — on madrone, JR, ST
- Graphis* sp. — on cherry bark, RR
- Heterodermia leucomela* (L.) Poelt — on walnut, live oak, manzanita, ST, JR

- Hyperphyscia adglutinata* (Flörke) H. Mayrh. & Poelt — on box elder, walnut, live oak bark, (some with apothecia) ST, JR
- Hypocenyce scalaris* (Ach.) M. Choisy — on redwood trunks in deep shade, ST, JR
- Hypogymnia apinnata* Goward & McCune — on chaparral, JR
- Hypogymnia duplicata* (Ach.) Rass. — on chaparral, JR; an excellent find (Lindsay 1973 reported it, but Wright [2001a] refuted the Lindsay record, re-identified Lindsay collection as *H. heterophylla*).
- Hypogymnia imshaugii* Krog — on chaparral, ST, JR
- Hypogymnia physodes* (L.) Nyl. — on pines and chaparral shrubs, ST, JR
- Hypogymnia tubulosa* (Schaerer) Hav. — on manzanita, ST, JR
- Hypotrachyna revoluta* (Flörke) Hale — on madrone, JR
- Hypotrachyna sinuosa* (Sm.) Hale — on pine, ST (excellent find; reported previously for CA only in secondary references such as Hale & Cole 1988; Brodo et al. 2001)
- Koerberia biformis* A. Massal. — on live oak, madrone, ST, JR
- Lecanactis salicina* Zahlbr. — lunch stop, L. Cam Gatehouse, on post, JR
- Lecania brunonis* (Tuck.) Herre — on rock near entrance, RR
- Lecania* cf. *subdispersa* (Nyl. ex B. D. Ryan) B. D. Ryan — on rock near entrance, RR
- Lecanora albellula* Nyl. (L. piniperda) — on madrone, ST
- Lecanora caesiorubella* Ach. — on box elder bark, wooden fence, ST, JR
- Lecanora dispersa* (Pers.) Sommerf. — on walnut, ST
- Lecanora impudens* Degel. — on interior live oak, wood fence, ST
- Lecanora muralis* (Schreber) Rabenh. — on rock wall, ST
- Lecanora meridionalis* H. Magn. — on live oak, interior live oak, ST (small black disk, raised white exciple)
- Lecanora pacifica* Tuck. — on fence, live oak, interior live oak, ST, JR
- Lecanora strobilina* (Sprengel) Kieffer — on Douglas-fir, JR
- Lecanora subrugosa* Nyl. — on live oak, interior live oak, walnut bark, ST
- Lecanora symmicta* (Ach.) Ach. — on live oak, redwood, ST, JR
- Lecidea varians* Ach. (Syn.: *Pyrrhospora varians*) — on live oak, interior live oak, ST
- Lecidella carpathica* Körber — on decomposing granite, JR
- Lecidella elaeochroma* (Ach.) Hazsl. — on cherry bark, JR
- Lecidella euphorea* (Flörke) Hertel — on interior live oak, madrone trunk, Douglas-fir twigs, ST
- Lepraria* sp. — on redwood, JR, ST
- Leptogium millegranum* Sierk — on seepage track on rock in quarry, ST
- Melanelia subaurifera* (Nyl.) Essl. — on live oak, rare, ST, JR
- Neofuscelia verruculifera* (Nyl.) Essl. — on rock in quarry, ST, JR
- Niebla* (= *Vermilacinia*) *cephalota* (Tuck.) Rundel & Bowler — on box elder bark, wooden barn, ST, JR
- Normandina pulchella* (Borrer) Nyl. — on live oak trunk, locally rare, probably undercollected, ST, JR
- Ochrolechia subpallens* Vers. — on interior live oak, ST, JR
- Opegrapha atra* Pers. — on box elder, poplar, live oak bark, ST, JR
- Opegrapha herbarum* Mont. — on oak, ST
- Opegrapha umbellulariae* Zahlbr. — rare; on California bay laurel bark, ST
- Opegrapha varia* Pers. — on oak, JR
- Pannaria conoplea* (Ach.) Bory — on interior live oak, ST
- Parmelia saxatilis* (L.) Ach. — on Douglas-fir, JR
- Parmelia sulcata* Taylor — on Pine JR, ST
- Parmotrema arnoldii* (DR.) Hale — on Douglas-fir and oak, JR, ST
- Parmotrema chinense* (Osbeck) Hale & Ahti — on walnut, live oak bark, redwood branches, JR, ST
- Parmotrema stuppeum* (Taylor) Hale — on walnut, live oak bark, JR, ST
- Peltigera canina* (L.) Willd. — around rock, JR
- Peltigera collina* (Ach.) Schrad. — around rock, JR
- Pertusaria albescens* (Hudson) M. Choisy & Werner — on fence, live oak, interior live oak, ST, JR
- Pertusaria amara* (Ach.) Nyl. — on interior live oak, ST
- Pertusaria lecanina* Tuck. — on live oak, JR
- Pertusaria leioplaca* DC. — on interior live oak, ST
- Pertusaria pustulata* JR, — on cherry (ostiole is black), JR

- Pertusaria rubefacta* Erichsen — on cherry, oak, JR, ST  
*Pertusaria velata* (Turner) Nyl. (Syn.: *P. santa-monicae*) — on box elder, live oak, live oak, interior live oak, walnut bark, ST, JR  
*Phaeophyscia hirsuta* (Syn.: *P. cernohorskyi*) — on live oak & on seepage track on rock in quarry, ST, JR  
*Phaeophyscia orbicularis* (Necker) Moberg — on California bay laurel, JR  
*Physcia adscendens* (Fr.) H. Olivier — on walnut bark & wooden fence ST, JR  
*Physcia cf. dubia* (Hoffm.) Lettau — on rock in quarry, ST  
*Physcia erumpens* Moberg — rare; on live oak, ST, JR  
*Physcia tribacia* (Ach.) Nyl. — on live oak, walnut, live oak, ST, JR  
*Physciella chloantha* (Ach.) Essl. — on Buckeye (gray pruinose, with scant soredia below tips, pale below) ST  
*Physconia isidiigera* (Zahlbr.) Essl. — on wooden fence, JR  
*Placynthium nigrum* (Hudson) Gray — on rock in quarry, ST, JR  
*Polysporina simplex* (Davies) Vezda — on rock wall, ST  
*Porpidia cf. thomsonii* Gowan — on dolomite in quarry, RR (Black lecideine apothecia)  
*Protoblastenia rupestris* (Scop.) J. Steiner — on burned limestone & quarry, RR  
*Pseudocyphellaria anomala* Brodo & Ahti — on oak, JR  
*Pseudocyphellaria anthraxis* (Ach.) H. Magn. — on live oak, ST, JR  
*Punctelia borreri* (Sm.) Krog — on Douglas-fir, JR  
*Punctelia perreticulata* (Räsänen) G. Wilhelm & Ladd — on walnut, live oak, live oak, ST, JR  
*Pyrrhospora quernei* (Dickson) Körber — on wood fence, ST, JR  
*Ramalina dilacerata* (Hoffm.) Hoffm. — on box elder, oak bark, ST, JR  
*Ramalina farinacea* (L.) Ach. — on box elder, live oak, live oak, walnut bark, ST, JR  
*Ramalina leptocarpha* Tuck. — on box elder, live oak bark, ST, JR  
*Ramalina puberulenta* Riefner & Bowler — on wood fence, ST  
*Ramalina subleptocarpha* Rundel & Bowler — on wood barn, ST, JR  
*Rinodina cf. macrospora* Sheard — on oak, JR  
*Rinodina gennarii* Bagl. — on rock, ST  
*Rinodina santa-monicae* H. Magn. — on dead wood, interior live oak, ST, JR (locally rare)  
*Sarcogyne regularis* Körber — on rock wall, decomposing granite, and rock in quarry, ST, RR  
*Sarea resinae* (Fr.) Kuntze — on Douglas-fir, RR  
*Schismatomma rediunta* (Hasse) Tehler — on wood barn, ST  
*Teloschistes chrysothralma* (L.) Th. Fr. — on live oak, JR, ST  
*Teloschistes flavicans* (Sw.) Norman — on walnut, live oak, ST: JR, ST  
*Tephromela atra* (Hudson) Hafellner — on wood fence, ST  
*Thelomma californicum* (Tuck.) Tibell — on wood fence, ST, JR  
*Toninia sedifolia* (Scop.) Timdal — rock crevices in quarry, ST, RR  
*Topelia californica* P. M. Jørgensen & Vezda — on box elder, Douglas-fir, JR, ST  
*Trapeliopsis flexuosa* (Fr.) Coppins & P. James — on wood fence, JR, ST  
*Trapeliopsis granulosa* (Hoffm.) Lumbsch — on wood fence, Douglas-fir trunk, JR, ST  
*Tuckermannopsis orbata* (Nyl.) M. J. Lai — on chaparral, JR, ST  
*Usnea arizonica* Motyka — on chaparral, JR  
*Usnea ceratina* Ach. — on chaparral, JR  
*Usnea cornuta* Körb. — on manzanita, JR  
*Usnea filipendula* Stirton — on chaparral, ST, JR  
*Usnea fulvovireagens* (Räsänen) Räsänen — on walnut bark, ST  
*Usnea rubicunda* Stirton — on manzanita, JR  
*Usnea subfloridana* Stirton — on chaparral, JR  
*Usnea wirthii* Clerc — on walnut, live oak, interior live oak, Douglas-fir, ST, JR  
*Verrucaria cf. aethiobola* Wahlenb. (pale crust, perithecia black, pruinose) — on rock in quarry, ST  
*Verrucaria nigrescens* Pers. — on rock wall & on rock in quarry, ST  
*Waynea californica* Moberg (Syn.: *W. stoehadiana*) — on madrone, JR  
*Xanthomendoza oregana* (Gyelnik) Søchting, Kondratyuk & Kärnefelt (Syn.: *Xanthoria oregana*) — on live oak, JR  
*Xanthoparmelia mougeotii* (Schaerer) Hale — on rock, JR

*Xanthoria fulva* (Hoffm.) Poelt & Petutschnig — On rock wall, ST

*Xanthoria parietina* (L.) Th — on box elder, live oak, walnut bark, ST, JR

*Xanthoria tenuiloba* L. Lindholm — on box elder, ST

*Xanthoria tenax* L. Lindblom — on live oak, JR

Reported by Shirley Tucker, <Tucker@lifesci.ucsb.edu>; Judy Robertson, <JKSRR@aol.com>; & Susanne Altermann, <altermann@cruzio.com>

LICHEN WALK AT FORT ROSS STATE PARK,  
MENDOCINO CO.  
SATURDAY, JULY 24, 2004

Fort Ross was established in 1812 by Russians as an outpost for sea otter hunters and a permanent trade base. It was the southernmost outpost of a Russian presence in the Pacific Northwest. The Russians remained at Fort Ross until sea otters became scarce in 1841. The holdings were sold to John Sutter, who later became famous when gold was discovered at his saw mill in the Sierra Nevada foothills.

None of the original fort structures remain, however several buildings have been reconstructed: the first Russian Orthodox chapel south of Alaska, the stockade, and three other buildings, including the Commander's House, which contains exhibits of the Russian-American Fur Company and the Russian occupation.

This Saturday was a lovely day to spend on the coast. There was no wind and the day was slightly overcast. A small number of people attended the field trip, but we were rewarded with a large variety of lichen species occurring in a very small area of rock outcrops northwest of the visitor center. Attending were Janet and Richard Doell, Ron and Judy Robertson, Sara Blauman, Lora Collins, Dan Norris and Nancy Hillyard. Judy Robertson led the trip and had prepared a list of lichens we might see in the area.

*Buellia halonia* (Ach.) Tuck. *B. stellulata* (Taylor) Mudd, *Lecanora phryganitis* Tuck., *L. penguis* Tuck., *L. gangaleiodes* Nyl., *L. californica*, *L. rupicola* (L.) Zahlbr., *Lecidella asema* (Nyl.) Knoph & Hertel, *Ochrolechia tartarea* (L.) Massal, *Pertusaria californica* Dibben, *Thelomma mammosum* (Hepp.) A. Massal crusts

covered the rocks with other yet to be identified species. *Cladidium bolanderi* (Tuck.) B.D.Ryan was nestled in depressions. Fruticose *Niebla homalea* (Ach.) Rundel & Bowler was common. Foliose *Flavoparmelia caperata* (L.) Hale, *Flavopunctelia flaventior* (Stirton) Hale, *Parmelia saxatilis* (L.) Ach., *Parmelia chinense* (Osbeck) Hale & Ahti, *P. crinitum* (Ach.) Choisy were growing on the rocks and *Cladonia furcata* (Hudson) Schrader, *C. chlorophaea*, *C. fimbriata* species surrounded many of the rock bases.

At the stand of cypress closer to the Visitor center some of the lichen species we encountered were *Dimerella lutea* (Dickson) Trevisan, *Arthonia cinnabarina* (DC.) Wallr., *Pyrrhospora quernei* (Dickson) Körber, *Ramalina* and *Usnea* species.

Reported by Judy Robertson, <JKSRR@aol.com>

LICHEN AND MOSS WALK ON THE NORTH SIDE OF  
WEST PEAK, MT. TAMALPAIS STATE PARK, MARIN  
CO.  
SATURDAY, AUGUST 21, 2004

Mt. Tamalpais State Park is 6,300 acres of redwood groves and oak woodlands with many opportunities for spectacular views of the Bay Area from roads and paths which surround and cross the 2,571 foot high peak. On a clear day, visitors can see the Farallon Islands 25 miles out to sea, the Marin County hills, San Francisco and the bay, hills and cities of the East Bay, and Mount Diablo. On rare occasions, the Sierra Nevada's snow-covered mountains can be seen 150 miles away.

August 21, 2004 was one of these clear days and the Bay Area from north to south could be seen from many places along the road and trail where 8 enthusiastic persons joined for a lichen and moss walk on the North Side of the Mt. Tamalpais West Peak. We met at the Rock Spring parking lot and drove to the starting point about 10 minutes away. Judy and Ron Robertson led the trip. Ron had compiled a list of over 35 moss species that we might see and Judy brought the list that they both had submitted to the State Parks System as a Preliminary Lichen Survey in 2003. The first part of the walk was through the old cement foundations that were part of a fortress during WWII. We looked at lichens and mosses that were growing on the road banks, cement walls and shrubs. Soon

we veered off the path and walked down a nearby slope through oaks and serpentine rock outcrops. Lichen and moss species typically growing in oak woodlands were plentiful. We had lunch along the hillside and the last stop was where a small growth of *Pseudocyphellaria crocata* L. Vainio could be seen on one of the rock faces. This is the only area in Marin and Sonoma Counties where Judy and Ron have found this lichen with bright yellow soralia dotting the upper surface. The walk back up the hillside was actually shorter than we anticipated and we dispersed about 2 pm. Participating were Bill Hill, Sara Blauman, Lora Collins, Athena Keena, Susan Bazell, Irene Winston, Judy and Ron Robertson

The following is a preliminary list of the lichens found in Mt. Tamalpais State Park collected by Judy and Ron Robertson and submitted to the State Parks System in 2003.

*Acarospora schleicheri* (Ach.) A. Massal  
*Anaptychia setifera* Rasanen  
*Bryoria furcellata* (Fr.) Brodo & D. Hawks.  
*Buellia halonia* (Ach.) Tuck.  
*Buellia lepidastra* (Tuck.) Tuck.  
*Caloplaca coralloides* (Tuck.) Hulting  
*Caloplaca decipiens* (Arnold) Blomb. & Forss.  
*Caloplaca variabilis* (Pers.) Mull. Arg.  
*Catapyrenium psoromoides* (Botter) R. Sant.  
*Chrysothrix candelaris* (L.) R. Laundon  
*Cladonia asahinae* Thompson  
*Cladonia bellidiflora* (Ach.) Schaerer  
*Cladonia cervicornis ssp. verticillata* (Hoffm.) Ahti  
*Cladonia fimbriata* (L.) Fr.  
*Cladonia furcata* (Hudson) Schrader  
*Cladonia macilenta* Hoffm.  
*Cladonia ochroclora* Florke  
*Cladonia pyxidata* (L.) Hoffm.  
*Cladonia squamosa var. subsquamosa* (Nyl. ex Leighton) Vain  
*Cladonia subulata* (L.) F.H. Wigg  
*Coelocaulon muricatum* (Ach.) J.R. Laundon  
*Collema furfuraceum* (Arnold) Du Reitz  
*Collema nigrescens* (Hudson) DC.  
*Dendriscoaulon intricatum* (Nyl.) Henssen  
*Dendrographa leucophaea* (Tuck.) Darbish  
*Dermatocarpon intestiniforme* (Korber) Hasse  
*Dermatocarpon luridum* (With.) J.R. Laundon  
*Dermatocarpon miniatum* (L.) W. Mann  
*Dimelaena thysanota* (Tuck.) Hale & Culb.  
*Dimelaena oriens* (Ach.) Norman  
*Dimelaena radiata* (Tuck) Hale & Culb.  
*Dimerella lutea* (Dickson) Trevisan

*Diploschistes muscorum* (Scop.) R. Sant.  
*Diploschistes scruposus* (Schreber) Norman  
*Endocarpon pusillum* Hedwig  
*Evernia prunastri* (L.) Ach.  
*Flavoparmelia caperata* (L.) Hale  
*Flavopunctelia flaventior* (Stirton) Hale  
*Gyalecta herrei* Vezda  
*Gyalecta jenesis* (Batsch) Zahlbr.  
*Heppia lutosa* (Ach.) Nyl.  
*Heterodermia leucomelos* (L.) Poelt  
*Heterodermia namaquana* Brusse  
*Hyperphyscia adglutinata* (Glorke) H. Mayrh. & Poelt  
*Hypocnomyce scalaris* (Ach.) Choisy  
*Hypogymnia enteromorpha* (Ach.) Nyl.  
*Hypogymnia imshaugii* Krog  
*Hypogymnia inactiva* (Krog) Ohlsson  
*Hypogymnia physodes* (L.) Nyl.  
*Hypogymnia tubulosa* (Schaerer) Hav.  
*Hypotrachyna revoluta* (Florke) Hale  
*Japewia tornoensis* (Nyl.) Tonsberg  
*Koerberia biformis* A. Massal  
*Koerberia sonomensis* (Tuck.) Henssen  
*Lecanographa hypothallina* (Zahlbr.) Egea & Torrente  
*Lecanora caesiorubella ssp. merrillii* Imshaug & Brodo  
*Lecanora demissa* (Flotow) Zahlbr.  
*Lecanora gangleiodes* Nyl.  
*Lecanora muralis* (Schreber) Rabenh.  
*Lecanora pacifica* Tuck.  
*Lecanora rupicola* (L.) Zahlbr.  
*Lecidea atrobrunnea* (Ramond ex Lam & DC.) Schaerer  
*Lecidea mannii* Tuck.  
*Lecidea tessellata* Florke  
*Lecidella asema* (Nyl.) Knoph & Hertel  
*Leprocaulon subalbicans* (Lamb) Lamb & Ward  
*Leptochidium albociliatum* (Desmaz.) Choisy  
*Leptogium corniculatum* (Hoffm.) Minks  
*Leptogium furfuraceum* (Harm.) Sierk  
*Leptogium lichenoides* (L.) Zahlbr.  
*Lobaria pulmonaria* (L.) Hoffm.  
*Lobaria scrobiculata* (Scop.) DC.  
*Lobothallia alphoplaca* (Wahlenb.) Hafellner  
*Melanelia elegantula* (Zahlbr.) Essl.  
*Melanelia glabratula* (Lamy) Essl.  
*Melanelia panniformis* (Nyl.) Essl.  
*Melanelia subaurifera* (Nyl.) Essl.  
*Melanelia subolivacea* (Nyl.) Essl.  
*Micaria prasina* Fr.  
*Mycoblastus sanguinarius* (L.) Norman  
*Neofuscelia verruculifera* (Nyl.) Essl.  
*Nephroma helveticum* Ach.  
*Nephroma laevigatum* Ach.

- Nephroma parile* (Ach.) Ach.  
*Nephroma resupinatum* (L.) Ach.  
*Niebla disrupta* (Nyl.) Spjut  
*Normandina pulchella* (Borrer) Nyl.  
*Ochrolechia upsaliensis* (L.) A. Massal  
*Ochrolechia subpallescens* Vers.  
*Ophioparma rubricosa* (Mull) Arg.) S. Ekman  
*Parmelia saxatilis* (L.) Ach.  
*Parmelia sulcata* Taylor  
*Parmeliella cyanolepra* (Tuck.) Herre  
*Parmelina quercina* (Willd.) Hale  
*Parmotrema arnoldii* (DR.) Hale  
*Parmotrema crinitum* (Ach.) Choisy  
*Parmotrema reticulatum* (Tayl.) Choisy  
*Parmotrema stuppeum* (Taylor) Hale  
*Peltigera collina* (Ach.) Schrad.  
*Peltula bolanderi* (Tuck.) Wetmore  
*Peltula euploca* (Ach.) Poelt  
*Pertusaria amara* (Ach.) Nyl.  
*Pertusaria californica* Dibben  
*Phaeophyscia cernohorskyi* (Nadv.) Essl.  
*Phaeophyscia decolor* (Kashiwadani) Essl.  
*Phaeophyscia orbicularis* (Neck.) Essl.  
*Phylliscum demangeonii* (Moug. & Mont.) Nyl.  
*Physcia adscendens* (Fr.) Oliv.  
*Physcia aipolia* (Ehrh.) Furnrohr  
*Physcia albinea* (Ach.) Nyl.  
*Physcia dubia* (Hoffm.) Lattau  
*Physcia erumpens* Moberg  
*Physcia phaea* (Tuck.) Thoms.  
*Physcia stellaris* (L.) Nyl.  
*Physcia tenella* (Scop.) DC.  
*Physcia tribacia* (Ach.) Nyl.  
*Physconia enteroxantha* (Nyl.) Poelt  
*Physconia isidiigera* (Zahlbr. in Herre) Essl.  
*Pilophorus acicularis* (Ach.) Th. Fr.  
*Placidiopsis cinerascens* (Nyl.) Breuss  
*Platismatia glauca* (L.) Culb. & C. Culb.  
*Platismatia herrei* (Imshaug) Culb. & C. Culb.  
*Platismatia stenophylla* (Tuck.) Culb. & C. Culb.  
*Polychidium muscicola* (Sw.) Gray  
*Polysporina simplex* (Davies) Vezda  
*Prototarmelia badia* (Hoffm.) Hafellner  
*Pseudocyphellaria anomala* Brodo & Ahti  
*Pseudocyphellaria anthraspis* (Ach.) H. Magn.  
*Pseudocyphellaria crocata* (L.) Vainio  
*Psora nipponica* (Zahlbr.) Gotth. Schneider  
*Punctelia borreri* (Sm.) Krog  
*Punctelia stictica* (Del.) Krog  
*Pyrrhospora cinnabarina* Sommerf.  
*Pyrrhospora querneae* (Dickson) Körber  
*Ramalina farinacea* (L.) Ach.  
*Ramalina menziesii* Taylor  
*Ramalina pollinaria* (Westr.) Ach.  
*Ramalina subleptocarpha* Rundel & Bowler  
*Rhizocarpon geographicum* (L.) DC.  
*Rimularia insularis* (Nyl.) Rambold & Hertel  
*Sclerophyton cerebriforme* Egea & Torrente  
*Solenospora crenata* (Herre) Zahlbr.  
*Sphaerophorus globosus* (Huds.) Vain.  
*Staurothele areolata* (Ach.) Lettau  
*Stereocaulon intermedium* (Sav.) Magn.  
*Sticta fuliginosa* (Hoffm.) Ach.  
*Sticta limbata* (Sm.) Ach.  
*Teloschistes chrysophthalmus* (L.) Th. Fr.  
*Teloschistes exilis* (Michaux) Vainio  
*Teloschistes flavicans* (Sw.) Norman  
*Tephromela atra* (Huds.) Hafellner  
*Tephromela aglaea* (Sommerf.) Hertel & Rambold  
*Thelomma californicum* (Tuck.) Tibell  
*Thelomma mammosum* (Hepp.) A. Massal  
*Thelotrema lepidinum* (Ach.) Ach.  
*Toninia ruginosa* (Tuck.) Herre ssp. *ruginosa* (Timdal)  
*Trapeliopsis wallrothii* (Florke) Hertel & Gotth.  
*Tremolecia atrata* (Ach.) Hertel  
*Tuckermanopsis merrillii* (DR.) Hale  
*Tuckermanopsis orbata* (Nyl.) M.J. Lai  
*Umbilicaria phaea* Tuck.  
*Umbilicaria polyphylla* (L.) Baumg.  
*Umbilicaria polyrrhiza* (L.) Fr.  
*Usnea ceratina* Ach.  
*Usnea cornuta* Korber  
*Usnea rubicunda* Stirton  
*Usnea wirthii* Clerc  
*Verrucaria sphaerospora* Anzi s.l.  
*Vermilacinia cephalota* (Tuck) Rundel & Bowler  
*Vermilacinia ceruchoides* (Rundel & Bowler) Spjut  
*Vermilacinia procera* (Rundel & Bowler) Spjut  
*Vermilacinia zebrina* Spjut  
*Xanthoparmelia cumberlandii* (Gyel.) Hale  
*Xanthoparmelia mougeotii* (Schaerer) Hale  
*Xanthoparmelia plittii* (Gyel.) Hale  
*Xanthoria candelaria* (L.) Th. Fr.  
*Xanthoria fallax* (Hepp.) Arnold  
*Xanthoria oregana* Gyelnik  
*Xanthoria parietina* (L.) Th. Fr.  
*Xanthoria polycarpa* (Hoffm.) Rieber

CALS FIELD TRIP TO JASPER RIDGE BIOLOGICAL  
 PRESERVE, SAN MATEO COUNTY, CALIFORNIA  
 OCTOBER 16, 2004

Jasper Ridge is located in the outer coast ranges  
 about 15 km east of the Pacific Ocean and about 50  
 km south of San Francisco; it is just a few minutes

from the main campus of Stanford University. The 1200 acre preserve is protected from the ocean by the Santa Cruz Mountains to the west. The climate can be best described as Mediterranean. Jasper Ridge offers some diverse plant communities: oak woodland, mixed evergreen forest, chaparral, redwood groves, freshwater marsh and stream banks. There is also a lovely lake, Searsville Lake, with a trail around it.

Stanford University owns and operates the preserve. Access to the public is limited – special arrangements are required. The preserve is utilized for research projects as evidenced by many plots that we saw as we passed along the trails. Additionally, it serves as an educational vehicle, offering docent-led walks at various times during the year. Two of our members, Janet Doell and Judy Robertson, have generously provided lichen training to the docents over the years.

A dozen lichen enthusiasts met Janet, our guide, at the gate in the morning. After all had assembled we drove a short distance to the beautiful Docent Center. Inside the building we were all pleased to see the lichen display that Janet assembled shortly after the building opened. Janet explained the type of habitat that we would be visiting and some lichens that we would likely see. Off we went down a trail that led through oak woodland to a large oak tree with huge drooping limbs covered with lichens. There was a nice assortment of *Ramalina*, with *R. farinacea* (L.) Ach., *R. leptocarpha* Tuck., and *R. menziesii* Taylor abundant. Not nearly as common, but, a special treat for many of us was *R. puberulenta* Riefner & Bowler. We also found *Collema furfuraceum* (Arnold) Du Rietz, a gelatinous lichen with a cyanobacterial photobiont.

We followed the trail down to Searsville Lake and explored the riparian habitat there, making a loop around the lake. *Flavopunctelia flaventior* (Stirton) Hale was very common on the oaks. Just before we came upon a concrete dam, we saw just a few *Cladonia* on greenstone. Janet explained how there had previously been a rather large area of *Cladonia* and how it had been invaded by *Diploschistes*

*muscorum* (Scop.) R. Sant. ssp. *muscorum*. The *Diploschistes* uses the algae from the *Cladonia* to get started, and then becomes free living, killing the *Cladonia* in the meantime. While crossing the dam, we found *Caloplaca* and *Candelaria* on the concrete and *Xanthoria* on the metal railing. Once across the dam we saw *Leproloma membranaceum* (Dickson) Vainio on more greenstone. Entering chaparral as we continued to proceed around the lake, we noticed a few small *Hypogymnia*. Janet said that they once were quite common in the area, but, most that we found were very small. We did, however, discover one *Hypogymnia tubulosa* (Schaerer) Hav. that was, indeed, well formed. *Ochrolechia* and *Pertusaria amara* var. *flotowiana* (Flörke) Vainio were growing on the larger shrubs and small trees in this area as well. *Xanthoparmelia*, most being *X. cumberlandia* (Gyelnik) Hale, as well as *Umbilicaria phaea* Tuck. were growing on some rocks along the trail. Coming to a wooden bridge, we crossed it looking for *Thelomma occidentale* (Herre) Tibell on the wooden railing. We found it, along with several *Melanelia*; Janet remarked that the *Thelomma* has, in fact, decreased here.

We returned to the Docent Center where we ate our lunches on the picnic tables under some huge oaks. After lunch a few of us took a small side trip to a stump and fallen trunk where we found three different pin lichens, one of which was *Cyphelium tigillare* subsp. *notarisii* (Tul.) W. A. Weber.

Field Trip participants were: Susanne Altermann, Earl Alexander, Sara Blauman, Irene Brown, Richard and Janet Doell, Bill Hill, Dan Norris and Nancy Hillyard, Judy Robertson, Leonard and Elizabeth Rush, Richard Strong.

More information on Jasper Ridge, including a lichen list can be found in the following article: Doell, J. and D. Wright. 1996. Macrolichens of Jasper Ridge Biological Preserve, San Mateo County, California. Bulletin of the California Lichen Society 3(1): 1-8, which is also available at <<http://ucjeps.berkeley.edu/rlmoe/cals.htm>>.

Reported by Sara Blauman

## Upcoming Events

### LICHEN WALK AT SAN BRUNO MOUNTAIN STATE PARK AND CALS GENERAL MEETING AND POT LUCK DINNER.

SATURDAY, JANUARY 29, 2005, 10AM

San Bruno Mountain is at the northern reaches of the Santa Cruz range. San Bruno Mountain State Park is a 2,266 acre area with day-use facilities, hiking trails, and beautiful views of the city and the bay. The park is home to a wide variety of birds and animals as well as several endangered plant and butterfly species. We will join the Yerba Buena CNPS chapter for a lichen walk in the Park. We will see a variety of lichens from coastal crusts to windswept chaparral species. Meet at the San Bruno Mountain Botanical Garden Parking lot. After entering San Bruno Mountain State & County Park, turn right immediately after passing the entrance kiosk, and cross under Guadalupe Canyon Parkway to this second parking area. Meet at 10 am. The walk with the CNPS chapter will end approximately at 1pm. CALS members may continue for a longer exploration of the area and then travel to the Brickyard Landing Clubhouse in Pt. Richmond for our annual CALS birthday celebration, pot luck and general meeting at 5pm that evening. For directions to the State Park, see the San Bruno Mountain State Park website at [http://www.parks.ca.gov/default.asp?page\\_id=518](http://www.parks.ca.gov/default.asp?page_id=518)

If you are interested in attending the CALS annual Potluck and Birthday Celebration, contact Judy Robertson at [jkstr@aol.com](mailto:jkstr@aol.com) or 707-584-8099.

### EXPLORING FOR MYXOMYCETES (SLIME MOLD) LED BY DON KOWALSKI

SATURDAY, FEBRUARY 12, 2005 10AM

Did you know there are over 280 species of Myxomycetes in California? Don Kowalski, an expert in the field, has named many of them. Don will give a short slide presentation about this fascinating subject and then lead us on a field trip exploring for slime molds. We will meet at the College of the Redwoods in Mendocino county at 10

am. in room 120 of the main campus building and then go to a site close by. Directions to the campus can be found at the College of the Redwoods Website at <http://www.redwoods.edu/District/Maps/mendomap.asp>  
Please bring a lunch.

### SO BE FREE ANNUAL EVENT OREGON INSTITUTE OF MARINE BIOLOGY MARCH 19-22, 2005

So Be Free stands for Spring Outing, Botanical Excursion, Foray, Retreat and Escape to the Environment. If you are interested in learning about mosses and liverworts, this is the event for you. OIMB in Charlston, Oregon and accommodate 40 participants. If you are interested in attending, contact Steven Jessup at <http://www.sou.edu/biology/Faculty/jessup.htm>.

### NORTHWEST LICHENOLOGISTS ANNUAL MEETING MARCH 24-26, 2005

NWL and the Northwest Scientific Association hold their yearly meeting jointly. This year the location is Corvallis, Oregon. This is a great opportunity to meet the lichenologists to the north of us. For more information, see the NWL website at [www.proaxis.com/~mccune/nwl.htm](http://www.proaxis.com/~mccune/nwl.htm).

### AN INTRODUCTION TO THE FOLIOSE AND FRUTICOSE LICHENS CONFERENCE ROOM, UC BERKELEY HERBARIUM SATURDAY, APRIL 9, 2005, 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.

FIELD TRIP TO ROCK SPRING, MT. TAMALPAIS STATE  
PARK  
SATURDAY, APRIL 23, 2005, 10 A.M. TO 1 P.M.

THIS LOOP TRAIL AT ROCK SPRING IS A FAVORITE FOR CALS MEMBERS. BARBARA LACHELT, A LONG TIME CALS MEMBER, HAS LED MANY FIELD TRIPS AT ROCK SPRING. JUDY ROBERTSON WILL BE LEADING US THIS SATURDAY. WE WILL LOOK AT LICHENS ON OAKS, CONIFERS, SOIL AND ROCK OUTCROPS. WEATHER IN THE AREA IS VERY UNPREDICTABLE. PLEASE DRESS ACCORDINGLY. MEET AT THE ROCK SPRING PARKING LOT AT 10 AM.

FIELD TRIP TO THE HAT CREEK AREA,  
MAY 14, 2005

North of Lassen Volcanic National Park is the Hat Creek Rim and Hat Creek Valley. Bill Madsen who has joined us on our field trips to the White Mountains and Modoc County has a cabin in the Hat Creek area and has offered it for our use for this weekend field trip. We can stay in the cabin and cook our meals there or camp close by. Anyone is welcome to join us just for the day as well. We will explore the surrounding area for lichens. This trip might be considered a continuation of the Modoc County trip as we investigate the State of California for lichens.

ONGOING LICHEN IDENTIFICATION WORKSHOPS  
LOCATION TBA  
THE 2<sup>ND</sup> AND 4<sup>TH</sup> THURSDAY OF EVERY MONTH, 5 PM.  
TO 8:30PM.

Join us every 2<sup>nd</sup> and 4<sup>th</sup> Thursday of each month for these Lichen ID sessions at Sonoma State University. 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. Darwin Hall at Sonoma State University will be undergoing construction starting spring semester, however we still plan to hold our workshop somewhere on campus. If you are interested in attending, please notify Judy Robertson and she will alert all participants of the location each meeting.

FIELD TRIP TO STUUEER BUTTES  
FEBRUARY 18-20

The Middle Mountain Foundation (a Sutter Buttes land trust) has invited us to explore and identify lichens on their properties. Peter and Margit Sands will host us and their ranch will be our main working area. We have been given permission to camp at a level area complete with porta potty but bring your own water, chairs, camp table, camp gear, food, etc.

Take either HWY 99 to HWY 20 at Williams and go east or HWY 99 at Yuba City and go west on HWY 20. In either case go north on Acacia ave. which will lead you into the town of Sutter. In Town on the right you will see a White church. We will meet in front. If possible car pool as we can only take six cars into the Buttes. There is overload parking for this also. As it is behind locked gates we must arrive at either of two times. Friday at 5:00 P.M. Or Saturday at 8:A.M. You must be on time to insure getting in.

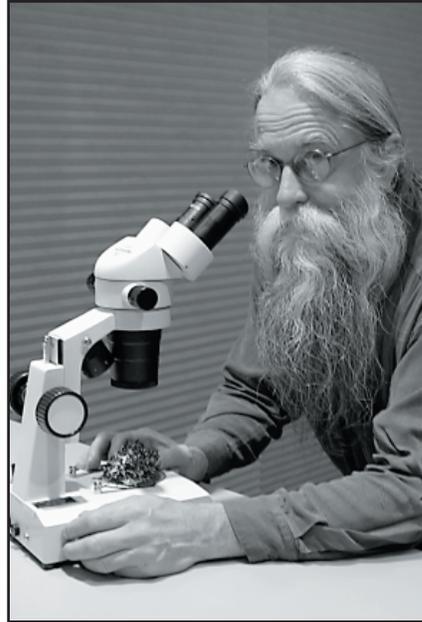
Peter Sands knows the flora, fauna and geology of the area very well. The Foundation has asked that we allow some of their guides to join in with us. There is limited parking space so if possible please car pool for this event, and remember we are on private lands so please respect fenced boundaries unless otherwise approved by our hosts. We will collect for one collection for us, one for the Foundation. If individuals need a species to fill out their collection it's O.K. but please be conservative.

You will need to sign up for this trip for final schedule and directions. Please contact Judy Robertson as indicated below.

If you are interested in participating in any of the above activities, or have questions, please contact Judy Robertson at <jksrr@aol.com or 707-584-8099.

## President's Message

One of the benefits of writing this President's Message is reviewing what has been noteworthy for CALS since the last time. One thing for sure is the publication of Volume Two of the Lichen Flora of the Greater Sonoran Desert Region -- it is very much about 'us' for both the lichens of our region and people involved. And how befitting it is to find in it new taxa named after Bruce Ryan (*Lecanora ryaniana*, *Lecanora brucei*). So much of the volume is actually written and edited by Bruce that it will stand for years as his final legacy to the world of lichenology. Also befitting are the several species newly named here for Tom Nash (*Fellhanera nashii*, *Lecanora nashii*, *Lecidella nashiana*, *Phaeophyscia nashii*, *Sticta nashii*) who, if anyone, is the 'father' of the entire Sonoran Desert project itself. But the dedication list goes on: *Lecania brattiae* and *Lecanora brattiae* for one of our founding members Charie Bratt, and *Xanthoparmelia tuckeriana* acknowledging Shirley Tucker.



Best of all there is the newly discovered lichen, *Xanthoria pollinarioides*, which probably would not even have been found if it were not for CALS. For several years it stood as our 'mystery lichen' (See table of occurrences at <<http://groups.yahoo.com/group/CaliforniaLichens/database>>, photos at <<http://groups.yahoo.com/group/CaliforniaLichens/files/>> and the back cover of the Summer 2000 CALS bulletin, Vol3 No1 including mention on page 13 of Darrell Wright's "Orange Lichens" article there.) Now finally it has been named and described in Volume Two by Louise Lindblom and Darrell Wright. It all began with the tenacious curiosity of our then new member Greg Jirak, who with his 'beginners enthusiasm' found this little orange thing on coastal *Baccarus* shrubs. In his usual thoroughness, our founding editor Darrell Wright had actually also collected it previously on the Marin County coast, but (reporting now from New Zealand) he thought at the time that it was something immature rather than something really 'new'. It took Doug Glavich in Arcata to compare it with herbarium specimens to further the suspicion, and Louise Lindblom seeing specimens that were sent to her to confirm the discovery, and now formally describe it with Darrell. Judy and Ron Robertson supplied the type specimen. What teamwork for CALS as a group!

Another CALS enabled effort that I am proud of is our printing of yet another Sonoran Lichens calendar for 2005 by Dr. Frank Bungartz. What spectacular photography! The calendars originally began as a gift by Frank to his mentor and PhD advisor Tom Nash at ASU, and continues now with Frank back home in Munich Germany sending the source file to our printer over the internet.

There has been an explosion of new life in the Conservation Committee with the addition by our board of new members Boyd Poulsen, Tom Carlberg, and (especially!) Andy Pigniolo who immediately instigated a review of possible species for our rare list. We welcome them into the process and thank outgoing committee members Cherie Bratt and Greg Jirak for their

dedicated work in the evolution of the committee. And all this happens under the adept guidance of the committee chair Eric Peterson. Much of the committee work gets done online, but a face-to-face meeting is scheduled for early 2005. Thank you all.

Lets not forget how CALS began -- with several of us for years doing the Lichen Exhibit at the annual December Fungus Fair of the Mycological Society of San Francisco. Our exhibit has evolved to now include the hands-on microscope table to capture the interest especially of young folks to the wonders and beauty of lichens. This year the exhibit matures further with Irene Winston setting the focus of the exhibit on the phylogeny of lichen symbionts. CALS continues to slowly grow as new people join the membership. A cursory glance at the roles shows about 14 recent new bulletin subscribing members with about 180 total on the mailing list at the moment. There has also been steady flux in and out of our yahoogroup, now with something over 200 members. So there we are - welcome to California Lichens in 2005, our 11th year.

Bill Hill

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#### ITEMS FOR SALE

CALS has the following items for sale. Checks should be made out to The California Lichen Society.

1. A CALS mini guide to some common California Lichens, text by Janet Doell, photography by Richard Doell. A pocket sized book illustrating 41 lichen species, with an introduction, glossary, and descriptive notes for each photo. Designed for anyone interested in the natural world who would like to learn something about lichens in California. Price \$10.00 (tax included), \$12.00 if mailed. To order contact Janet Doell at 510 236 0489, or e-mail her at <rdoell@sbcglobal.net>.

2. A CALS mini guide to some Southern California Lichens, text by Janet Doell, photography by Richard Doell. Almost identical to the first mini guide in design and layout, this book also has an index. All photographs were taken in southern California especially for this book. Many of the lichen genera depicted, and some of the species, are also present in more northerly counties.

To order contact Janet Doell as outlined above.

3. CALS lichen poster. This colorful 30" x 20" poster features 21 lichens. Photographs by Richard Doell. You can see a picture of the poster at the CALS Web site: <<http://ucjeps.herb.berkeley.edu/r/moe/cals.html>>. Price \$5.00 (tax included), \$7.00 if mailed. To

order contact Janet Doell as outlined above.

4. Hand Lens. \$5.00 (tax included), \$7 if mailed. These are Waltex 4 x 6 x 10 magnifiers (2 fold out lenses in a single holder; they are superimposed for the highest magnification). To order contact Judy Robertson at 707 584 8099 or e-mail her at <jksrr@aol.com>.

5. "Lichens of the Sonoran Desert Region" 2005 Calendar, 15 pages spiral bound 8½ inches wide by 11 inches high, again produced by CALS member Dr. Frank Bungartz, now at <bungartz@bsm.mwn.de>. \$15 (tax included), plus postage if mailed: \$2.21 domestic within USA, \$3.10 to Canada, \$8 air delivery foreign (outside of USA or Canada), or \$4 foreign economy rate (3 to 8 weeks delivery). To order contact Bill Hill at aropoika@earthlink.net and send payment AND your mailing address to: Calendar, POBox 472, Fairfax CA 94930. The calendar includes informative notes for lichens depicted. See a preview at <<http://ces.asu/ASULichens/profiles/calendar.html>>." PS: As of December 2004, there are still a few 2004 calendars available - they are worth it for the pictures!

6. For lichen identification supplies, including chemical kits, please contact Charis Bratt at 805 967-7043 or e-mail her at <cbratt@compuserve.com>. She can not mail chemicals due to postal restrictions, so you would have to make other arrangements for delivery of chemical kits.

# The Bulletin of the California Lichen Society

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Winter 2004

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Back cover: Images of *Usnea longissima* Ach. Clockwise from upper left:

- a) Specimen from the last recorded *U. longissima* in San Mateo County.
- b) Armstrong Redwoods State Reserve, Sonoma County.
- c) Off Seaview Road, Sonoma County.
- d) Eastern Prince William Sound, Alaska

Photography by Richard Doell (see also article on p. 37).

