# Bulletin

# of the

# California Lichen Society

Volume 9 No.1 Summer 2002

The California Lichen society seeks to promote the appreciation, conservation and study of the lichens. The interests of the society include the entire western part of the continent, although the focus is on California. Dues categories (in $US per year): Student and fixed income - $10, Regular - $18 ($20 for foreign members), Family - $25, Sponsor and Libraries - $35, Donor - $50, Benefactor - $100 and Life Membership - $500 (one time) payable to the California Lichen Society, P.O. Box 472, Fairfax, CA 94930. Members receive the Bulletin and notices of meetings, field trips, lectures and workshops.



The Bulletin of the California Lichen Society (ISSN 1093-9148) is edited by Charis Bratt with a review committee including Larry St. Clair, Shirley Tucker, William Sanders and Richard Moe, and is produced by Richard Doell. The Bulletin welcomes manuscripts on technical topics in lichenology relating to western North America and on conservation of the lichens, as well as news of lichenologists and their activities. The best way to submit manuscripts is by e-mail attachments or on 1.44 Mb diskette or a CD in Word Perfect or Microsoft Word formats. ASCII format is an alternative. Figures may be submitted as line drawings, unmounted black and white glossy photos or 35mm negatives or slides (B&W or color). Contact the Production Editor, Richard Doell at <doell4@attbi.com> for e-mail requirements in submitting illustrations electronically. A review process is followed. Nomenclature follows Esslinger and Egan's 7th Checklist on-line at <http://www.ndsu.nodak.edu/instruct/esslinge/chcklst/chcklst7.html>. The editors may substitute abbreviations of author's names, as appropriate, from R.K. Brummitt and C.E. Powell, Authors of Plant Names, Royal Botanic Gardens, Kew, 1992. Style follows this issue. Reprints may be ordered and will be provided at a charge equal to the Society's cost. The Bulletin has a World Wide Web site at <http://ucjeps.herb.berkeley.edu/rlmoe/cals.html>.

Volume 9(1) of the Bulletin was issued June 5, 2002.

Front cover: *Sphaerophorus globosus* (Hudson) Vainio, X3. Photography by Richard Doell.

Bulletin of the California Lichen Society

Volume 9 No. 1 Summer 2002

# A Landscape-level Analysis of Epiphytic Lichen Diversity in Northern and Central California: environmental predictors of species richness and potential observer effects

Sarah Jovan
Department of Botany and Plant Pathology,
Oregon State University, Corvallis, OR 97331
e-mail: <jovans@bcc.orst.edu>

Abstract. *In this study, patterns in epiphytic lichen species richness in northern and central California are modeled using regression techniques. Several climatic, geographic, and stand characteristic variables were included in the analysis to determine the best predictors of richness. Because the data were collected by multiple people, the potential for observer effects to impact data quality is also investigated. A stepwise linear regression identified longitude, maximum temperature (mean annual), and overstory tree diversity as the best predictors of species richness, together explaining about 30% of the variability in the data. Accounting for data collector identity raised the percentage of variability explained to 51%.*

## Introduction

The purpose of this study is to investigate epiphytic lichen diversity in northern and central California. This region of California has a diverse flora that consists of many distinct communities spanning the complex set of climatic and topographic gradients that thread throughout the landscape. The cyanolichen and *Usnea* rich communities characteristic of the humid, cool forests of the northwestern coastline are starkly different than the high and dry communities of the Sierras where brilliant *Letharia* species and *Hypogymnia imshaugii* predominate. The complex landscape provides a wide range of habitats, which in turn support a wide variety of epiphytic communities.

Defining the conditions that promote a high diversity of epiphytic lichens within any landscape is a particularly daunting task as each species has individualistic tolerances to environmental conditions, in many cases making distributional patterns complex and difficult to predict. Moreover many factors are known to influence the establishment of epiphytic lichen species. The general importance of climatic factors such as precipitation, relative humidity, and temperature are well documented.

The importance of various stand characteristics and structural heterogeneity to species diversity is also well studied. Some degree of substrate specificity is common for many species, making the composition of the tree community important to lichen establishment. In the Oregon Cascades, Neitlich and McCune (1997) demonstrated that hardwood patches in young (~50 yrs) mixed conifer forests had higher species richness than areas where hardwoods were absent. Hardwoods often support a different lichen flora than the conifer counterparts (Neitlich & McCune, 1997; Kuusinen, 1996; Becker, 1980), thereby increasing epiphytic lichen diversity in the stand overall. Older trees and snags often support a distinguished flora as well (Neitlich & McCune, 1997; Sillett & Goslin, 1999; Gustafsson et al, 1992). Some lichen species, known as late-successional or old-growth associated, occur more abundantly or even exclusively in older stands (Gustafsson et al, 1992; McCune, 1993; Rosso et al, 2000; Lesica et al, 1991).

These are but a small sample of the habitat qualities

that lichenologists have found to be important to lichens. Collecting data for all potentially pertinent variables is infeasible, so deciding upon a set of target variables must be done judiciously.

*Observer Effects*

Data spanning a broad spatial scale, as these data do, are often collected by multiple people. Four different people surveyed the lichen communities for this project. Naturally each surveyor has his/her own unique abilities, experience and education relevant to the nature of the data collection. There is concern that results of broad scale sampling of lichen community composition are not repeatable, that the numbers of species found and estimated characteristics of their distributions in the sample area vary greatly between observers. A study by McCune et al (1997) directly addressed this question using the same sampling protocol as used for the data analyzed here. They found that species richness captured in a plot varied considerably between the different surveyors, and that inequities in past experience with lichens and the local lichen flora greatly affected the surveyor's ability to accurately estimate species richness. Whenever multiple surveyors collect data for a study, particularly when the focus is a statistic sensitive to uncommon species, the effect of observer identity must be estimated to evaluate data quality.

*Objectives*

The objectives of this study are twofold: (1) to determine what environmental factors are the best predictors of species richness within the study area (Figure 1) using a multiple linear regression on a diverse set of 17 explanatory variables and (2) to determine how much additional variability in species richness is explained when surveyor identity is included in the model. Pinning down the exact conditions that support high or low lichen diversity, especially at the broad landscape level of northern and central California, would be nearly impossible. However, I will attempt to identify a general set of environmental conditions for which one would expect a higher diversity of species.

## Methods

*FHM Methodology for Collecting Community Data*

Lichen community data were collected by four surveyors under the direction of the Forest Health Monitoring (FHM)/Forest Inventory Analysis (FIA) programs (for field protocol see McCune et al, 1997). Over three years (1998-2000), the surveyors visited 153 permanent 0.4 hectare circular plots and documented the presence of all epiphytic macrolichen species. Plots were dispersed throughout Northern and Central California on a sampling grid (Figure 1).

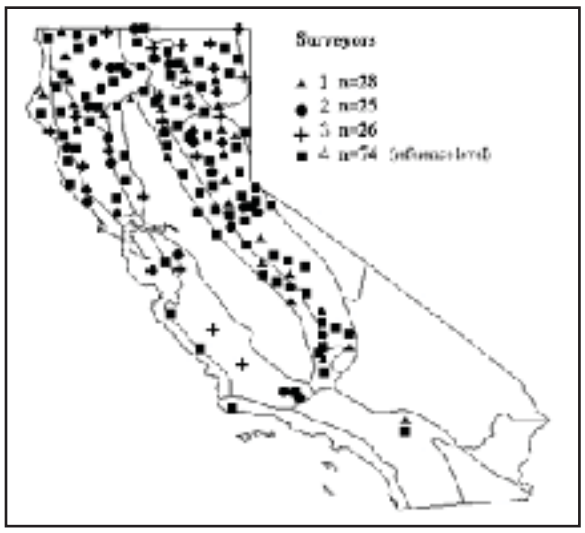



*Figure 1: Map depicting sampled plots. Different symbols indicate the surveyor who collected the data.*

*Determining a model for predicting species richness*

Stepwise multiple linear regression was used to select which group of environmental variables were the best predictors of species richness. To determine the most parsimonious model from a set of 17 environmental variables, the "forward" variable selection setting was used (S-plus software package). The annual means of precipitation, humidity, temperature, and dewpoint temperature were considered. The maximum and minimum yearly temperature, annual number of wetdays (number of days when precipitation occurred) and the Conrad index of continentality (Tuhkanen, 1980) were also included. All climate data was derived from the PRISM model (Daly et al, 1994). Geographic variables included were: elevation, longitude, and latitude. The following set of variables describing the stand structures of the plots was also analyzed: overstory diversity of trees, hardwood species di-

versity, conifer species diversity, total basal area, hardwood basal area, and conifer basal area.

A more complex (saturated) model including interaction terms between the variables selected by the stepwise regression was fit to the data. The saturated model was compared to the original model without interaction terms using an extra sums of squares F-test.

After accounting for all potentially important environmental and stand-related variables, indicator variables representing the four different surveyors were added to the accepted model and analyzed with a multiple linear regression. As each person surveyed a geographically dispersed set of plots, there should be essentially no confounding correlations between the indicator variables and the environmental variables (Figure 1). The new model was again compared to a saturated model, which included all possible second order interactions between the indicator variables and main effects using an extra sums of squares F-test.

*Investigation of Correlation Structure Among Environmental Variables*

One would expect several of the environmental variables (i.e., maximum temperature and mean temperature or precipitation and longitude), to be highly correlated. Because they explain approximately the same variability in species richness, the stepwise regression technique selects only the variable with the greatest contribution to the correlation of determination ($R^2$) of the model. Thus, one variable was removed from the model and substituted by a correlated variable. A series of multiple linear regressions were run on these permutations of the final model to investigate the underlying correlation structure among the environmental variables.

## Results

*Species Richness Model*

The forward stepwise regression identified longitude ($p<0.001$), maximum temperature ($p<0.001$), and tree species diversity ($p<0.001$) as the best predictors of species richness. The second regression suggested that observer identity was also asociated with species richness as coefficients of all surveyor indicator variables in the model were statistically significant (Table 1). In total, the three environmental predictor variables explained about 30% of the variability in species richness between

Table 1: Regression results for final model

| Source | Value | Std. Error | Pr(>\|t\|) |
|---|---|---|---|
| Intercept | -195.17 | 35.5378 | <.001 |
| Longitude | -1.6452 | 0.3 | <.001 |
| Maximum Temperature | 0.0487 | 0.0126 | <.001 |
| Overstory Diversity | 1.2287 | 0.3292 | <.001 |
| Crewmember 1 | -5.5194 | 1.1931 | <.001 |
| Crewmember 2 | -9.2352 | 1.2606 | <.001 |
| Crewmember 3 | -2.3785 | 1.2364 | 0.0563 |

plots ($R^2$=.30). Addition of the surveyor indicator variables resulted in an increase of variability explained by the model to .51 ($R^2$) in total. In all cases, the more complex models with interaction terms between the variables did not greatly improve the fit of the model ($p>.05$ for all extra SS F-tests and interaction term coefficients). Thus, the final model from the multiple linear regression analysis was: species richness ~ longitude + maximum yearly temperature + tree species diversity + SURVEYOR.

At fixed values of all other explanatory variables in the model, a one-unit decrease in longitude is associated with an average decrease in species richness by about 1.6 species (95% confidence interval: -2.24 to –1.05 species). On average, species richness is expected to increase by one species for every 20 degree increase in maximum temperature with all other variables held fixed (95% confidence interval for 20 degree increase in maximum temperature: .48 to 1.48 species). For each additional tree species on a plot, species richness will increase, on average, by 1.2 species (95% C.I.: .577 to 1.88 species). Surveyor identity also related to species richness

detected. In reference to the surveyor who found (on average) the highest diversity of species per plot, the other crewmembers found 2.4 (95% C.I.: .06 to 4.82), 5.5 (95% C.I.: 3.15 to 7.85), and 9.2 (95% C.I.: 6.71 to 11.69) fewer species per plot.

*Investigation of Correlation Structure among environmental variables*

Any one of the variables relating to moisture (precipitation, # wetdays, humidity) could be substituted for the main effect "longitude" in the final model to generate a comparable model with only a slightly lower coefficient of determination ($R^2$ ranged from .44 to .48). Substituting maximum temperature with the other variables related to temperature (minimum temperature, mean temperature, Conrad index of continentality) likewise generated comparable models ($R^2$ ranged from .47 to .49). Elevation, (usually thought to be a complex gradient involving both moisture and temperature), could also be substituted for maximum temperature ($R^2$=.49). All of the variables relating to stand characteristics were interchangeable with overstory tree diversity ($R^2$ ranged from .48 to .49) except the basal area of hardwoods, which had a non-significant coefficient (p=.215) and resulted in a lower coefficient of determination for the model ($R^2$=.45). In all cases the regression coefficient of the substituted variable and the coefficients of the other variables were statistically significant (p<.01).

## Discussion

*Environmental Predictors of Species Richness*

Interpretation of the species richness model generated in this study must be done cautiously. Even though the variables selected by the stepwise regression are the best predictors, they are only part of an intercorrelated set of variables associated with species richness. Because any variable from the moisture subset could be substituted for longitude to generate a model with a similarly high correlation coefficient, longitude may be thought of as a reflection of an underlying west to east moisture gradient. (Longitude doesn't "act" upon lichens although moisture level does). As moisture tends to decrease as you proceed east (longitude decreases), one would expect species richness to also decrease.

Figure 2 includes maps of California that present species richness (Fig. 2(a)), elevation (Fig. 2(b)), precipitation (Fig. 2(c)), maximum temperature (Fig. 2(d)), and overstory tree diversity (Fig. 2(e)) per plot. Because the model for predicting species richness is multivariate, there would not be perfect correspondence between the species richness of a plot and any environmental predictor considered singly. Nonetheless, the relationships between species richness and the environmental predictors

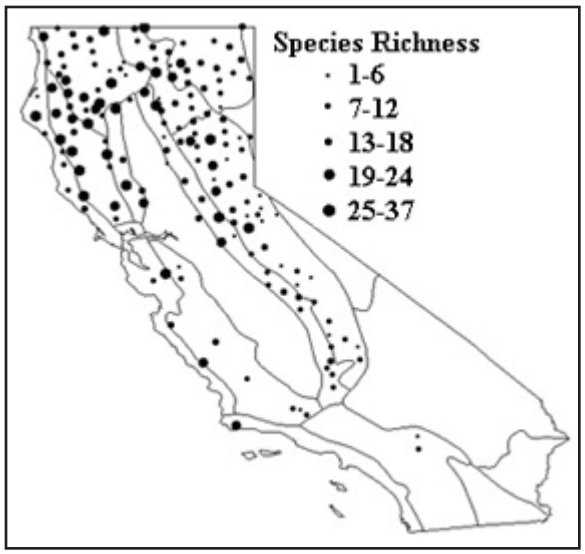



Figure 2(a)

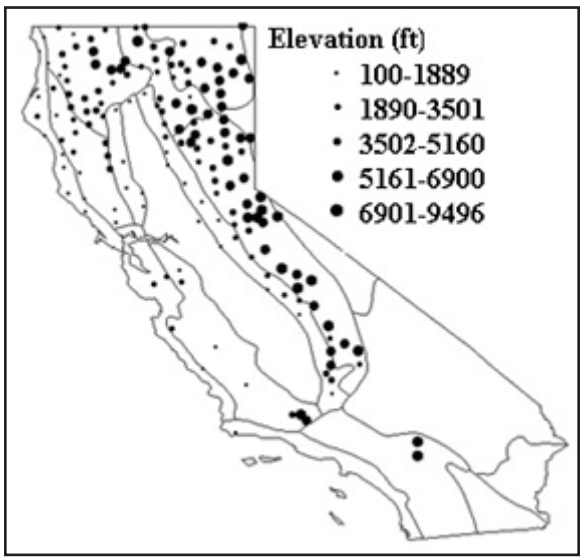



Figure 2(b)

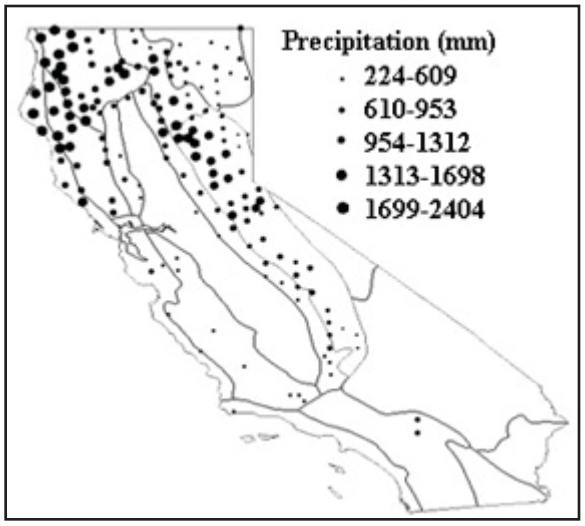



Figure 2(c)

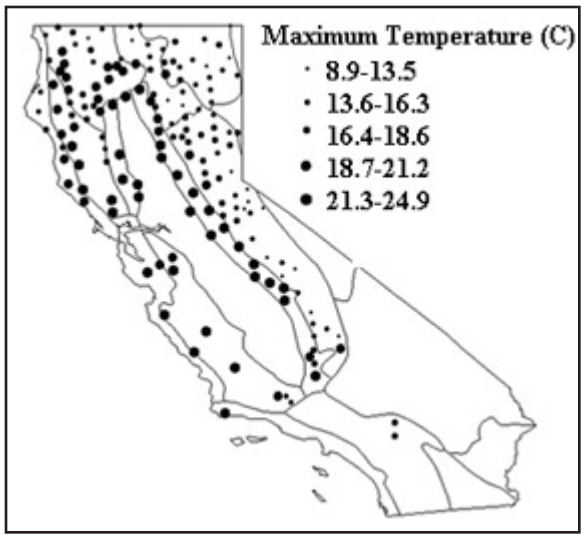



Figure 2(d)

are generally evident by comparing any two of the maps. The trends suggested by the model are most clear by comparing the two most climatically extreme regions in the study area: the species-rich northwest coast (where moisture is abundant, temperatures low, elevation low and overstory diversity high) and the relatively species poor Sierras (where arid, hot conditions prevail, elevation is high, and overstory diversity is low).

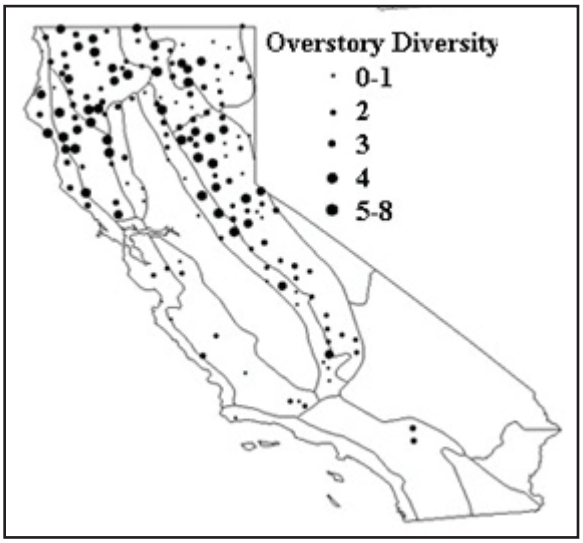



Figure 2(e)

*Observer Effects*

The FHM/FIA program has a standard method for ensuring data quality for projects like this one. All surveyors undergo training and certification. The trainee must find 65% of the species captured by a professional lichenologist. Those who failed the certification are given further training and repeat the test until passing. Periodically during the field season, the surveyors are audited. Lichen data from some plots is re-measured and sometimes both crew and experts survey the plot to compare species capture rates. This system works well for one intended use of the data, which involves using lichen community composition to evaluate air quality in the area. Gradient scores based upon community composition were more repeatable and consistent than species richness (McCune et al, 1997).

The results of this study agree with the findings of McCune et al (1997) regarding species richness. Surveyor identity explained about 21% of the variability in species richness, strongly suggesting a large inconsistency among surveyors. It is probable that the data were biased towards abundant species, resulting in the under-collection of rare, infrequent, or cryptic species that closely resemble others. Because climatic and geographic factors were included in the model before adding in the surveyor indicator variables, the effects of these

variables were controlled. Thus the likelihood that observed differences in surveyor performance were confounded by environmental factors is low.

*Recommendations for Future Attempts at Modeling Species Richness*

Repeatable, accurate measures of macrolichen species richness are difficult to obtain for large plots. At large spatial scales the list of potentially important environmental variables can be quite large, especially when the study area is topographically and climatically complex like California. As demonstrated in this study, climatic factors and broad stand characteristics like tree diversity are only a small part of the full story.

Longitude, maximum temperature, and overstory diversity explained only a total of 30% of the variability in species richness between plots, a disappointing amount even considering the wide geographic spread of plots. It is inevitable that many other relevant factors were overlooked with the coarse-grained approach that was used in this study. Due to a lack of complete data for the plots, potentially important habitat features such as age, stand disturbance history, canopy cover, local air quality and a measure of riparian influence were not included. Future attempts to model macrolichen species richness should incorporate a more elaborate set of variables including those mentioned above.

The potential for measurement error in the environmental data to weaken the model also needs consideration. All climate variables in this study were estimated on a 4 by 4 km grid over California. Direct weather data from monitoring stations were used to extrapolate climate estimates to other areas, based upon a regression-based model that adjusts for the effect of elevation (Daly et al, 1994). A Gaussian filter was then used to estimate climate within the 4 by 4 km grid cells. Although it would be difficult to quantify, some degree of error in the climate data is expected.

Also discovered here, observer effects can introduce much unwanted variability or "noise" into the data. Administration of a more rigorous lichen training, hiring crews with more prior experience with lichen surveys, and raising the standards of species capture during certification and audits would help improve the repeatability of species richness estimates. Having surveyors visit randomly chosen plots or a geographically dispersed set of plots is also a form of insurance. Much like the effect of averaging, inaccurate surveys are essentially "diluted" by the more accurate surveys, minimizing regional bias. Most importantly, however, this strategy allows the analyst to detect and quantify observer effects.

## Acknowledgements

I wish to thank Bruce McCune, Erin Martin, and Briana Lindh for thoughtful reviews of the manuscript.

## Literature Cited

Bailey, R.G. 1988. Ecogeographic analysis: a guide to the ecological division of land for resource management. (Misc. Publ. 1465.) Washington, DC: USDA Forest Service. 18 p.

Becker, V.E. 1980. Nitrogen-fixing lichens in forests of the southern Appalachian mountains of North Carolina. The Bryologist 83: 29-39.

Daly, C., R.P. Neilson & D.L. Phillips. 1994. A statistical-topographic model for mapping climatological precipitation over mountainous terrain. Journal of Applied Meteorology 33: 140-158.

Gustafsson, L., A. Fiskesjö, T. Ingelög, B. Pettersson, & G. Thor. 1992. Factors of importance to some lichen species of deciduous broad-leaved woods in southern Sweden. Lichenologist 24: 255-266.

Kuusinen, M. 1996. Cyanobacterial macrolichens on *Populus tremula* as indicators of forest continuity in Finland. Biological Conservation 75:43-49.

Lesica, P., McCune, B., Cooper, S., & Hong, W. S. 1991. Differences in lichen and bryophyte communities between old-growth and managed second-growth forests. Canadian Journal of Botany 69: 1745-1755.

McCune, B. 1993. Gradients in epiphyte biomass in three *Pseudotsuga-Tsuga* forests of different ages in western Oregon and Washington. Bryologist 96: 405-411.

McCune, B., Dey, J.P., Peck, J.E., Cassell, D., Heiman, K., Will-Wolf, S. & Neitlich, P.N. 1997. Repeatability of community data: richness vs gradient scores in large-scale lichen studies. Bryologist 100: 40-46.

Neitlich, P. and B. McCune. 1997. Hotspots of epiphytic lichen diversity in two young managed forests. Conservation Biology 11: 172-182.

Rosso, A.L., B. McCune, T.R. Rambo. 2000. Ecology and conservation of a rare, old-growth-associated canopy lichen in a silvicultural landscape. Bryologist 103: 117-127.

Sillett, S.C. & M.N. Goslin. 1999. Distribution of epiphytic macrolichens in relation to remnant trees in a multiple-age Douglas-fir forest. Canadian Journal of Forest Research 29: 1204-1215.

Tuhkanen, S. 1980. Climatic parameters and indices in plant geography. Acta Phytogeographica Suecia 67: 12-46.

---

## Special Notice

The following communications have been received by the Society:

*Macrolichens of the Siskiyous*, June 18-21, Course #: W8, Instructor: Ron Hamill

The Siskiyous are recognized as one of the most biologically diverse regions of the world. The abundance of forest types and unique geology of the Siskiyous are reflected in the richness of the lichen flora. This course will focus on the ecology and alpha-taxonomy of macrolichens of the region. Functional groups, morphological and chemical characters will be discussed and used for identification. Field trips to different habitats will be followed by identification sessions. Geared to all levels of experience. As microscopy, use of dichotomous keys and handling of reagents are necessary for proper identification, prior experience is helpful but not obligatory. Beginners should be overwhelmed but don't have to worry about getting everything, while advanced lichen lovers will likely learn a few things too. Tuition $160.

For more information and registration visit the Website: <http://www.siskiyou.org/sfi/class_toc_02.html>.

2002 Eagle Hill field seminars on the coast of Maine

*Crustose Lichens: Special Topics,* July 14-20, 2002, Instructor: Dr. Irwin M. Brodo

Emphasis-concentration on limited number of lichen groups, with in-depth studies using monographs and advanced literature; special attention to *Lecanora*, *Ochrolechia*, *Lecidea*, *Porpidia*, and *Rhizocarpon*: chemistry and identification of local sterile crustose lichens: participants invited to bring problem crustose lichens with them for study and discussion.

For more information and registration visit the Website: <http://maine.maine.edu/~eaglhill>.

# Pygmy Forest Fieldtrip, Mendocino Co., March 16, 2002 and list of Macrolichens of the Pygmy Forest

Compiled by Judith Robertson
362 Scenic Avenue, Santa Rosa, CA 95407
e-mail: <jksrr@aol.com>

The Van Damme State Park parking lot off Little River Airport road was the starting point for this day exploring the lichens of the Pygmy Forest. A variety of persons attended: CALS members, CNPS members and some folks responding to the announcement in the local paper. The day was overcast, but with no rain. Teresa Sholars, Professor of Biology at the Redwood College, began the fieldtrip by explaining the history of the Pygmy Forest.

The Pygmy forest community is unique to the Mendocino Coast of California. Pygmy vegetation is located on the third, fourth, and fifth terraces, two to five miles from the ocean, from the Navarro River to Ten-Mile with the prime area occurring between Albion ridge and Hwy. 20. Pygmy-like vegetation, but without Bolander Pine, occurs in southern Mendocino and northern Sonoma counties. Pygmy soil is highly leached, very acid, nutrient-poor and saturated (bog-like) year-round, with some iron-concreted hard pan.

Pygmy vegetation occurs on old, relatively flat terraces with little nutrient run-off available from higher slopes because adjacent communities are always down slope from the pygmy.

The forest is stunted, from 1 to 3 (5) meters tall, with occasional taller trees. Vigorous growth is usually lacking. The soil is covered with many species of lichens especially *Cladina portentosa* ssp. *pacifica* (Ahti) Ahti, which, in California, is usually restricted to this community. This cryptogamic crust is important in inhibiting erosion in this highly leached edaphically based community. Reproduction of this community is fire stimulated. The conifers have serotinous cones and the shrubs stump sprout.

Even foot-traffic in the Pygmy forest destroys the fragile cryptogamic crust. Roads and their accompanying ditches create an erosion potential which carries nutrients and water out of the site. Where roads are built, the vegetation is taller due to the fertility of the soil-mixed water running through the ditches. Where people build homes in the pygmy, leach lines do not percolate and added nutrients from leach lines change the natural growth.

The plants in this community grow slowly because the soil is highly acidic and nutrient deficient. They exhibit a tolerance for the harsh conditions but show stress by being stunted, gnarled and lichen encrusted.

The predominant plants of the pygmy forest are Pygmy Cypress *Cupressus pygmaea*, Bolander Pine *Pinus contorta ssp. bolanderi* and Bishop Pine *Pinus muricata*. Shrubs are from the Heath Family: Hairy Manzanita, Pygmy Manzanita and Fort Bragg Manzanita, Salal, Labrador Tea, Rhododendron and Blue Huckleberry.

The group walked the boardwalk trail at the first site. Teresa explained that the boardwalk was built to stop the destruction of the fragile Pygmy habitat by the human foot traffic. The stunted trees were encrusted with lichens and Cladina species were visible on the soil surrounding the walk.

The group then drove to an area in the Jackson State Forest, north of the town of Mendocino and west of Mitchell Creek Drive. This area is designated for burn so collecting was permitted.

In 1975, James A. Malachowski completed his Masters Thesis, "Macrolichens of the Pygmy Forest," at Chico State University, Chico CA. Teresa Sholars has added to his list of lichens over the last years.

The combined list follows with a few additions from the March 2002 field trip which are noted.

*JM* (James Malachowski): specimens cited in the "Macrolichens of the Pygmy Forest."
*TS* (Teresa Sholars): specimens collected by Teresa Sholars.
*JRR* (Judith and Ronald Robertson): specimens collected by J. & R. Robertson. March 2002 and Sept. 2001.

*Alectoria montana* – *JM*, as *Alectoria montana* Brodo & Hawksw., ined.: extreme stiffness, isidiate soralia.

*Alectoria sarmentosa* (Ach.) Ach – *JM*: white striations on branches, robust, draping to 50cm.

*Bryoria furcellata* (Fr.) Brodo and D. Hawksw.– *JM*, as *Alectoria nidulifera* Norrl. apud Nyl.: thallus fruticose, brown, tufted to prostrate, 4-10cm, shiny; soredia in part isidiate or spinulate; inconspicuous on conifer twigs and bark.

*Calicium lenticulare* Ach. – *JRR*: thallus, yellowish white, stalks thick with white pruina on capitulum; on pine cones and redwood bark.

*Candelaria concolor* var. *effusa* (Tuck.) G. Merr. & Burnham – *TS*: thallus greenish yellow, closely adnate on bark, margins dissected and sorediate, lower surface white, sparsely rhizinate; occasional in Pygmy Forest.

*Cavernularia lophyrea* (Ach.) Degel – *JM*: inflated lobe tips and pitted undersides; rare on conifer barks and twigs.

*Chrysothrix candelaris* (L.) J.R. Laundon – *JRR*: on pine cones.

*Cladina portentosa* ssp. *pacifica* (Ahti) Ahti – *JM*, as *Cladonia impexa* Harm.: white cushion mats on soil.

*Cladonia bellidiflora* (Ach.) Schaerer – *JM*: scarlet apothecia, rare, on soil.

*Cladonia carassensis* Vainio – *JM*: on soil with *Cladonia crispata*, shorter.

*Cladonia cervicornis* ssp. *verticillata* (Hoffm.) Ahti – *JM*, as *Cladonia verticillata* (Hoffm.) Schaerer: on soil.

*Cladonia chlorophaea* (Flörke *ex* Summerf.) Sprengel – *JM*: soredia course, granular; cups stout; widespread over soil, mosses, road banks, rocks, bases of trees.

*Cladonia coniocraea* (Flörke) Sprengel – *JM*: common on bark of the base of trees.

*Cladonia crispata* (Ach.) Flotow – *JM*: branchlets bearing apothecia, comprises over 90% of ground cover.

*Cladonia macilenta* Hoffm. – *JM*: red apothecia, common on fence posts and dead or rotting wood.

*Cladonia pyxidata* (L.) Hoffm. – *JM*: deep goblet shaped cups; found over moss over bark.

*Cladonia rei* Schaerer – *JM*, as *Cladonia nemoxyna* (Ach.) Nyl.: unbranched gray podetia, on soil.

*Cladonia squamosa var. subsquamosa* (Nyl. *ex* Leighton) Vainio – *JM*, as *Cladonia subsquamosa* (Nyl.) Vain.: covered with small squamules; on rotting wood or bases of trees.

*Cladonia subulata* (L.) F.H. Wigg. – *JM*: fine farinose soredia at the base of the podetia; rare on the soil.

*Dendriscocaulon intricatulum* (Nyl.) Henssen – *JM*, as *Dendriscocaulon intricatum* Henssen in. ed.: rare, resembles moss; in 1975 thought to be a free living cephalodia of *Lobaria* spp.

*Dibaeis baeomyces* (L.f) Rambold & Hertel – *TS*: primary crustose thallus greenish, granular; pink apothecia on tiny stalks (pseudopodetia); on soil, road cuts.

*Dimerella lutea* (Dicks) Trevisan – *TS*: inconspicuous pale orange-brown apothecia; growing on mosses on tree trunks.

*Graphis striatula* (Ach.) Spengel – *TS*: thallus crustose, white; hysteriothecium in linear black lines; on Myrica.

*Heterodermia leucomelos* (L.) Poelt – *JM*, as *Anaptychia leucomela* (L.) Mass.: long cilia on lobe margin, rare.

*Hypogymnia inactiva* (Krog) Ohlsson – *JM*: mineral gray, thallus lobes puffy, loosely attached at base, free or trailing; black and hollow in cross section; on the bark and twigs of conifers and rhododendron. The most common taxon seen in the Pygmy Forest.

*Hypogymnia occidentalis* L. Pike **–** *TS*: thallus adnate to bark, lobes short.

*Hypogymnia physodes* (L.) Nyl. – *TS*: soredia in the inside of the hollow lobe tips, tips bursting open.

*Hypogymnia tubulosa* (Schaerer) Hav. – *TS*: thallus mineral gray, loosely attached; lobes short, medulla black; soralia terminal, ring-shaped; apothecia lacking; widespread on conifers.

*Kaernefeltia californica* (Tuck.) Thell & Goward – *JM*, as *Cornicularia californica* (Tuck.) Du Rietz: found on conifer bark and twigs. The only fruticose, tufted, darkly pigmented lichen.

*Leproloma membranaceum* (Dickson) Vainio – *TS*: greenish, sorediate powdery mass; very common on redwood bark.

*Lobaria pulmonaria* (L.) Hoffm. – *JM*: upper surface strongly reticulate; thallus light brown, green when wet, loosely adnate; soredia coarsely isidiate; apothecia not common; in damper sites on lower tree trunks.

*Lobaria scrobiculata* (Scop.) DC. – *JM*: scattered on tree trunks.

*Loxosporopsis corallifera* Brodo, Henssen & Imshaug – *JRR*: whitish crust with dense patches of erect isidia; on pine bark.

*Melanelia elegantula* (Zahlbr.) Essl. – *TS*: thallus foliose, chestnut brown to olive green, often becoming white pruinose; isidia cylindrical, often branched; apothecia rare.

*Melanelia subaurifera* (Nyl.) Essl. – *TS*: thallus foliose, brown, closely adnate, covered with isidia and soredia.

*Melanelia subolivacea* (Nyl.) Essl. – *TS*: thallus foliose, olive brown; closely adnate to conifer twigs, bark; apothecia common, pycnidia on exciple; no soredia or isidia; moderately rhizinate; eight spores per ascus.

*Menegazzia terebrata* (Hoffm.) A. Massal – *JM*: unique, rare lichen found on smooth barked trees; distinct raised masses of soredia and holes in the thallus.

*Mycoblastus affinis* (Schaerer) Schauer – *JRR:* large, thick walled spores, 1-2 per ascus. The absence of red pigment in the hypothecium and smaller spores separate this species from *M. sanguinarius.*

*Mycoblastus sanguinarius* (L.) Norman – *TS*: thallus whitish gray, covered with fine warts; apothecia conspicuous, black; hypothecium red; on *Pinus muricata* bark; occasional in Pygmy Forest.

*Nephroma helveticum* Ach. – *TS*: thallus foliose, brown; margins of lobes lobulate to dentate-isidiate; loosely adnate; apothecia common on lower surface of lobe tips.

*Nephroma laevigatum* Ach. – *JM*: pale yellow medulla, apothecia on lower surface of lobe tips.

*Nephroma resupinatum* (L.) Ach. – *TS*: thallus foliose, brown, loosely adnate on trees and rocks; apothecia on lower surface of lobe tips; lower surface tomentose interspersed with white papillae.

*Nodobryoria abbreviata* (Mull. Arg.) Common & Brodo – *TS*: thallus fruticose, tufted, reddish-brown; apothecia almost always present.

*Ochrolechia subpallescens* Verseghy – *TS*: whitish thallus, pink apothecia; on *Pinus muricata* bark.

*Pannaria conoplea* (Ach.) Bory – *TS*: thallus gray, apothecia brown to reddish, on cypress bark.

*Parmelia saxatilis* (L.) Ach. – *JM*: angular white markings on the thallus, laminal and marginal

isidia, rhizines simple or apically branched.

*Parmelia squarrosa* Hale – *JRR*: laminal and marginal isidia, squarrose rhizines.

*Parmelia sulcata* Taylor – *TS*: marginal and laminal soredia on angular cracks, squarrose rhizines.

*Parmotrema arnoldii* (Du Reitz) Hale – *JM,* as *Parmelia arnoldii* Du Reitz: broad-lobed, mineral-gray lichen; common on trees.

*Parmotrema crinitum* (Ach.) Choisy – *JM,* as *Parmelia crinita* Ach.: cilia arising from isidia; on rhododendron twigs.

*Peltigera canina* (L.) Willd. – *JM*: on moss covered logs or wet soil.

*Peltigera neopolydactyla* (Gyelnik) Gyelnik – *TS*: thallus foliose, brown; lower surface buff with dark veins; rhizines long; apothecia common, erect; common on soil and mosses.

*Peltigera praetextata* (Flörke *ex* Sommerf.) Zopf. – *JM*, as *Peltigera praetextata* (Somm.) Vain.: lobes narrow, wavy, with coralloid isidia; rare.

*Pertusaria amara* (Ach.) Nyl. – *TS*: thallus greenish gray, finely white spotted, densely sorediate; apothecia not seen; on *Pinus muricata*.

*Platismatia glauca* (L.) Culb. & C. Culb. – *JM*: thallus foliose, whitish gray, bearing scattered soredia or isidia, broad and round lobe tips; lower surface black with white margins.

*Platismatia herrei* (Imshaug) Culb. and C. Culb. – *JM*: thallus greenish to mineral gray, loosely attached, terminal lobes long and narrow; isidia branched; lower surface white to brown, black or mottled; common on bark and twigs of conifers.

*Pseudocyphellaria anomola* Brodo & Ahti – *JM, as Pseudocyphellaria anomola* Magn.: thallus light brown, ridges and margins covered by gray white soredia.

*Pseudocyphellaria anthraspis* (Ach.) H. Magn. – *JM*: thallus light brown, reticulate-pitted, loosely attached; apothecia well developed; pseudocyphellae on underside; algae blue-green; growing in robust colonies on trunks of conifers, also on rocks.

*Ramalina farinacea* (L.) Ach. – *JM*: thallus 1-4cm; whitish, yellowish green with a single point of attachment; marginal soralia; on conifer twig and bark.

*Ramalina menziesii* Taylor – *JM, as Ramalina menziesii* Tuck.: thallus 8-16cm long, pendulous, straw to lemon green, perforate membranous lobes.

*Ramalina roesleri* (Hochst. *ex* Schaerer) Hue – *JM,* as *Ramalina roesleri* (Hochst.) Nyl.: small shiny thallus, perforate near base; rare on the bark of conifers.

*Sarea resinae* (Fr.) Kuntze – *JRR*: saphrophytic fungi with yellow-red apothecia, on pine resin.

*Sphaerophorus globosus* (Hudson) Vainio – *JM*: thallus greenish gray to tan, silver-gray, pinkish white, light orange, orange-brown or brownish; erect to sub-pendulous, 4-8cm; branches stiff, smooth, round in cross section; apothecia spherical at tips of branches, disks sooty black.

*Sticta fuliginosa* (Hoffm.) Ach. – *JM,* as *Sticta fuliginosa* (Dicks.) Ach.: dark brown upper surface covered by isidia, locally abundant on Little Lake Rd.

*Sticta limbata* (Sm.) Ach. – *JM*: rare, blends in with the conifer bark.

*Thelotrema lapidum* (Ach.) Ach. – *JRR*: apothecia urn-shaped resembling small volcanoes, on smooth bark.

*Tuckermannopsis orbata* (Nyl.) M.J. Lai – *JM*, as *Cetraria orbata* (Nyl.) Fink: thallus light brown, loosely adnate, lobes narrow 1-4 mm, pycnidia conspicuous; common on conifer and rhododendron twigs.

*Tuckermannopsis platyphylla* (Tuck.) Hale – *TS*: olive brown, wrinkled thallus, pycnidia.

*Usnea arizonica* Mot. – *TS*: tufted with apothecia.

*Usnea californica* Herre – *JM*: medulla pink or red, rare on conifer bark.

*Usnea condensata* Mot. – *JM*: sorediate and papillate fibrils, rare in the Pygmy and US.

*Usnea filipendula* Stirton – *JM,* as *Usnea dasypoga* ssp. *bicolor* Mot.: long soft thallus with blackening primary branches, found in the upper canopy of larger trees.

*Usnea fragilescens* (complex) – *JM*: as *U. fragilescens A,B,C,D,E,F*: obviously inflated primary branches; branch tips covered by orbicular soralia.

*Usnea occidentalis* Mot – *JM*: branch tips with soredia: rare on conifer twigs in the Pygmy.

*Usnea rubicunda* Stirton – *JM,* as *U. rubiginea* (Michx.) Mass.: thallus dark greenish yellow to red, medulla elastic and persistent; common on tree trunks and rocks in mature forests.

*Xanthoria candelaria* (L.) Th. Fr. – *TS*: minutely fruticose, sorediate.

*Xanthoria fallax* (Hepp) Arnold – *TS*: soredia on the underside of upturned lobe tips.

*Xanthoria polycarpa* (Hoffm.) Rieber – *TS*: knobby, with apothecia.

## References

Brodo, I.M., S.D. Sharnoff, and S. Sharnoff. 2001. Lichens of North America. Yale University Press, New Haven.

Esslinger, T.L. 1997. A cumulative checklist for the lichen-forming, lichenicolous and allied fungi of the continental United States and Canada. North Dakota State University, <http://www.ndsu.nodak.edu/instruct/esslinge/chklst/chcklst7.html>, Fargo, North Dakota.

Goward, R., B. McCune and D. Meidinger. 1994. The Lichens of British Columbia, Illustrated Keys. Part 1: Foliose and Squamulose Species. Special Report Series, 8. Research Program, British Columbia Ministry of Forests, Victoria.

Goward, R. 1999. The Lichens of British Columbia, Illustrated Keys. Part 2: Fruticose Species. Research Program, British Columbia Ministry of Forests, Victoria.

Hale, M.D., Jr. and M. Cole. 1988. Lichens of California. University of California Press, Berkeley.

Malachowski, J.A., 1975. Macrolichens of the Pygmy Forests. Unpublished master's thesis. California State University, Chico.

McCune, B. and L. Geiser. 1997. Macrolichens of the Pacific Northwest. Oregon State University Press, Corvallis.

References not published but used to compile article:

Cook, J. 2002. "Macrolichens of the Pygmy Forest," species list of 1975 with name change revisions.

Sholars, T. 1997. A Preliminary List of Lichens of the Pygmy Forest (adapted from "Macrolichens of the Pygmy Forest" by James A. Malachowski, 1975 MS Thesis, CSU Chico with additions from Teresa Sholars).

Sholars, T. 2002. Some species in the Mendocino Pygmy Forest. Bio. 23. College of the Redwoods.

Sholars, T. 2002. Pygmy Forest Natural History. Bio. 23. College of the Redwoods.

## Questions and Answers

Janet Doell
1200 Brickyard Way #302, Point Richmond, CA 94801
e-mail: <doell4@attbi.com>

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

1. Question: When a lichen gets insufficient sunlight for the algae to photosynthesize and the food runs out, does the fungus consume the algae?

Answer: When moisture and sunlight are unavailable lichens cease photosynthesizing and become more or less dormant. They can be frozen for long periods of time and recommence gas exchange within hours of being thawed and hydrated. The same thing occurs if they are dried and kept in a drawer. In the long arctic winters lichens are deprived of sunlight for extended periods and seem to thrive on that regimen. Apparently the fungus and the algae get the message to turn off at the same time and no savagery on the part of the fungus occurs.

2. Question: We get varied instructions about the dangers of using para-phenylenediamine, "P," in lichen determinations. Just how toxic is this substance?

Answer: For some time lichenologists have been warned to use "P" sparingly and with caution. A recent article by Frank Dobson in the Bulletin of the British Lichen Society sums up the main issues presented in recent discussions. This compound should indeed be treated with great care as it is easily absorbed through the skin and is a weak carcinogen. (Whether it is a carcinogen at all is questioned by others.) It is appalling to learn that P is used as a hair dye in this and other countries. Contact dermatitis and bladder cancer are among the diseases that have been attributed to P or similar products used for this purpose. Even when care is taken in the laboratory brown stains from this chemical will appear at a later date on papers where P has come in contact. These stains can only be harmful if touched. After dissolving P crystals or powder in alcohol be sure to wash out the container or it will leave a deposit which could become air borne and be breathed into the lungs. P is quite volatile and the gas phase can last for a few hours. It is important to work with it in a well ventilated area. Unfortunately, no good substitute for P has been found yet. As Frank Dobson puts it: "Do not let your interest in lichenology be the death of you."

3. Question: Do lichens damage the trees they are growing on? Why are so many lichens found growing on old dying trees?

Answer: I can think of no question which is asked more often than this one.

Some of us thought it was answered years ago: an old tree develops more cracks in the bark, and lichens find more nooks and crannies to find a toe hold in, so to speak. Now, in a recent internet review of this question, this theory was not mentioned. Many others were, however, i.e.: increased light as the tree lost its leaves; minerals leaching from rotten wood or bark provide more nutrients; dead or dying trees don't lose their bark regularly, providing more stability; more birds and insects are present to disperse spores, thallus fragments or soredia; older trees have had more time to collect fragments; older trees lack resources for immunological protection.

Overall, respondents did not believe lichens harmed the trees. Most forest managers disagree with that position. Now there is evidence that lichens on stem surfaces can affect the amount of chlorophyll produced per bark area, apparently due to the shade cast by the lichen. The importance of this fact is still not entirely understood, but it could affect the growth of trees.

### References

Dobson, Frank, in The Bulletin of the British Lichen Society, 2000.

Hill, Bob, University of Georgia, in a report on an "internet survey" 7/20/2000.

Solhaug, KA, Gauslaa,Y. and Haugen, J. Adverse effects of epiphytic crustose lichens upon stem photosynthesis and chlorophyll of *Populus tremula*. Botanica Acta Vol. 108, Nr. 3, June 1995 pp233-239. (Abstract)

Sparrius, Laurens, the Netherlands, in a message to the Lichen Listserver.

---

## *Ramalina menziesii*, anyone?

Janet Doell
1200 Brickyard Way #302, Point Richmond, CA 94801
e-mail: <doell4@attbi.com>

This was our invitation to a group of black cows in a field near Paso Robles recently. Richard and I were there to verify the story we had heard that cows love to eat *Ramalina menziesii,* and in fact get quite excited (for a cow) when it is available.

*R. menziesii* grows abundantly on the oaks in that region and the cows keep it trimmed in the pastures by eating it as high as they can reach. The sight of what looked like an unending amount of this lichen coming out of a very large trash bag and being handed to them caused a fair amount of excitement in these sleepy eyed bovines. One in particular, a large black cow with a scruffy coat and bony hips, became quite belligerent about getting as much of it as she could by shoving her more docile companions out of the way. We were feeding it to them by hand until a bull approached to get his share. He looked at me with what I took to be an evil eye and I retreated to the other side of the fence. Our friend Ray Farnow remained in the pasture until the bag was empty, which took about 15 minutes. There was no question about it, this was a real treat; and as the farmer had said, the cows ate it like candy. Except for one small calf, who tried it but spit it out.

All this bovine feeding frenzy came about because Ray had told us that the cows would come a-running when his kids held out the *R. menziesii* to them, and that a local cowboy had stated that they became "stoned" on it. If true, that would explain their enthusiasm about eating it, but how do you tell if a cow is stoned?

Richard and I drove down to see it all with our own eyes. Upon our arrival Ray called his neighbor, who invited us to go on into the pasture and feed the cows the *R. menziesii*, and not to worry about the bulls, they were all friendly.

Having verified that the cows really did enjoy eating a seemingily unending number of large handfuls of the lichen, we hung around a while to see if the large bony one who had consumed about half of the bag, showed any signs of being under the influence of a toxic substance. She didn't. She just sauntered off and started grazing. The rest of those who had partaken of the lichen feast did not do even that much.

So yes, we can say that for cows there is something unusually attractive about *Ramalina menziesii*, but the reason for it remains unclear.

*Ray Farnow feeding* Ramalina menziesii *to cows.*

There was a study done in Mendocino and Lake counties in 1979 (Longhurst, W.H., et al) which investigated the feeding habits and preferences of deer and sheep. When given a choice of five different foods, both the deer and the sheep chose *R. menziesii* as either their first or second choice in all the trials, although the deer ate more of it than the sheep in their foraging. Both deer and sheep attempt to eat the most nutritious food available, and these lichens are high in protein.

This last statement was confirmed by Dr. Teri Crocker, a large animal veterinarian in Sonoma County. I contacted her to see if she had any opinion as to what there was about these lichens that would make them so attractive to cows. She mentioned the high protein content of *R. menziesii* and also said that cows were smart about what they eat. Somehow they know enough to choose a salt lick which contains the particular minerals they need, if given a choice. There may be minerals in this lichen which are important to their health.

So the cows may well love to eat the *Ramalina* because it is good for them, which shows that humans could learn something from the lowly cow when it comes to eating habits.

## Reference

Longhurst, W.H., G.E. Connolly, B.M. Browning, and E.O. Garton. 1979. Food interrelationships of deer and sheep in parts of Mendocino and Lake Counties, California. *Hilgardia* 47: 191-247.

# News and Notes

## Annual Membership Meeting, January 26, 2002

The Annual Membership Meeting was held Saturday, January 26, 2002 celebrating CALS eighth birthday with a potluck lunch complete with birthday cake. The foray to Brooks Island which was to proceed the meeting was cancelled due to weather.

Because the December Bulletin had not yet been mailed with the ballots for the new officers, Judy Robertson presided with the proposed new officers all in attendance. Richard Doell presented his latest most excellent Lichen Slide Show, which had not had a proper viewing since the Mycological Society Fungus Fair two years ago. The general meeting went over old and new business. Much attention was given to the Conservation Committee with discussion on definition, purpose and methods.

In appreciation for the excellent job that Judy Robertson has done as president during the past four years, Janet Doell presented her with a gift of a leather traveling secretary folder on behalf of the society. Judy responded by presenting her Board members with T-shirts with the CALS logo, a project she had been wanting to do all during her term.

Charis Bratt

## Northwest Scientific Assn. Meeting and Fieldtrips, Boise Idaho, March 27-30, 2002

On March 27 to 30, 2002, I was able to join the Northwest Lichenologists for the annual Northwest Scientific Association conference at Boise State University in Boise, Idaho. There were conference presentations, poster sessions, and workshops regarding forest and grassland ecology, botany and zoology in the Pacific Northwest. The conference session which focused on lichens was on Friday March 29 and moderated by Roger Rosentreter. It began with an unscheduled talk and slide show by Terry McIntosh on the dry land mosses in the British Columbia area of the Pacific Northwest. Sarah Jovan presented her analysis of lichen communities in Northern California (see article in this bulletin). Erin Martin talked about variation in *Leptogium cellulosum* and *L. teretiusculum*. Eric Peterson talked about Natural Heritage Programs and lichen conservation. Bruce McCune presented studies on distribution of rare lichens in western Oregon. Roger Rosentreter discussed using a biological soil crust stability index for monitoring range land health. In addition to the conference sessions, the lichenologists participated in two field trips in the nearby area.

On Thursday we were led by Roger Rosentreter to the Lucky Peak Forest Nursery just east of Boise and then to the Grayback Gulch campground area just south of Idaho City. At the nursery we followed the nature trail up through shrubs festooned with lichens on lower branches and into the cliffs of the hard black volcanic columnar basalt rock layer that is so characteristic of the geology of the area. Roger gave us a lesson on the three different sagebrushes (Mountain, Basin, and Wyoming) and pointed out the native Black Hawthorn. We saw how the Idaho state flower, Syringa (*Philadelphus lewisii*) which grows slower than the nearby willows was more covered with lichens. A *Melanelia* we found was confirmed later in the day to be *M. subolivacea* (8 spores) rather than *M. multispora* (12-32 spores). Branches of shrubs were festooned with *Xanthoria fallax* (hooded labriform sorelia), *X. fulva* (more crescent shaped marginal soredia on more erect lobes), and *X. montana* (non-sorediate, formerly "*polycarpa*"). There was *Leptogium lichenoides* on the rocks sharing a more moist environment with the dark *Grimmia* moss, near *Aspicilia sp., Dermatocarpon and Lecidea atrobrunnea*. Some *Physconia sp.* was found

on bitterbrush (*Purshia tridentata*). The dark basalt cliffs were dense with a myriad of crustose lichens, most noticeable of which is the bright chartreuse *Pleopsidium chlorophannum*. We found *Psora nipponica* there, *Aspicilia sp., Candelariella*, and many other crusts.

After stopping for lunch we drove up to Grayback Gulch where we slogged through two feet of snow to find *Vulpicida canadensis* and *Bryoria*, dripping from the Ponderosa Pine trees. The location is somewhat of a riparian coastal ecological disjunct from the surrounding area. This part of the field trip was done in the manner of a Northwest Lichenologist's certification test plot. It was interesting to find black *Bryoria* starkly displayed for the picking on white snow. A highlight was when Eric Peterson found *Calicium adequatum* on the dead branches of an alder. *Bryoria fremontii* was most common here and *Bryoria fuscescens* was also found along with *Alectoria imshaugii, Hypogymnia imshaugii*, and *Melanelia*. There was even a little *Evernia prunastri* on a hawthorn shrub – unusual for this far inland, and *Xanthoria fulva*. *Ramalina subleptocarpha* is also found here, unusual for southern Idaho.

On Saturday Roger Rosentreter again led us this time up Bogus Basin Road (named because early gold miners had found only "bogus" pyrite there), where we specialized in finding soil lichens. This is an area of rolling round topped ridges and hills above the basalt layer, consisting mostly of granitic sediments of the prehistoric "Lake Idaho." We learned that the local flora and fauna had evolved to favor preservation of the environment, with deer herds coming down to lower elevations in the wetter winter months (where coincidentally the wet sandy soil was more resilient to foot traffic than when it is dry and fragile in the hot summer months), and then they migrated to higher elevations in the hot summer (where the clay based soil was then hard and dry and safe to walk on rather than a wet mire as in the winter months). The introduction of cattle and sheep has upset this delicate balance, along with introduced European "cheat grass" which grows masses of combustible material and then wildfires burn everything, leaving the ground barren for only more cheat grass to take hold. A few areas still remain of the old landscape. Soil lichens were an important component of keeping the soil from erosion by frequent fierce winds. For me the highlight of this field trip was finding the *Aspicilia filiformis* which looks more like laundry lint embedded in dried mud, rather than a lichen – no wonder it was not discovered until fairly recently. We also visited a rocky canyon off the road, where Roger pointed out the many crustose species found there, while Terry McIntosh from Vancouver BC delightfully complemented it with his knowledge of many of the mosses we found there.

Bill Hill

## Fieldtrip to Santa Margarita Ecological Reserve, April 19-21, 2002

The fieldtrip to Santa Margarita Ecological Reserve (SMER) on April 19-21 almost didn't happen, as Charis Bratt who had organized it was taken ill at the time. Bill Hill then took over coordinating and it turned into a small but very effective lichen survey fieldtrip. SMER is located about 10 minutes from the town of Temecula off Interstate 15 south of San Bernardino. Now a 4460 acre property managed by San Diego State University as a research reserve, it was inherited from the estate of New York millionaire eccentric Murray Schloss who purchased it in the 1920's as a center to "recolonize the world" after an impending catastrophic destruction of the world's population. Besides the main Southside facility in the original ranch house, there is the Northside Phillip C. Miller Field Station where we stayed and staged our fieldtrip. The Northside facility consists of a single-wide house trailer complete with kitchen, bathroom and sleeping rooms, and a laboratory building that is a large two-car garage with a west facing roll-up door that makes working at the laboratory benches delightfully "outdoors." It sits on a knoll overlooking the deep gorge of the Santa Margarita River which flows west through the Camp Pendleton Military Base to the Pacific Ocean 18 miles away. The Reserve is instrumented to the hilt with weather stations, stream monitors, and (soon to be) webcams observing wildlife, all connected online by a microwave link. The majority of the area is typical dry Southern California chaparral and coastal scrub, with more trees down in the riparian habitat of the

river and its tributaries. The natural habitat of the vicinity is rapidly being encroached on by avocado orchards and housing developments.

On Friday afternoon Mark VanScoy, the site manager for SMER, gave Bill a tour of various possible lichen habitats in the reserve. Cheryl Beyer and Les Braund were there for both Saturday and Sunday, with Eric Peterson and SMER docent Linda Prager joining us on Saturday and Andrew Pigniolo on Sunday. Saturday we spent most of the day extensively collecting specimens especially from the rocks, cliffs and trees at both sides of the 'gorge' road crossing below the Northside facility, and then on the ridgetop chaparrel areas along the road to the Southside facility, negotiating the four wheel drive road with Cheryl's very adequate vehicle. It got better and better as we went until we finally had to say "enough is enough!" We never did get to the riparian/oak woodland areas near the Southside facility. Eric's survey and collecting skills were especially appreciated, and we will have a respectable checklist once all the specimens are identified. Highlights of finds were possibly *Hypogymnia mollis* (laminally sorediate) on the ridgetop, along with *Hypogymnia gracilis* (a new species described by McCune in the recently published "Lichen Flora of the Greater Sonoran Desert Region"). Among the numerous crustose species on the rocks in the gorge, Eric has identified *Acarospora contigua cf*. (which matches the description in "Lichens of North America"). On the shrubs in the gorge there was *Candelaria "pacifica"* (also new in the Sonoran Flora book). There were several soil lichens in level areas of the chaparrel. Sunday was spent entirely in the lab space looking at our finds and trying to key out some of them.

Bill Hill

## Brooks Island Foray, May 12, 2002

The CALS Brooks Island foray, originally scheduled for January 26, but cancelled due to bad weather, finally took place on May 12. Twelve members took advantage of the wonderful spring weather to visit this small island just across the channel from the Richmond Marina and to survey the lichens there. A full report will appear in a future Bulletin.

## CALS Spring Workshops

*An Introduction to the Foliose and Fruticose Lichens, February 9, 2002*
Eight enthusiastic participants met in Darwin Hall on the Sonoma State campus for this Saturday workshop to learn the basics about foliose and fruticose lichens. Judy Robertson had prepared a teaching set of lichens illustrating lichen morphology. The morning was spent examining and comparing features on different specimens. After a sack lunch on the campus square, we identified the same specimens with various keys. It was a great help to first learn the lichen structures and then use that information to identify the specimen.

Participants were Don Brittingham, Barbara Carlson, Jerry Cook, Helen Hancock, Mary Ann Hannon, Michele Lee, Patti Patterson, and Donald Schrock.

Thank you to Dr. Chris Kjeldsen who has arranged the use of the SSU classroom for this workshop and the ongoing ID sessions.

*An Introduction to Crustose Lichens, April 13, 2002*
We were able to hold this workshop in Hensill Hall on the SFSU campus. The building will soon be unavailable while earthquake retrofitting takes place. The SFSU Lichen collection will be accessible by appointment only. It will be stored on a lower floor of the building, but there will be little work space available.

This was a full day. Fifteen people signed up to attend, some travelling from southern California, Oregon, and the Sierra foothills. Judy and Ron Robertson had prepared a teaching set of crustose lichens so each participant had 15 similar specimens to work with. After a short introduction to crusts, we started using the specimens to examine crust morphology, comparing different types of fruiting bodies, growth forms, learning some of the descriptive terms unique to crustose lichens. Then, we learned how to make sections of different kinds of fruiting bodies to observe the microscopic features. Everyone had the opportunity to observe many different kinds of spores and be introduced to the other parts of an apothecial section. Mikki

McGee was a great help adding her special knowledge and experience with using microscopes, sectioning and staining crusts.

After lunch, we identified to genus the same specimens using the crustose keys in "Lichens of California" by Hale and Cole and the new book, "Lichens of North America" by Brodo and the Sharnoffs. We are finding the "Lichens of North America" keys very user friendly for our CALS workshops.

By 4 p.m. everyone was exhausted, but much was accomplished. Participating were Earl Alexander, Susanne Altermann, Shelly Benson, Rosemary Cary, Mike Dalbey, Jim Harrison, Bill Hill, Joyce Gothrup, Michelle Lee, Bill Lupfer, Erin Martin, Mikki McGee, Marck Menke, Judy Robertson, Stanley Spencer and Rob Weiss.

Thank you to Dennis DesJardin for the use of the SFSU classroom and microscopes.

*Ongoing Lichen Identification Workshops, Darwin Hall, Rm. 207, Sonoma State University, 2nd and 4th Thursday of every month. 5:00 to 8:30 p.m.*

I look forward to these evenings at SSU. We have 6 regulars and some sporadic participants. We bring our specimens and keys, ask each other questions, try to confirm ID's, experiment with sectioning and staining and spot tests. We are learning from each other as we work together through difficult places in the keys or are just at a place where we come to a dead end. We have time for snacks but the main focus is on learning more about lichens as we share our knowledge with one another.

We will continue to meet through the summer months; however, contact Judy Robertson, (707) 584-8099 or <jksrr@aol.com> if you would like to join us to make sure the workshop will still be held on that particular date.

Judy Robertson

## Upcoming Events

### Field Trips

*Santa Cruz Island, August 5-9, 2002, led by Charis Bratt*
The long awaited second CALS field trip to Santa Cruz Island has been scheduled. We will travel by boat from Ventura, stay at the UC Reserve Field Station and have Heidi Bratt once again as our fabulous cook. We will use station vehicles to access several parts of the island. Participation is limited to 14 persons and preference will be given to those who did not go on the previous trip. Reservations should be made with Charis as soon as possible. A deposit of $100 will be required by July 25th. Total cost will be about $200.

RSVP: Charis Bratt, Santa Barbara Botanic Garden, 1212 Mission Canyon Road, Santa Barbara, CA 93105, (805) 682-4726 ex. 152, <cbratt@sbbg.org>.

*Lichens of Rock Spring, Mt. Tamalpais State Park, August 24, 2002, 10am, led by Barbara Lachelt*
Join us for a visit to this beautiful area on Mt. Tam. We start at the Rock Spring parking lot and in an approximately one mile hike explore the lichens on soil, rocks, chaparral shrubs, oaks and conifers! Barbara knows the lichens in this area and has compiled a list we can use to help learn all we see. This is a great way to spend a Saturday.

*Lichens of Sonoma County, October 6, 2002, 10am, led by Judy Robertson*
We will meet at the home of a local CALS member to explore the lichens on his acre-plus land in Sebastapol, west of Santa Rosa. Then we will walk to a local cemetery and observe the lichens on the old gravestones. The Luther Burbank Experimental Gardens is nearby the cemetery. It has walkways with many unusual trees that are numbered to a key. Collecting will not be permitted there, but this should prove to be an interesting day exploring lichens in a variety of habitats in Sonoma County.

## Workshops

*An Introduction to the Foliose and Fruticose Lichens, September 21, 2002, 10am to 4pm, by Judy Robertson, San Jose State University, Building and Room TBA*
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.

*Hands-On Lichen Basics, October 19, 2002, 10am to 4pm, by Barbara Lachelt, University Herbarium, 1001 Valley Life Sciences Bldg., UC Berkeley*
CALS founding member Barbara Lachelt will present this Saturday workshop, Hands-On Lichen Basics. Barbara has developed a teaching set of lichens which she uses to illustrate lichen morphology. She gives all participants opportunity to examine the specimens while learning the descriptive terms. Then, each person applies this new knowledge to identify prepared unknowns. Please bring a lunch. Coffee, tea and snacks will be provided.

*Microworkshop, November 2, 2002, 10am to 4pm, by Mikki McGee, SFSU camus, Hensill Hall Annex.*
This workshop will be on the use of microscopes with lichens. We will be using SFSU microscopes, so everyone will be able to exchange help with their neighbor. Persons willing to stay late may obtain special instruction on their own microscope.
Topics will be:
(AM) 1) Effective Enjoyable Microscopy, and 2) Avoiding frustration.
(PM) Special problems with lichens: 1) wetting the unwettable, 2) determining mature ascospores, 3) dealing with crystals, pigments and other obscurations and obfuscations, 4) clearing and staining solutions, and 5) you suggest what troubles YOU!!

Please bring a lunch. Coffee, tea and snacks will be provided.

RSVP: Mikki McGee, 3 Inyo St. #3, Brisbane, CA 94005, (415) 467-5285, <mikkimc@juno.com>.

Specify: Phone #, e-mail address, and mail address (If message is not confirmed, repeat the RSVP. There have been problems with the post office, etc., lately.)

Also specify whether you have a specific problem you desire help with, and if you bring a microscope, what make and model it is.

For more information about any of the above activities, please contact Judy Robertson at (707) 584-8099 or <jksrr@aol.com>.

## Other events

To be scheduled: workshops for southern California. Dr. Richard Bray has offered us space at UC San Marcos. Check our website later on for further information.

SF Mycological Annual Fungus Fair, December 14-15, 2002, Oakland Museum. See this great display of fungi and always an exhibit by CALS.

## Announcements

### Donors

We would like to recognize the following members of CALS who subscribed in 2002 at the Donor, Sponsor, Benefactor or Life Membership level. As an expression of our appreciation, new members to these categories will receive a CALS poster. New members to the Life Membership and Benefactor Level will also receive a mini guide.

Life Membership:
Jacob Sigg

Benefactors:
Charis Bratt
David Magney

Donors and Sponsors:
Jerry Cook
E. Patrick Creehan, M.D.
Bill Hill
Lawrence Janeway
Elisabeth Lay
Donna Maythem
John Nixon
John Pinelli
Boyd Poulsen
Elizabeth Rush
Curt Seeliger
Dr. Shirley Tucker

### Secretarial Change

Mikki McGee, our secretary, has resigned. We're sorry to see her go. Judy Robertson has graciously consented to fill in as acting secretary with Bill Hill to help. Thank you, Judy and Bill.

### Database Notice

The lichen database at the Santa Barbara Botanic Garden is now online. It is now about 95% complete. The address is <http://cochise.asu.edu/collections>. This address also gets you to the Arizona State University Lichen database which includes Nash, Ryan and Marsh collections, many of them from California. It is far from complete, but still very useful.

### By-Law changes

The following By-Law changes are proposed to clarify election procedures and to enable the Board to work more smoothly. The proposed changes are underlined.

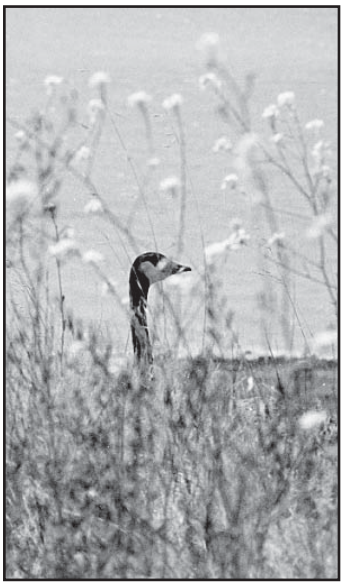
ARTICLE II
Mailing address:
The mailing address of the society shall be the address of the president then presiding or otherwise as the Board shall designate.

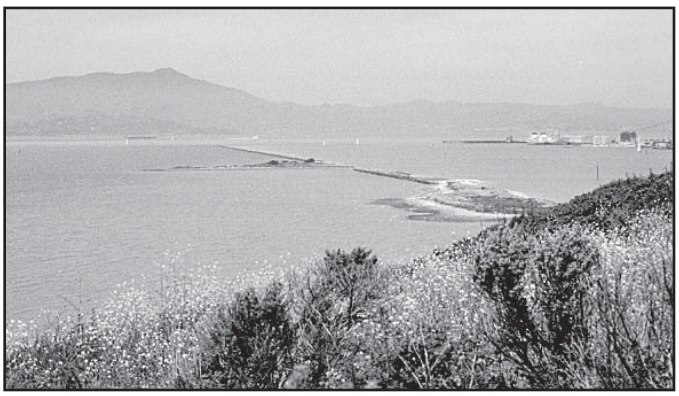
ARTICLE IV
Officers:
6. Section 2. Election of Officers. Officers shall be elected by mail-in ballot enclosed in the Winter Bulletin of the year preceding or by mail in December of the year prceeding. Ballots not returned in 30 days shall be deemed to be an affirmative vote.

ARTICLE V
Amendment to By-Laws:
These By-Laws may be amended by the vote or consent of a majority of members after a written draft is distributed. Amendments shall be distributed at an annual meeting or by mail or enclosed in the Bulletin. Ballots not returned in 30 days shall be deemed to be an affirmative vote.

(Please find, fill out and mail the separate ballot included with this Bulletin mailing. Thank you.)

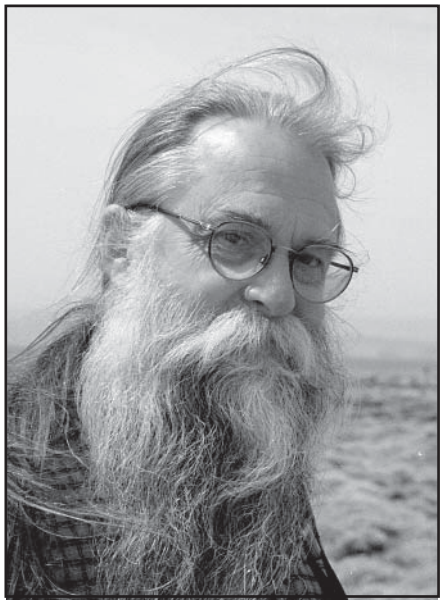
***Scenes from Brooks Island Foray, May 12, 2002***
Photography by R. Doell



## President's Message

Dear CALS Members,



The new year and new regime for CALS started out with a bang with a Board meeting at the Annual Membership Meeting on January 26 where we defined a new Conservation Committee, and appointed Greg Jirak as the "organizing chairperson" to further define its structure and function. As we are all now using the internet more and more, we now also have an email list for CALS (<CaliforniaLichens@yahoogroups.com> – to which you already have been "subscribed" if you sent your email address with your subscription, but anyone can join the group at <http://groups.yahoo.com/group/CaliforniaLichens>). Immediately discussion about rare lichens was developing on this new CaliforniaLichens group, with Eric Peterson lending very good comments, and so by our second board meeting (March 17 in Point Arena after the Pygmy Forest field trip) we had decided he would be the perfect chairman for the Conservation Committee, working with Greg to evolve the organization. Eric comes with sterling recommendations (thank you Cheryl Beyer for the initial suggestion to include him on the committee). He is now with the Nevada Natural Heritage Program, and has cut his teeth on lichens with his Caliciales studies under Bruce McCune at Oregon State University. I think we have a great core group with five members. Trying to get the entire committee to meet in person however has been daunting with members so scattered geographically. The latest attempt resulted in a "mini meeting" with Eric Peterson and Cheryl Beyer during our field trip to the Santa Margarita Ecological Reserve. E-mail will probably be the norm for meetings (of Committees and the Board) and we now have e-mail lists for the Conservation Committee, as well as for the business of the CALS Board of Directors. Judy and I often work together in online chat.

I believe that the way to lichen conservation and a better appreciation for lichens comes with educating and exposing more new people to lichens. This soon creates

more "experts" in the field. Some of our now most competent members are clear examples of this. We all were once new to lichens – but also, we never know enough! We need to keep having more field trips, workshops, and symposiums to get more people inspired about lichens, and thus grow this pool of expertise for future competent surveys and ever important conservation work. The NorthWest Lichenologists (url at <http://www.proaxis.com/~mccune/nwl.html>) have developed whole protocols and certification programs for surveys of lichens specialized for the forested North West Coast, but much of California is a drier inland "southwest" environment and we need to learn a whole new different lichen flora. The need for more work here was quite evident at the recent field trip to the Santa Margarita Ecological Reserve, where enthusiastic Southern California members Les Braund and Andy Pigniolo were commenting on the dearth of lichenological expertise and help in the area. With Eric and Cheryl we even joked of "annexing" Nevada and Arizona for the purposes of lichen surveys, conservation, and membership because of the climate and habitat similarities with Southern California.

Regular lichen identification workshops, such as the regular biweekly Thursday night workshops spearheaded by Judy and Ron Robertson at Sonoma State University, are the key for continuing education in learning lichens. It would be very good if we could get a similar regular workshop going in Southern California, where we might then attract, invite, and cajole the more knowledgeable members in the area for guidance. And lets not forget the more specific workshops like the recent crustose workshop by Judy Robertson, or the "outreach" field trips for other groups like the Native Plant Society, or docent programs like CALS founding member Janet Doell has done at Stanford's Jasper Ridge for years. During the Santa Margarita trip, we also discussed the importance of getting good lichen books into public libraries, such as Brodo and the Sharnoffs' excellent new "Lichens of North America." And we have just begun to exploit e-mail and the internet to connect scattered members for sharing questions and insights about lichens.

This is all encouraging and exciting, and I am looking forward to helping our California Lichen Society have a great future. We can do it together.

Bill Hill

# The Bulletin of the California Lichen Society

Vol. 9, No. 1 Summer 2002

**Contents**



Back Cover:

A) Section of thallus showing young thallus of *Trentepohlia aurea* (Nees & Mont.) Hariot, a green alga with orange pigment, emerging from the photobiont layer of *Graphis striatula* (Ach.) Sprengler. There is a distinct single cell cross-wall connecting the base of the filament to adjacent typical-form phytobiont cells. The phenomenon is fairly common (S. Tucker, pers. comm.) The thickened, layered end cap of the *Trentepohlia* filament is the product of repeated terminal cell divisions, characteristic of some species of Trentepohlia. The terminal cell is 14µ at its greatest width. (450x, AO Spencer eyepiece projection, electronic flash/Koehler. Specimen mounted glycerin jelly.)

B) "Macro" view of filaments of *Trentepohlia aurea* (Nees & Mont.) Hariot emerging from the thallus of *Graphis striatula* (Ach.) Sprengler. Average width of lyrella is 270-300µ, and of the algal filaments is 14µ. (4x Tiyoda objective with 10x AO Spencer eyepiece projection, electronic flash.)

Photography by Mikki McGee.

Figure A

Figure B

(Captions overleaf)