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The *Bulletin of the California Lichen Society* is edited by Isabelle Tavares, Shirley Tucker and Darrell Wright and is produced by Darrell Wright with help from Nancy Brewer. 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 apart from short articles and announcements is on 1.44 Mb diskette in Word Perfect 4.1, 4.2 or 5.1 format; ASCII format is an alternative. A review process is followed, and typed manuscripts should be double-spaced and submitted as two copies. Figures are the usual line drawings and sharp black and white glossy photos, unmounted. Nomenclature follows Esslinger and Egan's Sixth Checklist (*The Bryologist* 98: 467-549, 1995). 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 will be provided for a nominal charge. Address submittals and correspondence to The California Lichen Society, c/o Darrell Wright, 2337 Prince Street, Berkeley, CA 94705, 510-644-8220, voice and FAX; E-mail: dwright@emf.net.

Volume 3(1) of the *Bulletin* was issued July 30, 1996. Contributors were Charis Bratt, Santa Barbara Museum of Natural History, 2559 Puesta del Sol Road, Santa Barbara, CA 93105; Janet Doell, 1200 Brickyard Way, #302, Pt. Richmond, CA 94801; William A. Hill, 141 Lansdale Avenue, Fairfax, CA 94930; Barbara Lachelt, 76 Angela Avenue, San Anselmo, CA 94960; Robert Stewart, P.O. Box 1244, Pt. Reyes Station, CA 94956; Shirley Tucker, Department of Biological Sciences, University of California, Santa Barbara, CA 93106-9610; and Darrell Wright, 2337 Prince Street, Berkeley, CA 94705.

Cover: *Ramalina menziesii* on *Quercus*, probably *Q. lobata*, in park-like Oak Woodland at Jasper Ridge Biological Preserve, Stanford University, Stanford, CA, 1996. Photo by D. Wright.

# Bulletin of the California Lichen Society

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## Macrolichens of Jasper Ridge Biological Preserve, San Mateo County, California

Janet Doell and Darrell Wright

**Abstract:** *Sixty-one macrolichen species are reported from the Preserve which is a biological field station of Stanford University. Particular attention is paid to the secondary product chemistry of several difficult taxa. Notes are provided on the macrolichens as possible monitors of air quality at the Preserve.*

The 1200 acres that make up Jasper Ridge Biological Preserve (JRBP) are part of Stanford University's large holdings and lie in San Mateo County, 50 km south of San Francisco and within minutes of the main campus. The accessibility, mild climate, and rich diversity of terrain and vegetation on the Preserve have provided the University with a convenient research area and have also attracted scientists from all over the country and from abroad. JRBP has been in constant use by researchers for over a hundred years, although it was not formally designated a biological preserve until 1973. The senior author has been a docent at the Preserve since 1982.

The Preserve is in the outer Coast Ranges 15 km from the Pacific Ocean at the base of the Santa Cruz Mountains, which rise to 650 m 3 km to the west, shielding the area to a considerable extent from oceanic influence. The climate is Mediterranean with warm dry summers and mild wet winters (mean summer maximum temperature is 28.1° C; mean winter minimum 4.3° C; data are for 1974-1996 from the JRBP weather station). Rainfall averages 560 mm/yr and is heaviest between November and March. Elevation at the Preserve varies from 70 to 200 m with significant diversity of microclimate. Rocks are Jurassic Franciscan sandstone, greenstone (volcanic) and serpentine with extensive overlays of Tertiary marine and Quaternary non-marine sediments (Jennings and Burnett 1961).

Prehistorically, the Preserve lands were used by the Ohlone tribe of Native American hunters and gatherers. Historical land use included lumbering (c. 1850 to 1916) and cattle ranching (1830's to 1960). The lumbering town of Searsville existed in the southwest corner of the Preserve lands from 1844 to 1892, but was abandoned when the local water company dammed San Francis-

quito Creek to produce Searsville Lake. The purchase of the lands by Stanford University was completed in 1916.

Albert W.C.T. Herre appears to have made the first lichen collections from the area on "Searsville Ridge" or "the ridge between Searsville and Stanford" (Herre 1910). Specialized lichen studies were carried out at the Preserve by Adams et al. (1993), Rundel (1974) and Sanders (1989, 1992). Undergraduate work relating to the lichens was done by Nakayama (1973) and McClure (1976). Our study is the first lichen inventory for the Preserve.

All of the major vascular plant communities (Munz 1959) of the Central Western California floristic region except those along the seashore are present on the Preserve (see map, fig. 1):

**Oak Woodland:** *Quercus agrifolia* Née, *Q. douglasii* Hook. & Arn., *Q. kelloggii* Newb., *Q. lobata* Née and *Aesculus californica* (Spach) Nutt. with *Candelaria*, *Cladonia*, *Collema*, *Evernia*, *Flavopunctelia*, *Physcia*, *Physconia*, *Ramalina* and *Usnea*.

**Mixed Evergreen Forest:** *Arbutus menziesii* Pursh, *Umbellularia californica* (Hook. & Arn.) Nutt. and the Oak Woodland species except *Quercus douglasii*; the macrolichen flora is similar to that of the Oak Woodland.

**Chaparral:** *Adenostoma fasciculatum* Hook. & Arn., *Baccharis pilularis* DC., *Cercocarpus betuloides* Torrey & A. Gray and *Quercus durata* Jepson with *Cladonia*, *Flavopunctelia*, *Hypogymnia*, *Parmelia*, *Physcia*, *Ramalina* and *Xanthoria*.

**Redwood groves:** *Sequoia sempervirens* (D. Don) Endl. and *Pseudotsuga menziesii* (Mirbel) Franco with *Cladonia* and *Peltigera*.

**Freshwater Marsh and Stream Banks:** *Alnus rhombifolia* Nutt., *Populus balsamifera* L. ssp. *trichocarpa* (Torrey & A. Gray) Brayshaw, *Salix exigua* Nutt. ("*S. hindsiana*"), *S. laevigata* Bebb, *S. lasiolepis* Benth., *S. lucida* Muhlenb. ssp. *lasiandra* (Benth.) E. Murray, and *Umbellularia californica* with *Evernia*, *Flavopunctelia*, *Ramalina* and *Usnea*.

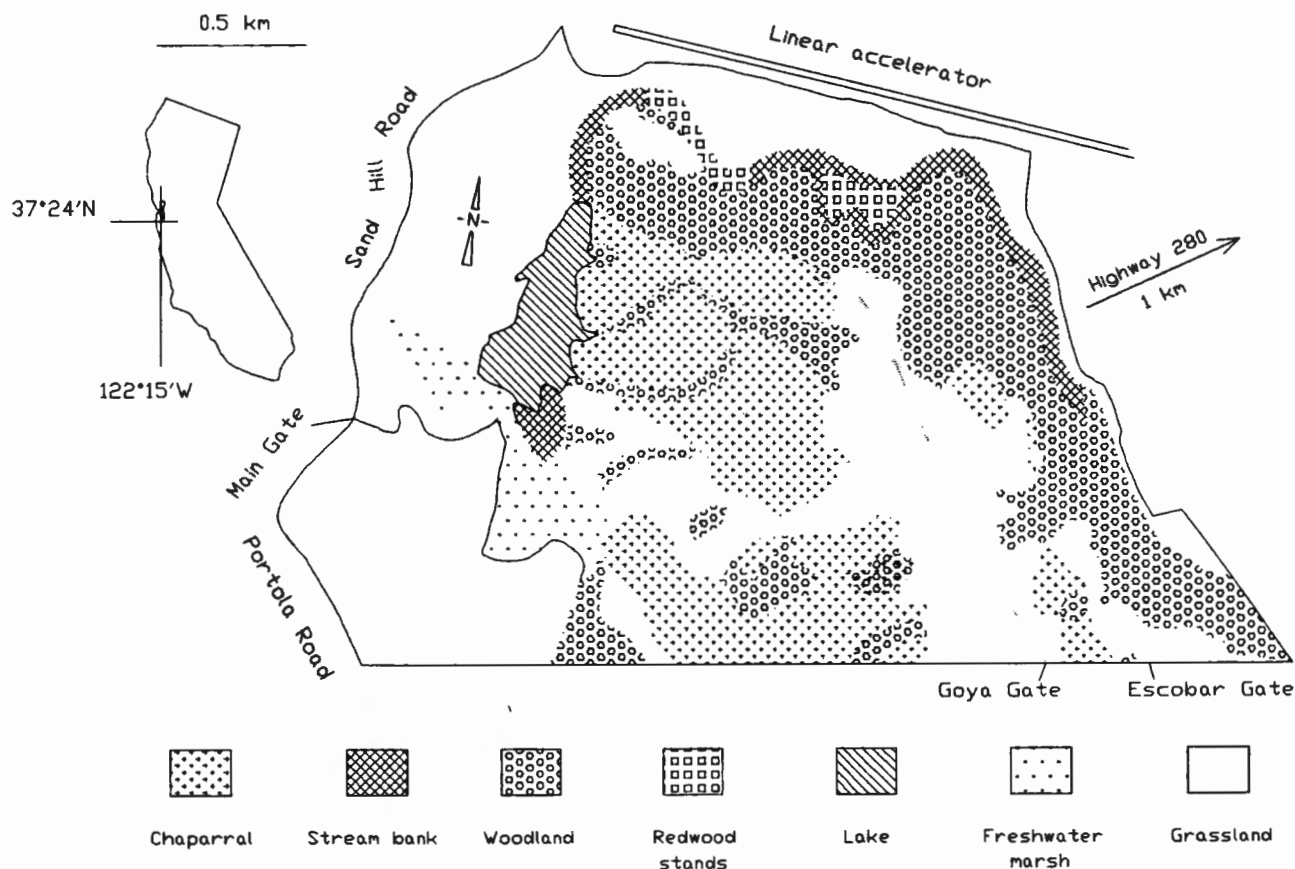


Fig. 1. Vegetation map of Jasper Ridge Biological Preserve.

Rock outcrops have *Physcia*, *Umbilicaria* and *Xanthoparmelia*.

Collections were examined where necessary by TLC in standard solvents B1 and C (Culberson 1972; Culberson and Johnson 1982). Figure 2 gives representative chromatograms.

Nomenclature follows Esslinger and Egan (1995) for lichens and Hickman (1992) for vascular plants. Collections are at the Preserve with duplicates, where available, at the H. D. Thiers Herbarium (SFSU). Many taxa were collected more than once, but only a single typical collection is cited. Collection numbers are Doell's and are preceded on the packets by "JR".

#### Annotated List of Species

*Candelaria concolor* (Dickson) Stein – on sandstone at Rattlesnake Rock, 27. Also in Woodland and at edge of Chaparral.

*Catapyrenium lachneum* (Ach.) R. Sant. – on serpentine soil in Grassland, 62b.

*Cladonia asahinae* J. W. Thomson – on old planks in Mixed Evergreen Forest, 204, 205; on greenstone outcrop, 174. Det. S. Hammer (provisional). Podetia are less than 1 cm tall with more than one per primary squamule. Color is noticeably bluish, characteristic of this taxon and of fatty acid-containing material in general, according to Hammer (pers. comm.). TLC showed fumarprotocetraric acid, but we were not able to verify that the spots in classes 5 and 6 were the fatty acids expected for this taxon (Hammer 1995). Hammer (1995) lists a San Mateo Co. record.

*Cladonia chlorophaea* (Flörke ex Sommerf.) Sprengel – on soil under chaparral shrubs, 55; on moss on greenstone in Mixed Evergreen Forest, 175.

*Cladonia fimbriata* (L.) Fr. – on old planks in Mixed Evergreen Forest, 197.

*Cladonia furcata* (Hudson) Schrader – on soil under *Quercus durata* at Chaparral-Grassland boundary, 49.

*Cladonia humilis* (With.) J.R. Laundon – on soil on road to dam, 30. Fumarprotocetraric acid, atranorin and one unknown (B,C: 5-6). Det. S. Hammer.

*Cladonia ochrochlora* Flörke – on mossy bank on Lakeshore Fire Road, 257.

*Cladonia scabruscula* (Delise) Nyl. – on soil on bank of Lakeshore Fire Road, 278. The discontinuous cortex is a convenient field character for separating this from the much more common *C. furcata* (cf. Hammer 1995).

*Collema furfuraceum* (Arnold) Du Rietz – on *Quercus lobata* at Woodland-Grassland boundary, 45.

*Collema* cf. sp. 1 (Goward et al. 1994) – on *Quercus* in Oak Woodland, 91b. The strongly branched marginal and apical lobules give the thallus a beaded appearance, especially when wet.

*Evernia prunastri* (L.) Ach. – on *Quercus agrifolia* in Oak Woodland, 8. Very common.

*Flavoparmelia caperata* (L.) Hale – on *Quercus douglasii* at edge of Woodland-Grassland boundary, 277. Occasional.

*Flavopunctelia flaventior* (Stirton) Hale – on *Quercus agrifolia* in Oak Woodland, 28. Flourishing (and fertile) here in several plant communities. May be an indicator of air pollution when exclusive or even when dominant. See p. 5.

*Hyperphyscia adglutinata* (Flörke) H. Mayrh. & Poelt – on base of *Quercus* trunk on Lakeshore Fire Road, 130.

*Hypogymnia heterophylla* L. Pike – on *Adenostoma* in Chaparral, 107; on dead twig in Mixed Evergreen Forest, 169. Medullary ceiling darkening toward center of thallus.

*Hypogymnia imshaugii* Krog – on bare twig on lake shore near Chaparral, 261. Entire medullary cavity white; lobes suberect.

*Hypogymnia occidentalis* L. Pike – on *Quercus agrifolia* in Oak Woodland, 116; on dead *Arctostaphylos* in Chaparral, 160. K-, PD- (det. B. McCune). The commonest *Hypogymnia* at JRBP.

*Leptochidium albociliatum* (Desmaz.) Choisy – on serpentine soil in Grassland, 62.

*Leptogium corniculatum* (Hoffm.) Minks – on moss at the lake shore, 259.

*Leptogium furfuraceum* (Harm.) Sierk – on *Quercus agrifolia* in Chaparral, 222.

*Melanelia glabra* (Schaerer) Essl. – on dead twig at the lake shore, 147.

*Melanelia subargentifera* (Nyl.) Essl. – on *Quercus agrifolia* at Woodland-Grassland boundary, 252.

*Parmelia sulcata* Taylor – on *Quercus agrifolia* at Woodland-Grassland boundary, 215.

*Parmotrema chinense* (Osbeck) Hale & Ahti (*Parmelia perlata* [Hudson] Ach.) – on dead twigs at the lake shore, 7. Common. PD+ orange, dark but not red: TLC (fig. 2) confirms stictic acid complex versus the salazinic complex of *P. stippeum*. Simple spot tests do not separate *P. chinense* 7 from *P. stippeum* 70 because stictic complex in *P. chinense* is not necessarily K+ persistent yellow, as sometimes reported (Hale 1965 sub *Parmelia perlata*, Hale and Cole 1988). It may be K+ pale orange (our observation) or yellow-orange (cf. Purvis et al. 1992), more or less as for salazinic complex, with the color perhaps due to the unknowns in *P. crinitum* (Ach.) Choisy; the junior author has observed that *Parmotrema crinitum* and *P. chinense* in Marin County have the same chromatogram, which is identical with that obtained by Culberson et. al. (1981) for *P. crinitum* from North Carolina and from Europe, except that norstictic acid was not detected in Marin Co. material of either species.

*Parmotrema stippeum* (Taylor) Hale – on *Quercus agrifolia* in Mixed Evergreen Forest, 70. K+ orange becoming red only at margin of spot: TLC in solvent C shows salazinic acid complex versus the stictic complex of *P. chinense*, q.v. (fig. 2).

*Peltigera canina* (L.) Willd. – on moss on rock in Redwood Grove, 133; on soil in Oak Woodland and on moss near the lake shore. During a recent two to three year drought period this lichen seemed nearly to disappear.

*Phaeophyscia hirsuta* (Mereschk.) Essl. – on *Umbellularia* in Mixed Evergreen Forest, 217. Cortex K- (3 tests). Individual lobes and in some cases entire thalli such as 217 lack the characteristic cortical hairs (Esslinger 1978); 218 has cortical hairs. In addition, occasional specimens such as this may be pale on the lower surface (Esslinger 1978), contrary to Hale and Cole (1988).

*Phaeophyscia orbicularis* (Necker) Moberg – on *Quercus kelloggii* at Woodland-Grassland boundary on ridge, 143. It is the thallus that tends to be orbicular (Thomson 1963), not the soralia, contrary to Hale & Cole (1988).

*Physcia adscendens* (Fr.) H. Olivier – on dead branch under *Salix* on Swamp Trail at head of lake, 93; on *Quercus lobata* in Grassland, on shrubs in Chaparral and on greenstone.

*Physcia aipolia* (Ehrh. ex Humb.) Fürnr. var. *aipolia* – on *Quercus lobata* at Woodland-Grassland boundary, 63b, and in the Oak Woodland. Medulla K+ yellow. 118 varies strongly toward var. *alnophila* (Vainio) Lynge with large and small apothecia intermixed and restricted to the central part of the thallus (Goward et al. 1994).

*Physcia callosa* Nyl. – on *Quercus agrifolia* in Mixed Evergreen Forest, 144.

*Physcia clementei* (Sm.) Lynge – on *Quercus* in Oak Woodland, 142. Diffusely isidiate-sorediate on the upper surface. For a clarification of the morphology, which is not merely sorediate (Hale and Cole 1988), see Thomson (1963). Previous California reports are from Kern County southward (Hale and Cole 1988); this find extends the range 120 km north.

*Physcia dubia* (Hoffm.) Lettau – covering a shaded greenstone outcrop at Woodland-Grassland boundary on the ridge, 268. It gives the rock a bluish color.

*Physcia stellaris* (L.) Nyl. – on bark in Mixed Evergreen Forest, 153. Medulla K-.

*Physcia tenella* (Scop.) DC. – on dead branch in Mixed Evergreen Forest, 102.

*Physconia enteroxantha* (Nyl.) Poelt – on *Quercus agrifolia* in Oak Woodland, 181. The yellow medulla and soredia are K+ yellow and KC+ orange (Bratt 1994). All *Physconia* collections were determined or verified by T.L. Esslinger.

*Physconia isidiigera* (Zahlbr.) Essl. – on *Umbellularia* and oaks in Oak Woodland and Mixed Evergreen Forest, 232b. Soralia (often collections of corticate isidia [Esslinger 1994]) are merely marginal, not labriform. Medulla and soredia K-, KC-. Common. *Physconia detersa* and apparently also *Physcia grisea* of North American authors, at least in part (see Thomson 1963 sub *P. grisea* f. *isidiigera*).

*Physconia perisidiosa* (Erichsen) Moberg – on *Quercus agrifolia* in Mixed Evergreen Forest, 219. Soralia labriform, lobe ends pale and with black striation below, sometimes hard to recognize in small thalli; medulla and soredia K-, C-. Rare.

*Pseudocyphellaria anthraspis* (Ach.) H. Magn. – on *Quercus agrifolia* in Oak Woodland, 64. All collections

of this lichen, which is usually fertile in the San Francisco Bay Area, were sterile.

*Punctelia borreri* (Sm.) Krog – on *Quercus agrifolia* in Oak Woodland, 223. Distinguished from the following by the lower surface black as opposed to pale brown.

*Punctelia subrudecta* (Nyl.) Krog – on shrub in Chaparral near the lake shore, 284.

*Ramalina farinacea* (L.) Ach. – on dead *Salix* on Swamp Trail at head of lake, 106; on *Quercus agrifolia* in Oak Woodland, 201: this unusual specimen with abundant round laminal as well as oval marginal soralia was determined by R. Riefner and P. Bowler. Common. 203 was K+ yellow becoming red on two contiguous marginal soralia while three other soralia were K-.

*Ramalina leptocarpha* Tuck. – on *Quercus agrifolia* in Grassland, 251, also on *Quercus* at Woodland-Grassland boundary and on the lake shore. Thalli small, none approaching in size the large thalli collected in rural west Marin Co. by Wright.

*Ramalina menziesii* Taylor – on *Quercus douglasii* in Oak Woodland, 113; on dead log beneath *Salix* on Swamp Trail; on shrubs in Chaparral. Very common, accumulating on the ground following storms.

*Ramalina puberulenta* Riefner & Bowler – on *Quercus agrifolia* in Mixed Evergreen Forest, 17; on *Quercus lobata* at Woodland-Grassland boundary, 248; on dead branch near Swamp Trail at head of lake. Rick Riefner believes all puberulent material in central California is probably this species (pers. comm.). It is distinguished from *R. leptocarpha* by its pubescence and shorter spores (Riefner & Bowler 1994). Some collections originally determined as *R. leptocarpha* proved to be *R. puberulenta* when reexamined; 45X may be needed to see the pubescence clearly, although it is often not difficult to make out at lower power. Collections vary from broad-lobed (249) to narrow-lobed (250), and at least one (248) has areas where cortex has disappeared and a kind of net has developed in the resulting perforation.

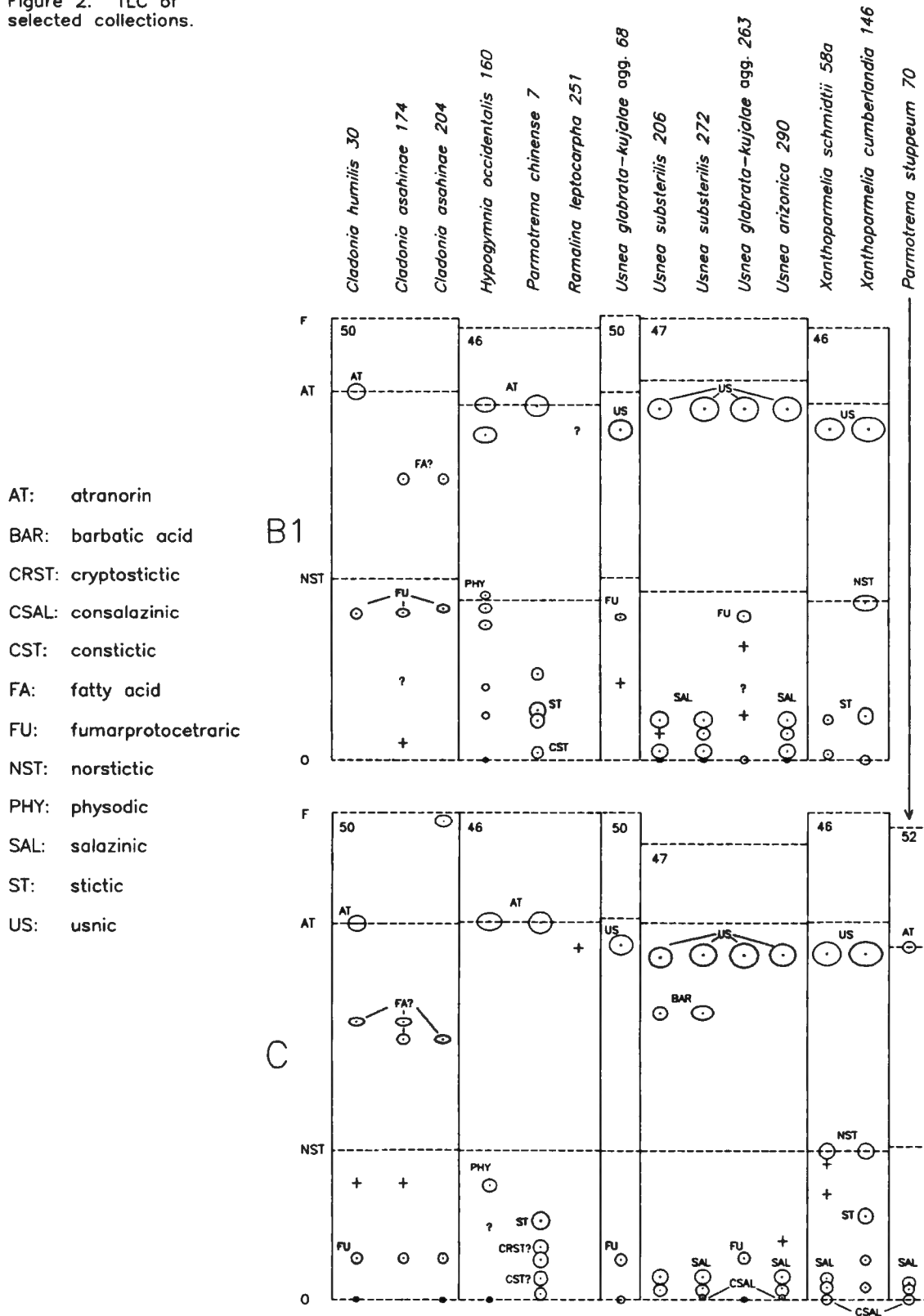
*Sticta fuliginosa* (Hoffm.) Ach. – on *Quercus agrifolia* in Mixed Evergreen Forest, 127; also on Lakeshore Fire Road. Rare.

*Teloschistes chrysophthalmus* (L.) Th. Fr. – on twig of *Quercus* at Woodland-Grassland boundary, 233. Rare.

*Tuckermannopsis orbata* (Nyl.) M.J. Lai (*Cetraria orbata* [Nyl.] Fink) – on cultivated *Pinus radiata* at upper end of lake, 292. Det. D.E. Baltzo and I. Tavares. Retained

See #140

Figure 2. TLC of selected collections.



under *Cetraria* by McCune and Goward (1995) and by Purvis et al. (1992).

*Umbilicaria phaea* Tuck. – on Tertiary sandstone at Rattlesnake Rock, 63. Common on rock outcrops in Woodland and Grassland.

*Usnea arizonica* Mot. – on dead twig on trail to marsh at head of lake, 290. Irregular swellings near the summits of the branches will be either pycnidia or incipient apothecia (vertical section) and help to identify this taxon when it is immature; note also the narrow papillae (I. Tavares). K+ red, PD+ orange: salazinic acid complex (fig. 2). All *Usnea* collections were examined by I. Tavares.

*Usnea glabrata* (Ach.) Vainio - *U. kujalae* Räsänen aggregate – on *Salix* at the lake shore, 68. Branches inflated; laterals short; papillae lacking except on lower trunk; axis narrow; medulla wide, lax. Green when fresh, orange-tinged after 13 years in the herbarium. K-, PD+ red: fumarprotocetraric acid as major secondary product rather than protocetraric as reported from the northern Rocky Mountains by McCune and Goward (1995); compare with the chromatogram of *Cladonia asahinae*, fig. 2. *Usnea* 263 is similar but has longer, more abundant lateral branchlets, like those of the holotype of *U. kujalae*, whose recent merger with *U. glabrata* (Myllys 1994) should be critically evaluated (I. Tavares, pers. comm.).

*Usnea scabrata* Nyl. – on *Adenostoma* in Chaparral, 75b. Has wide, blunt papillae, isidia and deep rugae or pits. K+ yellow turning orange, PD+ orange. McCune and Goward (1995) report salazinic acid.

*Usnea substerilis* Mot. – on *Quercus* in Oak Woodland, 206. Has wide, blunt papillae, salazinic acid complex (fig. 2), and a cortex with a lightly pruinose appearance. The medulla in a primary branch of normal size (0.7 mm diam.) tested K- and PD-, while the residue in the TLC shell vial was K+ bright yellow becoming red, demonstrating that there may not be enough lichen product in a small exposure of medulla to give a visible spot test. The filter paper method, as applied to *Bryoria* filaments by Brodo and Hawksworth (1977), might be effective for such apparently non-reacting *Usneas*.

*Usnea wirthii* Clerc – on dead twig near lake shore, 265. Has irregular red dots on the cortex and a pale yellow axis. In some collections the red spots are absent or difficult to see. K+ yellow, PD+ orange: I. Tavares (pers. comm.) found norstictic acid by TLC of a large number of specimens; McCune and Goward (1995) reported psoromic and rarely norstictic.

*Xanthoparmelia cumberlandia* (Gyelnik) Hale – on greenstone in Oak Woodland, 146. K+ yellow becoming orange: stictic acid complex with norstictic (fig. 2). Of eight collections only two were fertile. One might interpret Hale's world monograph (Hale 1990, p. 98) as limiting this species to the eastern U.S., but he evidently did not intend that (B. McCune, pers. comm.).

*Xanthoparmelia schmidtii* Hale – on serpentine rock in Grassland, 59. K+ red, PD+ yellow turning orange: salazinic and norstictic acids (fig. 2). This extends the range 100 km northwest from Tulare Co. (Hale 1990). It is probably also in Monterey Co. (Wright 1995).

*Xanthoria candelaria* (L.) Th. Fr. var. *candelaria* – on *Quercus* at Woodland-Grassland boundary, 179.

*Xanthoria fallax* (Hepp) Arnold var. *fallax* – on *Quercus lobata* at Woodland-Grassland boundary, 52. Pycnospores of 52 are rod-shaped, 3 x 1  $\mu$ m (cf. McCune and Goward 1995).

*Xanthoria hasseana* Räsänen – on dead branch on Swamp Trail at head of lake, 98. Det. I. Tavares and D.E. Baltzo. Has flat lobes that are finely branched (Räsänen 1944).

*Xanthoria polycarpa* (Hoffm.) Rieber – on dead branch at edge of Chaparral, 15.

#### Evidence for air pollution

The following observations suggest that heavily travelled U.S. Highway 280 just two km to the east is having pollution impacts at the Preserve:

1. *Usneas* were consistently short and bushy, when at least some taxa would be expected to have larger, more expanded thalli. Weissig (cited in Feige [1982]) found that lichen growth rates were reduced at three sites in the city of Cologne compared with three relatively unpolluted sites in the surrounding countryside.
2. Hypogymnias also were consistently small at JRBP.
3. Some *Usnea* collections were aberrant, e.g. 202, 226 and 272 (I. Tavares). Sigal and Nash (1983) report severe morphological distortion of lichen thalli in a polluted area in southern California, although the effect in this case was due chiefly to ozone rather than to SO<sub>2</sub>.
4. *Usnea arizonica*, usually apotheciate in the San Francisco Bay area, was found with pycnidia (or possibly incipient apothecia) only. Feige (1982) reports that production of apothecia in the lichen



*Lecanora muralis* was markedly less within the city of Cologne than in its environs.

5. *Pseudocyphellaria anthraspis*, usually apotheciate, was found only without apothecia (and was clearly not sorediate *P. anomala*).
6. *Flavopunctelia flaventior*, a species that appears to be the premier toxitolerant macrolichen in Marin Co. 65 km to the north and a pollution indicator when dominant (D. Wright unpubl.), is very common at JRBP. The existence of pollution indicator lichen species has been documented for more than a quarter of a century (Hawksworth and Rose 1970).

The student paper by McClure (1976) reported levels of lead in *Ramalina menziesii* and four other species ranging from 70 to 130 ppm in the interior of the Preserve (880 ppm along Highway 280). These values are close to what one would expect on the basis of reports by Kral et al. (1989, cited in Richardson 1992) for *Hypogymnia physodes* in rural Czechoslovakia and by Glenn et al. (1995) for *Punctelia subrudecta*, *Parmelia sulcata* and *Anaptychia ciliaris* in a more polluted area in northern Italy. McClure's report must reflect the leaded gasoline in use then, and new measurements of Pb levels to compare with the old ones would be of interest. His findings do suggest an effective channel for transfer of airborne pollutants from Highway 280 to the interior of the Preserve. Although SO<sub>2</sub> levels should also have fallen since 1976 owing to the introduction of automotive catalytic converters, that decline would have been offset at least in part by increased vehicle traffic and possibly by acid rain (cf. Hawksworth 1995, under his "Discussion").

At the present time, reduced, sterile and aberrant macrolichen thalli suggest impacts even in the center of the Preserve. There has been no study of atmospheric SO<sub>2</sub> levels at JRBP, according to N. Chiariello, Jasper Ridge Scientific Coordinator (pers. comm.). Such a study would reveal whether the lichens were sending a message about air quality at the Preserve. We will report on our own measurements with simple SO<sub>2</sub> probes (Sensodyne) in the next *Bulletin*.

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Lichens Collected at the Hastings Natural History Reservation, Monterey County, California, during the CALS Foray of January 20-21, 1996

Shirley Tucker and Charis Bratt

About 109 species are included in this list from the Hastings Natural History Reservation (HNHR). The Reservation, on Carmel Valley Road, is administered by the Museum of Vertebrate Zoology, University of California, Berkeley.

Little collecting was done on rock, so there are undoubtedly many additions to be made from that source. Only partial determinations are available for some taxa, but such reports are helpful to show presence. Also included are a few additional reports by Bruce Ryan from his short stay at the Reservation some years ago.

Localities are coded in the list of species according to the following numbers:

1. Around corral along entry road and on the surrounding live oaks;
2. Along road 1.5 mi. E of the HNHR entrance, on *Acer macrophyllum*;
3. On blue oaks (?) and on rock outcrops, uphill from the HNHR office and museum buildings;
4. On rock wall and on nearby chaparral and oaks on the drive to the Director's residence.

- Acarospora schleicheri* (Ach.) A. Massal. - 3  
*Acarospora smaragdula* (Wahlenb.) A. Massal. - 3  
*Acarospora* sp. - 4  
*Arthonia radiata* (Pers.) Ach. - 3, 4  
*Aspicilia* sp. - 3  
*Bacidia* sp. - 1  
*Bryoria abbreviata* (Müll. Arg.) Brodo & D. Hawksw. (*Nodobryoria a.*) - 1  
*Buellia* - 2+ species, 1, 2, 4  
*Caloplaca cerina* (Hedw.) Th. Fr. - 1, 3, 4  
*Caloplaca chrysophthalma* Degel. - 3  
*Caloplaca cinnabarina* (Ach.) Zahlbr. - 3  
*Caloplaca ferruginea* (Hudson) Th. Fr. - 1, 3  
*Caloplaca holocarpa* (Hoffm. ex Ach.) M. Wade - 1, 2  
*Caloplaca* - 2 spp. on rock, 4  
*Candelaria concolor* (Dickson) Stein - 1, 3  
*Candelariella vitellina* (Hoffm.) Müll. Arg. - 3  
*Catillaria lenticularis* (Ach.) Th. Fr. - 1, 3  
*Cetraria aculeata* (Schreber) Fr. - 4  
*Chrysothrix candelaris* (L.) J.R. Laundon - 1  
*Cladonia coniocraea* (Flörke) Sprengel - 1  
*Cladonia fimbriata* (L.) Fr. - 1, 2  
*Cladonia subradiata* (Vainio) Sandst. (= *C. balfourii* of authors) - Ryan  
*Collema furfuraceum* (Arnold) Du Rietz - 1

*Collema nigrescens* (Hudson) DC. – 3, 4  
*Cyphellium lucidum* (Th. Fr.) Th. Fr. – Ryan  
*Cyphellium tigillare* (Ach.) Ach. – locality not specified.  
*Diploschistes muscorum* (Scop.) R. Sant. – Ryan  
*Evernia prunastri* (L.) Ach. – 1, 3, 4  
*Flavoparmelia caperata* (L.) Hale – 1  
*Flavopunctelia flaventior* (Stirton) Hale – 1, 3  
*Hypogymnia imshaugii* Krog – 1, 3, 4  
*Hypogymnia occidentalis* L. Pike – 1  
*Koerberia biformis* A. Massal. – 1  
*Lecanora confusa* Almb. – locality not specified.  
*Lecanora demissa* (Flotow) Zahlbr. – Ryan, on rock  
*Lecanora expallens* Ach. – 1  
*Lecanora hagenii* (Ach.) Ach. – 1, 3, 4  
*Lecanora muralis* (Schreber) Rabenh. – 3  
*Lecanora pacifica* Tuck. – 1  
*Lecanora scotopholis* (Tuck.) Timdal – 3  
*Lecanora symmicta* (Ach.) Ach. – 1, 3, 4  
*Lecanora* – 3 to 4 unidentified spp., 1, 3  
*Lecidea atrobrunnea* (Ramond ex Lam. & DC.) Schaerer – 3  
*Lecidea tessellata* Flörke – locality not specified.  
*Lecidea* – 3+ unidentified spp., 1, 2  
*Lecidella asema* (Nyl.) Knoph & Hertel – Ryan, on rock  
*Leptochidium albociliatum* (Desmaz.) Choisy – Ryan  
*Leptogium arsenei* Sierk – Ryan, Nash  
*Leptogium furfuraceum* (Harm.) Sierk – 1, 4  
*Leptogium corniculatum* (Hoffm.) Minks (= *L. palmatum* [Hudson] Mont.) – 1, 2  
*Letharia vulpina* (L.) Hue – 1  
*Lichinella* sp.? – 4  
*Melanelia disjuncta* (Erichsen) Essl. – 3  
*Melanelia glabra* (Schaerer) Essl. – 3  
*Melanelia multisporea* (A. Schneider) Essl. – 3  
*Melanelia subolivacea* (Nyl.) Essl. – 1  
*Nephroma helveticum* Ach. – 2  
*Nodobryoria abbreviata* (Müll. Arg.) Common & Brodo (= *Bryoria abbreviata* [Müll. Arg.] Brodo & D. Hawksw.) – 1  
*Normandina pulchella* (Borrer) Nyl. – with *Physcia*  
*Ochrolechia oregonensis* H. Magn. – 1, 2, 4  
*Parmelia saxatilis* (L.) Ach. – 2  
*Parmelia sulcata* Taylor – 1  
*Parmelina quercina* (Willd.) Hale – 1, 3  
*Peltigera canina* (L.) Willd. – 1, 2  
*Peltigera collina* (Ach.) Schrader – 1, 2  
*Peltigera degenii* Gyeln. – Ryan  
*Peltigera membranacea* (Ach.) Nyl. – 1  
*Peltigera praetextata* (Flörke ex Sommerf.) Zopf – Ryan  
*Pertusaria amara* (Ach.) Nyl. – 2  
*Pertusaria leloplaca* DC. (= *P. leucostoma* Massal.) – 1, 2  
*Pertusaria* spp. – 1, 4  
*Phaeophyscia cernohorskyi* (Nádv.) Essl. – 1, 4  
*Physcia adscendens* (Fr.) H. Olivier – 1  
*Physcia aipolia* (Ehrh. ex Humb.) Fűrnr. – 1, 2  
*Physcia biziana* (Mass.) Zahlbr. – 3

*Physcia stellaris* (L.) Nyl. – 1  
*Physcia tenella* (Scop.) DC. – 1, 3  
*Physconia americana* Essl. – 1, 3, 4  
*Physconia enteroxantha* (Nyl.) Poelt – 1, 3, 5  
*Physconia isidigera* (Zahlbr.) Essl. – 1  
*Physconia perisidiosa* (Erichsen) Moberg – 1, 3, 4  
*Polychidium muscicola* (Sw.) Gray – 1, 3  
*Pseudocyphellaria anomala* Brodo & Ahti – 2  
*Pseudocyphellaria anthraspis* (Ach.) H. Magn. – 2  
*Punctelia subrudecta* (Nyl.) Krog – 3  
*Ramalina farinacea* (L.) Ach. – 1, 3, 4  
*Ramalina leptocarpha* Tuck. – 1, 3, 4  
*Ramalina menziesii* Taylor – 1, 3, 4  
*Rinodina* sp. – 4  
*Sticta fuliginosa* (Hoffm.) Ach. – 2  
*Syzygospora physciacearum* Diederich – 1, 2. A lichen parasite on *Physcia*. Previously reported only for Santa Barbara and Santa Cruz Cos. (Diederich 1996).  
*Tephromela atra* (Hudson) Hafelln. (= *Lecanora atra* [Hudson] Ach.) – 1  
*Thelomma occidentale* (Herre) Tibell – 1  
*Toninia sedifolia* (Scop.) Timdal – 4  
*Trapeliopsis granulosa* (Hoffm.) Lumbsch (*Lecidea granulosa* [Hoffm.] Ach.) – 1  
*Tuckermannopsis chlorophylla* (Willd.) Hale – 1  
*Usnea* – 3 spp., 1, 3, 4. Note: Usneas collected and identified by Herre from Hastings were *U. filipendula*, *U. scabrata* ssp. *nylanderiana* and *U. subfloridana*.  
*Xanthoparmelia cumberlandia* (Gyelnik) Hale – 4  
*Xanthoria candelaria* (L.) Th. Fr. – 1  
*Xanthoria polycarpa* (Hoffm.) Rieber – 1  
*Xanthoria ramulosa* (Tuck.) Herre – 1, 3

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## An Introduction to the Lichen Spot Tests

Darrell Wright

According to Jungreis (1985), chemical spot-testing dates from classical times, when Pliny the Elder (A.D. 23-79) wrote that the Romans detected iron in vinegar with a reagent strip of papyrus soaked in an extract of gall nuts. The first modern chemical spot-testing dates from the work of the German chemist Friedlieb Runge (1794-1867), the discoverer of caffeine and quinine, starting about 1822 (Anft 1955).

Spot tests were first applied to lichens by the Finnish lichenologist, William Nylander (1822-1899). Nylander does not say (1866a,b) how he hit upon calcium hypochlorite (bleach) and potassium hydroxide (lye). He may

have examined the chemical literature, in which spot tests were described at least as early as 1834 (Runge cited in Anft 1955), or he may have taken his cue from the long tradition of testing plant materials for color reactions. In either case, the idea of spot-testing lichens and the choice of the two reagents (they happened to be at hand?) seem inspired: it would be hard to find two simple, inexpensive tests as useful as these.

The PD test, which in the 1930's was a standard organic chemist's test (J. A. Elix, pers. comm.) for aromatic aldehydes, substances with a benzene ring carrying a -CHO group, was introduced into lichenology by the lichenologist-chemist, Yasuhiko Asahina (Asahina 1934). According to Hawksworth and Hill (1984, p. 118), Nylander in 1865 was the first to publish the results of iodine starch tests on lichens. Bachmann (1890) appears to have been the first to use an N test (nitric acid), as well as tests with other inorganic reagents, in a study of the mostly brown non-crystalline pigments in a number of lichen species. The tests in common use are summarized in Table 1.

The lichen spot tests do not seem to have lost much of their currency in spite of modern chemical refinements like chromatography. One key after another calls for them, and it is a good idea to first go through a key to see which tests will be needed. A suitable panel of results can then be put together before the keying is begun (it does not take long to learn which tests will be needed for particular groups). Reagents for the tests are described in standard references (e.g., Hale 1974, 1979; Esslinger 1977; McCune and Goward 1995; Thomson 1967).

It is easier to apply the reagents and to observe the results if you work under the dissecting microscope. Slice away the cortex to expose an area of medulla 5 mm x 5 mm with a cleaned (soap and water) single-edged razor blade. In most lichens this gives a white surface on which any colors that develop may be easily observed. Select an inconspicuous part of the thallus to test, usually a lobe tip or the margin of the thallus, since, after the medulla is bared, you need to remove the lobe tip first to the testing surface (I use a piece of polypropylene sheet—see below) to apply the reagents and afterwards to a special waste container, especially necessary for PD. In the case of a fruticose thallus, you may want to decide which side is morphologically more representative; call it the "front", and then take material to be tested from the "back"; the form of the thallus should not be altered by removal of the test fragment. Clamping tweezers, available in model shops and hobby supply stores, are good for holding the fragment during the tests. Why take such pains? You want your collections of these very slow growing, slow-to-regenerate organisms, which you have taken out of nature, to

be as useful as possible to yourself and others. Peter Bowler (pers. comm.) pointed out that many lichens should be thought of as old growth, so that removing a lichen may be comparable to cutting down a redwood.

I have found the best tool for applying the reagent is a colored plastic toothpick (e.g., Item O1-455, Paper Art Co., 3500 N. Arlington Ave., Indianapolis, IN 46218, 12 packs of 300 picks each, available in party supply stores). These are disposable, non-reactive and color-coded (yellow for K, red for C, blue for PD), so that you can repeat a test without having to use a new toothpick to avoid cross contamination by different reagents. I put a drop each of K, C and Steiner's PD (Hale 1974) onto a 6" x 8" sheet of non-reactive plastic (1/8" polypropylene) and then dip the tip of the toothpick into the drop. I remove excess solution clinging to the toothpick by tapping it on the polypro sheet, delivering to the lichen more or less reagent, as I choose, but never more than a tiny fraction of the volume of the drop from the dropper bottle. When I am finished with the toothpick, I rest it on the polypropylene, to be reused if I need to repeat *that* test on *this* specimen. I apply the reagents in the sequence (left to right) shown in figure 1. When I am finished with the specimen, I push the used toothpicks aside on the polypro sheet and take new ones for the next test. When the test session is over, I empty the polypropylene sheet into the special waste container. The sheet is easy to wash up, although I first wipe away the PD with a piece of soapy tissue that then goes into the special container.

There are sources of error for which you need to watch:

1. Reagent that has become weak is a problem only with C in my experience. A small plastic squeeze bottle (5 ml), which is handy for placing one drop on the testing surface, seems to keep it at good strength for several weeks. If the odor of chlorine bleach is present, it will probably be effective, but you may wish to test it on a C+ thallus or just replace it. Steiner's PD solution (see Hale 1974 for formula) lasts for more than a month but eventually will turn orange enough to mask weak yellow or orange PD reactions. K does seem to last indefinitely.

2. The C reactions are fleeting and are sometimes missed. This happens mostly, it seems, because an excess of bleach was used. The  $\mu$ l quantities delivered on the tip of the plastic toothpick help avoid this problem and often give a persisting red or rose color. In general, the less reagent used the better, although it is best to cover an area about two mm on a side to guard against failure of the test because of spotty distribution of lichen product; the tip of the toothpick is flattened and the side can be used in the manner of a flexible spatula to spread

the solution on a medulla that does not want to absorb it.

3. Avoid dead, dying and other abnormal tissue. Lobe tips are usually the best for testing, although in some specimens the central parts of the thallus will have higher concentrations of lichen products. Occasionally there is not enough lichen product in a small thallus fragment to give a visible reaction (see note under *Usnea substerilis* in the article on the macrolichens of the Jasper Ridge Biological Preserve in this issue). An interesting technic for dealing with this difficulty by collecting solid lichen product from a dilute solution, discovered here accidentally, is shown in figure 2. Acetone extractant rises over the course of an hour through the TLC pipette or melting point capillary tube and is drawn by adhesive forces out onto the glass wall of the vial where it accumulates as a bead of crystalline material. This bead is quite convenient for testing with reagent on the tip of a toothpick (the vial is placed on its side under the dissecting microscope).

4. Scraping to expose the medulla in a species with

atranorin in the cortex may, I discovered, mix this K+ substance into the medulla which then gives a weak false positive test with K. Exposing the medulla with a single clean slice helps avoid the problem.

5. Occasionally a test will be negative when a positive one was expected. Repeat it in another area of the thallus; there may be too little secondary product in the first area tested, and you have come up against one of the limitations of the spot tests. Infrequently, only specific structures will react, e.g., soredia or the margin of the apothecium. The literature you are using should warn you when this is the case.

I put the drops of reagent (fresh drops for each specimen) in a line always in the same sequence from left to right (fig. 1): K, C, and PD, so that I will know which drop is which if a test is ambiguous and I want to repeat it. I record the results in a collections database on a laptop computer next to the dissecting microscope. This information is later printed onto a slip of paper that then goes into the packet.

Test	Formula	Color	Substances detected	Reaction time
K	10% KOH	Yellow to red	Some depsides, $\beta$ -orcinol depsidones, quinone pigments	Fast, sometimes changing
C	5% NaClO (household bleach)	Pink to red; orange	Substances with meta-hydroxyls; xanthone pigments	Fast, often fleeting
KC	K followed by C	Pink	Meta-hydroxyls produced by treatment with K	Fast, fleeting
CK	C followed by K	Yellow, gold	Barbatic and diffractaic acids (depsides)	Fast
PD	5-10% para-phenylenediamine	Pale yellow to brick red	Mostly $\beta$ -orcinol depsidones, some depsides	Slow
I	1 part I, 2 parts KI or NaI	Blue, red	Starch and starch-like substances	Fast
N	50% HNO <sub>3</sub>	Blue-green, reddish	Brown pigment in <i>Neofuscelia</i> , blue-green pigment in <i>Spilonema</i>	Fast

Table 1. Lichen spot tests.

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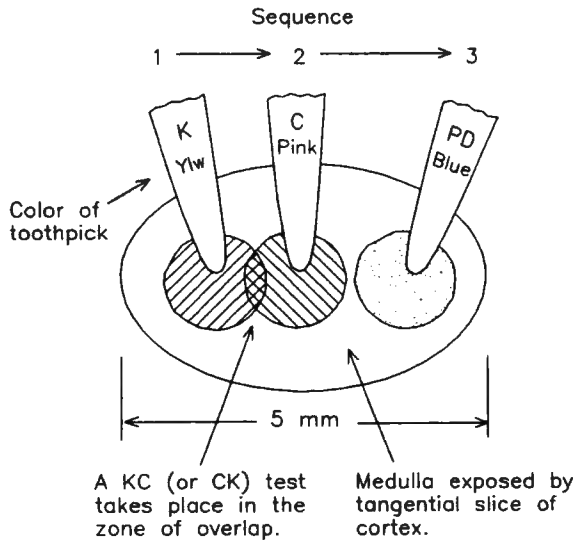


Figure 1. Multiple spot tests on a single small exposure of medulla.

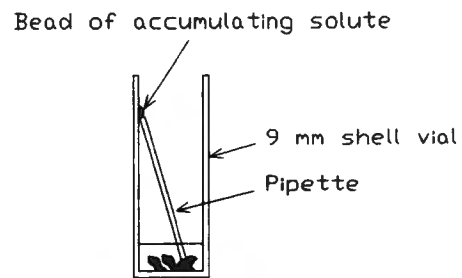


Figure 2. Accumulating solute for spot-testing.

### A Minority Recommendation on Spot Test Methods for Lichens

Shirley Tucker and Charis Bratt

Both of us conduct chemical spot tests on lichens somewhat differently from the previously described method.

S. T.'s method:

1. Place a microscope slide, with a small piece of white paper below it, on the stage of a dissecting microscope if available. If not, the tests can be made on the slide over paper, and observed without magnification.

2. Moisten a small healthy or typical area of the lichen, cut off three pieces with a razor blade, each about 1/8 inch across, and place them with a forceps at wide intervals on a glass slide. When the pieces are moist, they are easily handled and will not fly into space when picked up with a forceps. If top and bottom differ in color, place the lighter side up; it is harder to see color reactions in a dark surface. Make sure some edges are cut or torn diagonally in part, so that parts with cortex (surface) and medulla (internal tissue) can be distinguished if necessary.

Note: Be wary of using pieces already broken off and in the bottom of the envelope, as they may not be the same species.

The three tests will be made on these small pieces of tissue. Be sure all are from the same part of the thallus, so that all are the same lichen. The order of the tests, from left to right, is arbitrary, but should be consistent so that the person doing the test knows which is which. I do K first, at far left, then C in the middle, and P at the far right.

3. While observing under the microscope, add a drop of K to the first piece, forming a small pool of liquid around the piece. A positive reaction will turn the piece yellow within 30 seconds or so, and in some lichens, will then turn red. Some color, visible against the white background, may leak out into the surrounding liquid, again giving a positive test. If there is a negative reaction, there is no change in color, other than perhaps a slightly darker hue to the normal dry color. A plus/minus reaction would be the verdict if there is only a faint color change (brownish or faint yellow), after a minute or more.

4. While observing the second piece under the microscope, touch a drop of C to the second piece, especially to the cut edges. This can be done with a capillary tube or a dropper; a dipped toothpick really does not add enough liquid C to be sure you have a good test. A positive reaction will be an immediate rosy flush, which usually disappears quickly, or a drop of red on the cut edge, so watching as you add the chemical is very important. The pink color may tinge the liquid C around the specimen, but it doesn't persist. Bruising or making razor-blade cuts in the piece of tissue will give added opportunity for seeing a positive test. If the reaction is negative, the piece does not react, except to bleach out and lose all color. The C chemical becomes ineffective rather easily, but a fresh lot from the Clorox bottle each day should be effective. One also can keep on hand a supply of a lichen that has a definite C+ reaction, and test the C on that before trying it on an unknown.

The KC test is done on this piece already tested with C. Blot excess liquid C from around the piece, and add a drop of K. A positive test will show color within a minute, often within a few seconds.

5. A chemical test with P can be done on the third piece, on glass over paper, while observing through the dissecting microscope. A positive reaction may be rapid, so watching while applying the chemical is important.

6. Record the results of the three (or four) tests on a piece of paper inserted in the envelope with the specimen. Some collectors like to add the spot-test results to the label, eg., K-, C+ red, KC+ yellow, P-.

The three pieces are discarded after the test, and the slide is washed and can be re-used. If one is uncertain about a test, repeat it with small pieces from different parts of the thallus.

By this method, chemicals are kept away from the lichen specimen and the packet. It is extremely important not to deface the specimen by leaving stains on it. It is much easier to cut off tiny pieces of the thallus before there are chemical spots present on it.

Also, the likelihood of leakage from one spot test to a neighboring one is avoided. Both K and P tend to move rapidly within the lichen tissue, so that it is easy to damage more of the lichen thallus than you intend, if it is attached. Also, both C and P can move rapidly in the thallus, and influence the neighboring reactions if done adjacent to other spots.

Shirley Tucker

#### C.B.'s Method

1. I do not routinely do all of the tests, but only those which are required in keying. If a medulla test is required, it is often easier to remove the cortex from the test fragment while it is still attached to the thallus. I then place the fragment (or fragments as needed) on a piece of scrap paper.

2. I use a very small capillary tube to place a drop of reagent on the fragment to be tested. If you cannot find capillary tubes small enough, you can heat those you do have over an alcohol burner, draw them out and then break off the tips to get an extremely fine point.

3. Placing small amounts of reagents in shell vials with neoprene stoppers which are kept in place when you are not actively testing preserves your reagents and keeps them from reacting with each other. A wooden holder for the shell vials and their respective capillary tubes keeps things organized.

4. Capillary tubes should be drained on an absorbent surface (such as paper towel) immediately after each test. This keeps the reagent from drying and blocking the tubes and clears them of any contaminate.

5. If you have only a very small specimen or are uncertain of result, it is often helpful to use the acetone extraction method. Place a fragment on a piece of filter paper on a slide, put a drop or two of acetone on the lichen fragment. The chemical tests may then be done on the portion of the filter paper that has the residue from the acetone.

C. Bratt

**The *Cetraria merrillii* Club**

On the CALS field trip to Inverness Ridge at the Pt. Reyes Seashore, I was introducing the group to what I still believe is *Kaernefeltia californica* while another seasoned observer was suggesting it was *K. merrillii* and a third had reached the conclusion it was *Nodobryoria*. I sent an E-mail S.O.S. to Ernie Brodo regarding the distinctions between *Kaernefeltia (Cetraria, Tuckermannopsis) merrillii*, *Kaernefeltia (Cetraria, Cornicularia) californica*, and *Nodobryoria (Byroria) abbreviata* (I have still not got around to sending him the collection). He kindly answered with the following which I thought the readers of the Bulletin would enjoy. It is reproduced with his permission:

"Welcome to the *Cetraria merrillii* club. The problems with this species with respect to *Nodobryoria* and *Cetraria californica* have confused and confounded many lichenologists, including me.

To begin with, I readily agree that the dividing line between *C. merrillii* and *C. californica* is often very fuzzy. One can find angular/terete as well as flattened branches in both species, but in *C. merrillii* the flattened branches predominate and you can always find at least a few apothecia developing on the upper lobe surface, rather than terminally or subterminally as in *C. californica*. In many specimens, however, it's a tough call. This is especially true in California. In B.C., the species don't overlap geographically. *Cetraria californica* is coastal, and *C. merrillii* is strictly montane and inland.

Distinguishing *Nodobryoria abbreviata* from *Cetraria californica* is much easier. To begin with, there is the color: very reddish brown in *Nodobryoria*, and yellowish brown to olive brown (or olive black) in the *Cetrariae*. The epihymenium in *Nodobryoria* is a clear yellow-brown, never KOH+ violet; in both *Cetrariae* but especially in *C. californica*, it is a grayish violet in KOH. Lichenes Can. Exs. 111 shows that reaction well. Recent TLC of that specimen, by the way (to answer your question), showed it to contain "traces of lichesterinic and protolichesterinic plus three other more abundant unidentified fatty acids." I'm not sure which of these compounds was the "unidentified substance" referred to on the label. In checking over quite a number of specimens of *C. californica* in CANL (I don't remember if I tested every one, but it was close), every specimen had a K+ violet epihymenium. There may, of course, be some K- negative specimens of *C. californica*, especially from shady habitats where the epihymenial pigment may not develop well. You'll note that not every specimen of *C. merrillii* was KOH

positive" (Ed.: see *Bryologist* 98: 189-206, 1995; *Bryologist* 99: 125-136, 1996)."

Darrell Wright

**Notes and News**

**Field Trip to Hastings Reservation, Monterey County, California, January 20-21, 1996**

Rain threatened but none fell during field hours at this University of California Natural Reserve in Carmel Valley. Most of the participants arrived on Friday night and therefore had two nights in rather comfortable rooms. Attending were Charis and Peter Bratt, Shirley and Ken Tucker, Mona Bourell, Tom Bertholf, Winonah Kondolf, Lynn Marsh, Clayton Newberry, Mary Simpson, Myles Wilson, Bob Stewart, and Janet and Richard Doell.

We spread out into different areas of the reservation for the Saturday morning field trip. At 1:00 p.m., Mark Stromberg, resident Reserve Manager, spoke to our group about the history of the Reserve and about ongoing research there. Afterwards, we concentrated on the Oak Woodland habitat near our lodging. We by no means covered the more than 2000 acres of the Reserve. After a dinner featuring a delicious soup by Charis Bratt, we held a short business meeting followed by an amazing four-projector slide show by Richard Doell.

Bob Stewart

**April Field Trip to Morro Bay, Monterey County, California**

On the weekend of April 20 and 21 CALS members converged on Morro Bay to observe the lichens of the area. Attending were Dennis Sheridan, Shirley Sparling, Mona Bourell, Janet and Richard Doell, Cherie Bratt, Darrell Wright, Bob and Kathy Stewart, Beth Sampson, Jeanne Larson, Shirley and Ken Tucker, Bill Hill, Brian Ali, and Herb Saylor. Many arrived Friday evening, camping at Morro Bay State Park and staying at nearby motels. After breakfast at the campground, we formed a caravan to a "vacant" lot across from Los Osos Junior High School in Baywood Park, a small community just south of Morro Bay.

The location was an elfin forest slated for development. Besides being an Indian midden site (with shell mounds visible by the roadside), this area adjacent to the Natural Preserve at the mouth of Los Osos Creek



sported a great variety of vascular plants, lichens, and wildlife. Immediately upon stepping between the shrubs we came upon a horned lizard sunning itself. Brian Ali and Dennis Sheridan, the entomologists amongst us, found several butterflies and many insects. Major shrubs in the area were *Ceanothus* and *Salvia mellifera* (Black Sage), as well as small shrubby individuals of *Quercus agrifolia* (Coast Live Oak) and *Arctostaphylos* (Manzanita). Cherie Bratt cautioned us to look for two lichens in particular: *Sulcaria isidiifera*, endemic to only a restricted area here and looking like pale tan *Bryoria* with isidiate splits in the branches, growing on shrubs; and *Cladonia firma*, endemic to Europe and in North America found only here. It resembles last night's popcorn strewn on the ground. The *Cladonia* with at least four other lichen species was quite common at the base of small shrubs, but the *Sulcaria* was VERY scarce and took a sharp eye to find. *Hypogymnia mollis* with its laminal soredia was a treat for many of us. It is common on twigs of shrubs here. There were other Hypogymnias, including a probably yet undescribed species. There was *Heterodermia leucomelos forma albociliata* on shrubs, *Pertusaria santamonicae* on the oaks, and the fine lacy fog form of *Ramalina menzesii*. *Usnea rubicunda* was abundant, and *U. wirthii* and *U. mutabilis* (later identified by Doris Baltzo) were also present.

After lunch at the campground we scanned the wind blasted rocks above the park museum overlooking Morro Bay, finding *Dimelaena radiata*, *Niebla*, and *Thelomma* on the rocks, and *Dendrographa leucophaea forma minor* tucked in a hollow. *Leprocaulon microscopicum* was at the shaded base of the cliffs, and *Schizopelte californica* and *Niebla cephalota* on trunks of Monterey Cypress (*Cupressus macrocarpa*).

Next we hiked the trails amongst twisted tree trunks in the Los Osos Oaks Reserve where we found ONE beautiful specimen of *Sulcaria isidiifera*. Cherie Bratt had made a thorough study of the Reserve and had a checklist for us to review.

After meetings back at the campground and a satisfying dinner with burritos prepared by Mona Bourell, we gathered at the Community Center for slide shows: Santa Barbara Island by Cherie Bratt, lichen parasites by Shirley Tucker, and Morro Bay area lichens by Dennis Sheridan. It was a long wonderful day. On Sunday, those remaining stopped to observe the lichens in Santa Rita Canyon on the way home. There Herb Saylor collected some *Ramalina menzesii* and *Usnea* with parasites, having learned about it from Shirley Tucker the night before. He gave them to

Shirley, who has sent them to Dr. Paul Diederich in Luxembourg to be identified.

Bill Hill

### SFMS Workshop

Janet Doell led a workshop on lichens for the San Francisco Mycological Society on April 23. After a brief talk, those present (11) worked with sample material to learn lichen structures. CALS members Herb Saylor, Bob Stewart, Louise and Bill Freedman and Lisa Bauer were among the group.

### *Lichens of California* available at reduced price

Mariette Cole, co-author of the book *Lichens of California* and now a member of CALS, has offered to supply members of CALS with this book, now out of print, for \$11.00. Let Janet Doell know if you want one for this bargain price, and she will arrange for the purchase.

### Congratulations!

CALS senior member at 94 years of age, Mrs. Alvena Storm, received the honorary degree of Doctor of Humane Letters from San Diego State University this past May. The honor was awarded in recognition of 40 years of teaching at the University followed by 30 years of remaining active on campus after retirement. Congratulations, Mrs. Storm!

### June Lichen Class

On June 15 and 16 Babara Lachelt again taught an introductory class in lichenology at San Francisco State University for CALS members. The three students present were able to benefit from a lot of personal attention. The Society has many members who describe themselves as beginners, and the Board of Directors arranged for this class to meet their needs. Any insight into why the response was so small would be helpful to the Board in planning future events.

Many thanks are due Dr. Dennis DesJardins at SFSU for making the facilities available to us at no cost. Having a laboratory for the class across the hall from the large lichen section of the H.D. Thiers Herbarium is a big asset for such a class. CALS members who availed themselves of this opportunity were Cheryl Beyer, Barbara Williams and Winonah Kondolf.

## Notes and News

A workshop by Cherie Bratt and Dr. Shirley Tucker was presented at the same location the weekend of July 13-14.

### Revisions to By-Laws

With membership continuing to increase it became necessary to change the organization of the Society, especially with regard to the number of officers. Any change in the By-laws calls for a vote of consent by a majority of the members. You will find a copy of the revised By-laws and a ballot inside this Bulletin. Please mail the ballot to CALS if you wish to voice your opinion. A lack of response will be considered a "yes" vote.

### Dues are overdue!

Membership dues of the California Lichen Society are due and payable from January 1 to March 31. Anyone joining the Society after October 1 will be considered paid through the following year. Those in arrears will have received notice of the fact with this issue of the Bulletin. Dues categories are

Regular	\$15-
Sponsor	25-
Donor	35-
Student or hardship	10-

All categories of members enjoy the same privileges and receive the Bulletin.

### CALS at the Fungus Fair

Several CALS members were involved in preparing a lichen display for the Fungus Fair of the San Francisco Mycological Society last December 10. The theme of the two-table display was "Lichens are Everywhere". Lynn Marsh applied her artistic talents to designing the display and making a large map of the world which hung on the wall behind the tables. One table had information about lichens in general, and Bill Hill again manned his popular microscopes for use by young and old. Lichens from several states, New Zealand, Chile and some European countries were loaned by Bill Hill, Barbara Lachelt and Janet Doell to demonstrate that lichens are ubiquitous.

In the meantime Richard Doell showed his multi-media slide production, "Lichens on Location", three times in the auditorium.

Thanks to Beth Sampson the display was repeated at the Coyote Point Fungus Fair on January 21, where Richard Doell again presented his multi-media slide show.

### Mendocino National Forest Volunteers Needed

Two volunteers are needed to work together on a one-day herbarium search and nine days of habitat reconnaissance in the Forest. They will look for seven species: *Dermatocarpon luridum*, *Hydrothyria venosa*, *Leptogium saturninum*, *L. rivale*, *Lobaria hallii*, *L. oregana* and *L. pulmonaria*. Mileage (\$0.30/mile) and per diem (\$18.00/day) are available. Contact David Isle (916-934-3316) or Barbara Lachelt (416-456-2918).

### Lichen Seminar at Napa, January 6th, 1996

CALS member Ernie Fremont, also of the Napa Valley Chapter of the California Native Plant Society, invited Barbara Lachelt of CALS to give a one day lichen seminar for his chapter's botanical activists. The seminar was held at the Wantrup Nature Preserve, 730 acres of forest and grassland administered by the Land Trust Organization and located about seven miles northeast of St. Helena in Napa County. The event was hosted by CALS member Joe Callizo, Naturalist in Residence at the Preserve.

The "ticket" to the class was a dissecting microscope, and six chapter members were able to join on that basis. Following a brief tape-slide presentation, there was a field walk to the forested part of the Preserve. The rather prolific lichen growth there is on shaded boulders, in pine and oak forest and on very old, decaying fence posts.

After lunch the group met in the residence meeting room, which was set up as a classroom for lab work. The day ended with a donated dinner and sampling of great local wines. Barbara Lachelt's great teaching was much appreciated, as was Joe Callizo's providing the facilities and hospitality.

Ernie Fremont

### CALS Reception for Dr. Tom Nash

Dr. Tom Nash, Professor of Botany and Curator of Cryptograms at Arizona State University gave a presentation on the Sonoran Desert Lichen Project on January 12, 1996, at the UC/Jepson Herbarium, University of California, Berkeley. The introductory lecture

described, among other aspects of the project, its geographic scope: in addition to the lichens of the Sonoran Desert proper, the Project will also include the lichens found in all of the State of Sonora, Baja California, Arizona, and southern California north to Santa Barbara County. Collaborators from 17 different countries are involved with the Project.

Following the lecture, Dr. Nash presented a beautiful and informative slide show of various Sonoran lichens and their habitats. Next, Bill Hill showed a short video documenting his recent visit to Arizona State University. Highlighted in the video were Dr. Nash's lichen laboratory and herbarium facilities. Following the presentations, the California Lichen Society hosted an informal reception for Dr. Nash.

Mona Bourell

### Coming Events

**October 19-20. Field Trip to the Siskiyou National Forest** in southern Oregon. We have invited the Northwest Lichen Guild to join us for this event. Participants will meet at Bear Camp in the northern part of the Forest on the morning of Saturday, October 19, weather permitting. Camping is limited in the immediate area, but more detailed information regarding the camping possibilities will be obtained in August. The town of Agness is an hour's drive to the west over paved roads and has motels and an RV camp.

Be sure to contact one of us if you are interested in this field trip (no need to confirm now) so that we can keep you informed of plans, maps, schedules and other details.

Contact persons:

Cherie Bratt	805-682-4711
Janet Doell	510-236-0489
Veva Stansell	541-247-7153
Bruce Rittenhouse	805-756-0100

**January 18-19. Field Trip and Seminar at Wantrup Preserve in Napa County.** CALS' hundredth member Joe Callizo is the manager of this 730 acre preserve in Pope Valley and has offered us accommodations free of charge. There are beds for 8 in four bedrooms and lots of floor and camping space. There is also a meeting room and lots of lichens to check out. Details will appear in the winter Bulletin.

### President's Report

Having said entirely too much already in this Bulletin, I shall use this space for just one more announcement. CALS is in the process of producing a poster illustrating 21 lichens of California with high quality laser printed photos, which we hope will be on sale within the next few weeks. The photographer is Richard Doell, and the poster is being produced for CALS by Craig Stewart. It will sell for less than ten dollars and should tell the world of our existence and of the beauty of the lichens. It will also be a source of revenue for the Society.

Janet Doell

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