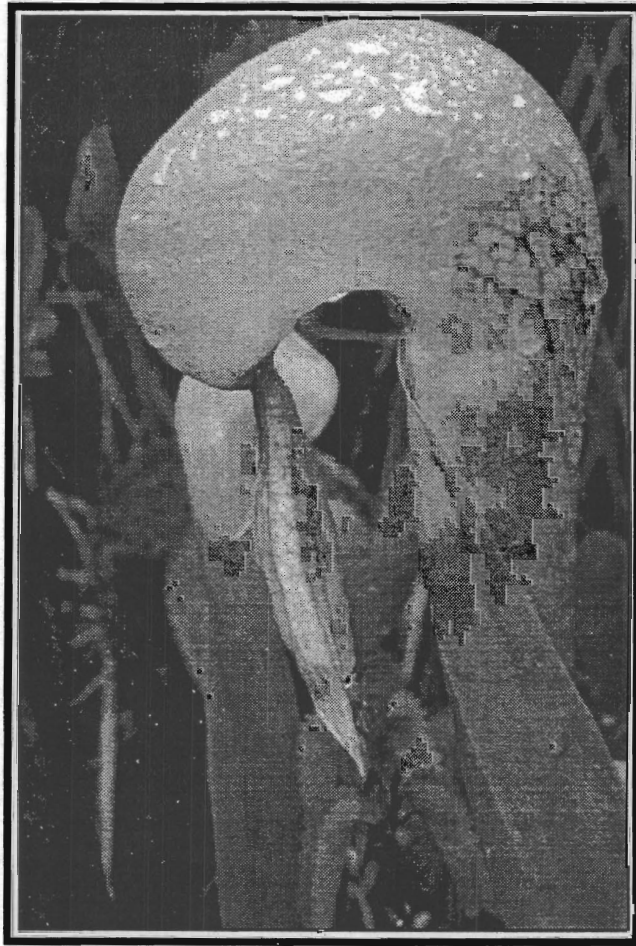


# PROCEEDINGS OF THE FIRST CONFERENCE ON SISKIYOU ECOLOGY

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**Edited by:**

**Jennifer K. Beigel, Erik S. Jules, and Barry Snitkin**

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Hawksw. and *Sulcaria isidiifera* Brodo are good examples of species with very limited ranges along the west coast of North America. These lichens are limited in part by climate. The climate gradients, plus the unusual geology, give the Klamath region potential to harbor narrowly endemic lichens.

#### LICHENS AND THE KLAMATH REGION *Potential for Narrow Endemics*

The climate of the Klamath region involves interesting gradients both from north to south and from west to east. The region lies in a transition zone between the wet temperate climate to the north, in western Oregon, and the drier Mediterranean climate to the south, in California. This gradient allows some mixing of the lichen floras typical of the maritime Pacific Northwest (west of the Cascade crest) and those typical of the Pacific Southwest. From west to east there is a change from a coastal climate with moderate temperatures and high humidity year-round to a continental climate with greater extremes of temperature and more intermittent moisture. There appears to be considerable intermixing of coastal and continental lichen floras in places in the Klamath region, relative to the sharp transition seen over the Cascades to the north. In addition to these gradients, the region has a rough topography from sea level to over 2700 meters (9000 feet).

The most notable habitat characteristic in the Klamath region for vascular plants is the high frequency of ultramafic rocks and soils, mostly serpentine and peridotite. Saxicolous lichen communities (growing on rock) are strongly influenced by rock chemistry (Brodo 1974). Ultramafic geology undoubtedly has a strong effect on the saxicolous lichens in the region.

A number of studies have examined lichen communities on ultramafic rock in Europe (see Purvis and Halls 1996). These studies typically find rather low species richness relative to other rock types. Some have speculated that this is due to the low tolerance that most lichens have for the toxic metals found in ultramafic rocks. The European studies have also noted that lichen communities on ultramafic rock have an unusual composition. Saxicolous lichens can be grouped into two general substrate categories: calcicolous species, that grow on calcium rich substrates with a relatively high pH, and siliceous species, that grow on other rock types with generally lower pH. Ultramafic rocks host a mix of calcicolous and siliceous species. The presence of calcicolous species is odd, because ultramafic rocks typically have very low calcium content. One could speculate that they may be responding to the relatively high pH of the rock. These studies have also found several species that are limited to serpentine. It is

unknown if these 'serpentine endemics' have evolved a special adaptation to the chemistry of serpentine.

In North America there have been only three studies of lichens on ultramafic substrates. In Quebec, Canada, a fairly high species richness of lichens, 157 species, was found on serpentine (Sirois et al. 1988). A study of the lichen community on serpentine rock on a seashore in the San Juan islands of Washington identified 61 species and found numerous specimens that could not be identified (Ryan 1988). It is unknown whether these specimens are exhibiting unusual morphologies of known species, or are undescribed species. One study was made on lichens on serpentines in California (Sigal 1989), with locations from San Luis Obispo County north to Mendocino County, reporting a total of 76 species across all locations. All these locations are south of the Klamath region as it is defined in this paper. None of the studies in North America have reported serpentine endemics.

It is possible that lichens endemic to the Klamath region exist, but have yet to be found. Several professional lichenologists have traveled through the region and done some collecting, but there have been no scientific studies of the lichens in this region. Current knowledge of the lichen flora of the region is similar to the knowledge of the vascular plant flora at the beginning of this century. Except for this paper, only three other reports (none of which are published in a scientific journal) are known to exist on lichens in the Klamath region (Wagner 1996a and 1996b, Stansell and Peterson 1997). These reports give only species lists with little habitat data for small areas in the Siskiyou mountains. Lichenology in the Klamath region has great potential for scientific research and is open for discovery.

#### *Importance of the Klamath Region to Distributions of Selected Lichens*

*Bryoria tortuosa* (G. Merr.) Brodo & D. Hawksw. ranges from the San Francisco Bay area of California, north to central British Columbia, and east to Idaho (Brodo & Hawksworth 1977, McCune & Geiser 1997), with a few disjunct populations in Europe (Holien 1986). Although this species is known from many locations scattered throughout its range, it is generally found in extremely low abundance, lending it strict survey and manage requirements in the Northwest Forest Plan (U.S.D.A. & U.S.D.I. 1994). However, a population with large biomass has been found near Weaverville in Trinity County, California, in the southern portion of the Klamath Region. There it grows abundantly in mature *Pinus ponderosa* growing in open, well-lighted situations.

*Umbilicaria phaea* var. *coccinea* Llano is a saxicolous lichen, which may warrant species level taxonomic status. It typically grows on basalt in river

valleys. A large population of this lichen grows along the Klamath and Shasta rivers at the eastern border of the Klamath region. Several small disjunct populations occur farther to the north and east in south-central Oregon and central Washington. This taxon may more closely approximate a Klamath region endemic than any other known lichen taxon.

*Umbilicaria lambii* Imshaug and *U. rigida* (Du Rietz) Frey are saxicolous lichens not previously reported on the west coast south of Washington and Oregon, respectively. These species were found on ultramafic rock near Sanger Peak in Del Norte County, California, during a field trip sponsored by the Conference on Siskiyou Ecology.

*Sulcaria badia* Brodo & D. Hawksw., a rare epiphytic lichen (Peterson et al. *in review*), was found on *Pseudotsuga menziesii* north-east of Selma, Josephine County, Oregon. This is only the fourth known population of this potentially endangered species.

The specimens of *Sulcaria badia* (EBP# 2473), *Umbilicaria lambii* (EBP# 2485), and *U. rigida* (EBP# 2494) have been placed in OSC.

#### LICHENOLOGY IN THE KLAMATH REGION

This paper presents a preliminary checklist of lichens for the Klamath region (Table 1). This list is by no means complete, even for the more common macrolichens; it is intended as a basis for a more comprehensive checklist. Included are 83 genera and 218 species, one species includes two varieties. Nomenclature follows Esslinger and Egan (1995) and McCune and Geiser (1997). Sources for the checklist are Wagner (1996a and 1996b), Stansell and Peterson (1997, except *Coccotrema pocillarium*, a misidentification), and the author's personal collection. The twenty species that the author has identified from ultramafic substrates in the region are noted.

Modern lichen floristic works exist for California (Hale & Cole 1988) and for Oregon and Washington (McCune & Geiser 1997). These will provide a strong base for progressing with lichenology in the Klamath Region. While these books are excellent resources for the highly visible macrolichens in the region, only Hale & Cole attempt to cover crustose lichens. The taxonomy of crustose lichens is poorly understood at present. Even crustose taxa that are well understood are often very difficult to identify to species, even for experts. Unfortunately much of the saxicolous lichen flora consists of crustose species. While future research on lichens in the Klamath region will likely focus on the macrolichens, attempts should be made to work with crustose species when possible.

#### ACKNOWLEDGMENTS

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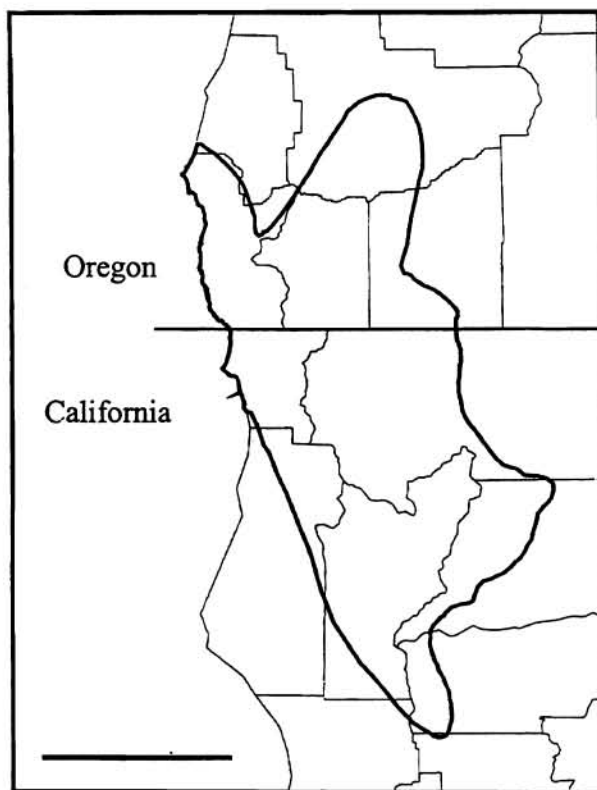


FIGURE 1. The Klamath Region in California and Oregon as defined by geology (Diller 1902). Bar equals approximately 100 kilometers.





