Newly Identified California Moss in Mountain Fens!

PHILONOTIS BREUTELIOIDES (BARTRAMIACEAE, BRYOPHYTA), A NEW MONTANE FEN MOSS SPECIES ENDEMIC TO CALIFORNIA

Authors: James Shevock and Blanka Aguero Madroño

Summary by Sonya Pendrey, UCSC Environmental Studies Graduate

Significance: Big and small, vascular and nonvascular, it's important for California residents to be familiar with endemic California plant species. Bringing the general public's attention to this newly documented moss, *Philonotis breutelioides*, is a great way to encourage knowledge and record keeping of California species through both official research and community science to protect biodiversity in the face of climate change.

California Academy of Sciences' researchers James Shevock and Blanka Aguero have been working to categorize mosses. These are plants that don't grow flowers or rely on specialized tubes to transport water and nutrients. Rather, mosses reproduce via spores and moss cells directly absorb moisture and minerals.

In 2022, the researchers documented a species of moss that is newly recognized by Western science as *Philonotis breutelioides*. *P. breutelioides* can be found in low-lying marshy wetlands fed by groundwater, called fens, in the southern Cascades, Klamath, and southern Sierra Nevada mountain ranges.

FIG. 1. Photo of *P. breutelioides* fen habitat. Grassy Lake Fen in Plumas National Forest by Catie and Jim Bishop from the U.S. Forest Service.

If you were to go for a hike in Plumas National Forest and come across a fen like the one above, you'd be in the right place to spot *P. breutelioides*. You'd have to keep your eyes peeled for tufts or mats of tan-brown moss with a slight red tinge about 2.3–5 cm tall, almost like a shag carpet!

FIG. 2. Macroscopic image of *Philonotis breutelioides* (Shevock and Blanka 2023).

Compared to other mosses in Philonotis, *P. breutelioides* has leaves that narrow into a pointed tip with slightly curved shoot tips, leaf bases with obvious folds, and long thin-walled cells in more numerous rows between the leaf center and edge.

For Shevock and Aguero, deciding where to place this species in the moss family tree was difficult because it's similar to two larger species groups: *Philonotis* and *Breutelia*. By looking at genetic information, Shevock and Aguero found a relationship between *P. breutelioides* and a previously described moss species, *P. fontana*. This allowed the researchers to place *P. breutelioides* in the *Philonotis* group. Although *P. breutelioides* has been identified, there still remains much mystery around this group of mosses and their relation to one another.

Much of California's biological diversity has been recorded but often smaller organisms like mosses are overlooked in documentation surveys. In the face of climate change, habitat degradation, and many other circumstances that threaten California's biodiversity, identifying and documenting moss species is important because it provides a record of life that can support conservation efforts of larger ecosystems. Specifically, fen habitats are impacted by grazing herd and pack animals. Concern for *P. breutelioides* could lead to further environmental protections or different management decisions in the areas this moss has been documented.