

CAREER: Leaf microclimates and plant-insect interactions

Plant-eating insects make up over one quarter of all macroscopic organisms, and the plants they eat another quarter. Little is known, however, about the factors influencing which insects occur on which plants. The proposed studies examine a set of questions about how leaf microclimates—the temperature and relative humidity adjacent to a leaf's surface—influence insect-plant associations. In particular, the studies are structured by three questions. First, how different are leaf microclimates from nearby macroclimates (the conditions that a meteorologist would call “climate”)? Second, how do insects interact with available microclimates? This section focuses both on females searching for places to lay eggs and on eggs and larvae in different microclimates. Third, how does the effectiveness of other, better-known plant defenses (secondary compounds and trichomes) depend on leaf microclimate? This application of environmental biophysics to the study of plant-insect interactions will illuminate basic questions about insect ecology, and it will serve as a platform for understanding effects of global climate change on insect herbivores, including crop pests.

The work will be carried out in the context of a new educational initiative at the University of Montana—the **Montana Program on Insects in the Environment**, or M-PIE. M-PIE will focus on three areas. First, M-PIE's core will be an upper-division undergraduate class on the environmental biophysics of plant-insect interactions. This yearly class will prepare students to be active collaborators on the projects. Second, M-PIE will establish formal ties to University of Montana's Project TRAIN (Training American Indians in Environmental Biology), and one environmental sciences student from Salish Kootenai College will participate in M-PIE every year. Third, M-PIE will support local high schools in Missoula by training 2 teachers in Years 2 – 4, with the goal of helping them develop teaching units on insect-plant biology.