

SUMMER RESEARCH EXPERIENCE FOR UNDERGRADUATES ON SEXUAL SELECTION IN INSECTS

This REU is funded by the National Science Foundation and provides a 10-week paid research opportunity for students to engage in evolutionary ecology research with insects in California

11 June 2021 to 20 August 2021

Research topic: Reproductive trade-offs between costly sexually selected weapons and other expensive tissues in three species of Coreoidea (Insecta: Hemiptera)



The above image shows the extravagant hind legs of a male in a species of *Hyalymenus*. © Ummat Somjee

In many species, males engage in competitive behaviors with weapons for access to high-quality territories and mates. However, weapons may be costly to develop and maintain and likely compete with other traits for limited resources. Furthermore, when females mate with multiple males, investing resources in weapons may not significantly increase reproductive success. In such cases, males may invest more resources in reproductive tissues, such as testes size, to compete with sperm from other males in the female reproductive tract.

Leaf-footed bugs (Hemiptera: Coreoidea) have become a model in studying trade-offs between weapons and testes. Males in several species use their hind legs as weapons, which they can naturally self-amputate (autotomy) when they are injured or to escape predators or a bad molt. If a male were to lose a weapon, would he be able to reallocate resources towards increased testes growth? Would the loss of a hind leg also trade-off with other expensive tissues, like flight muscles? What happens in species that have hind legs that are not used as weapons? This study seeks to answer these questions in three species of leaf-footed bugs, which is part of a larger comparative study analyzing trade-offs between weapons and testes across the family.

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Qualifications & Responsibilities

We are seeking **three** undergraduate students that are committed, reliable, independent, and team-oriented with a positive attitude and great work ethic to conduct this study. Some previous research experience and coursework in biology are preferred, but no formal experience with insects or insect science is required.

Only US citizens and permanent residents enrolled in an undergraduate degree program and that will not graduate prior to the completion of the REU will be considered.

Students must: 1) be comfortable handling live and dead insects, 2) be able to conduct fieldwork in very hot and dry conditions, 3) be extremely detail-oriented, 4) take initiative in learning the study organism and research project, 5) understand what needs to be done and complete tasks with maximal effort, 6) be able to perform frequent computer-based work and fieldwork, 7) exhibit exceptional note-taking and organizational skills, and 8) be independent once trained.



Students will be trained in fieldwork, insect husbandry, rearing, autotomy, imaging, dissections, and measurements. Students will also be required to dedicate part of their weekly research hours to one-hour lab meetings per week, attend weekly virtual science seminars at affiliated institutions, and present a summary of project findings or primary scientific literature towards the end of the REU.

Research Team

Drs. Michael Forthman and Christine W. Miller are committed to excellence in the mentoring of undergraduate researchers. We have collectively mentored over 150 undergraduates in the past twelve years. Undergraduate students have authored peer-reviewed publications, presented at local and national meetings, and won local and national awards. The successful applicants will work with the research team throughout the REU. Please visit www.millerlab.net and mforthman.weebly.com for more information on the research team.

Application Deadline is March 15, 2021

Interested applicants should submit a CV or resume, unofficial transcripts, contact information for two references, and a 500-word (or less) statement of interest to Dr. Michael Forthman (mforthman@cdfa.ca.gov). It is advised that these documents are submitted as a single PDF.

COVID-19 AND TRAVEL DISCLAIMER

Due to the continued threat of COVID-19 and evolving safety guidance, this REU required a change in project location and budget. As a result of this, airfare for students to travel to/from California from outside the state will not be covered under REU grant funds. However, a competitive stipend is available per student, and local, project-related travel within California will be covered by the REU grant funds. Furthermore, local, state, and federal COVID-19 guidance will be followed, and successful applicants traveling from outside California may be required or asked to quarantine in California approximately 10 to 14 days (subject to change based on future safety guidance) prior to the start of the REU project.

