

**Research Opportunities for Undergraduates**

**Fall 2024 and Spring 2025**

(also check http://eeb.uconn.edu/faculty/)

**Bagchi Lab:** We research how interactions between organisms (e.g. plants and their herbivores) shape communities and how those interactions might be affected by human disturbance. We work in both temperate and tropical forests. My lab has opportunities for internships in the summer, primarily looking at how interactions between plants, caterpillars and birds are modified in forest fragments around Connecticut. Interns will receive training and gain experience in identification of plants, insects and birds, forest surveys, rearing of caterpillars, macrophotography and data analysis. During the semester we have opportunities for students to gain experience with data management and analysis and field work at the start of the fall semester and the end of the Spring semester. There are also opportunities to develop individual projects on plant-caterpillar and plant-fungal interactions - please email robert.bagchi@uconn.edu if you are interested.

**Bolnick Lab:** (https://bolnicklab.wordpress.com) We study how ecological interactions between species drive evolution of genetic diversity within populations, divergence between populations, and the origin of new species. At present, our main focus is on how ecological interactions between parasites and their hosts (specifically, a tapeworm and fish) drive evolution of host immunity. For this work, we combine field research (Alaska, British Columbia, and soon the northeast) with laboratory experiments, genetics, immunology, cell biology, and behavior. We are open to undergraduates who want to gain experience by assisting with ongoing projects or animal care, as well as students who wish to embark on independent research projects of their own design. We also have a project on the evolutionary genetics of yeast, both in lab-evolved populations and in apple orchards around CT, which undergraduates could readily get involved with and start independent projects. Students involved through the lab may be engaged with DNA extraction and sequencing, dissections of fish specimens, experimental immune assays with live fish, field work, or computational analyses. Contact: [daniel.bolnick@uconn.edu](mailto:daniel.bolnick@uconn.edu)

**Bush Lab:** We study the history of life using fossils, with a focus on biodiversity change and mass extinctions in marine ecosystems. We also examine long-term changes in marine ecology. Contact me to discuss possible projects.

**Caira Lab:** The research conducted by undergraduate students in my lab typically involves the description of new species (and occasionally genera) of tapeworms that parasitize the digestive system (i.e., spiral intestine) of a variety of sharks and stingrays (i.e., elasmobranchs) from around the world. Each student typically focuses on describing the community of species that parasitize a particular host species of their choosing. Students gain competence in the preparation of whole mounts and histological sections for light microscopy as well as in the

preparation of specimens for scanning electron microscopy. The work involves a substantial amount of time spent at a microscope studying and measuring whole mounts of tapeworms and at the scanning electron microscope characterizing the surface features of their target worms. They engage in the various steps required for the formal description of tapeworm species new to science and the basics of taxonomy and systematics. In most cases students also shadow graduate students to conduct the molecular work required to generate sequence data to confirm the novelty of their species. Depending on the complexity of the system, student projects often expand to include other elements such as phylogenetic relationships, characterization of mode of attachment, or exploration of the ecological elements of these intriguing host/parasite systems.

**Dagilis Lab:** We study how interactions between genes (epistatic, physical, regulatory or co-evolutionary) impact the process of evolution more broadly, with a focus on speciation and hybridization. Work is conducted primarily by utilizing publicly available data, developing bionformatic pipelines and generating novel mathematical models. Students in the lab will pick up computational and mathematical skills, while learning more about what makes large scale evolutionary processes tick. Students interested in working in the lab are welcome to inquire at adagilis@uconn.edu.

**Davis Lab:** We study how mammal distributions and population dynamics are impacted by environmental change and interactions with other mammal populations such as predation and competition. We complete camera trap surveys of mammals in CT every autumn and normally have space for 4-6 undergraduates to complete independent studies (for 2 credits) while contributing to that endeavor. Foundational ecological knowledge and access to a vehicle for transport to and from the field site (20 minute drive from UConn campus) are required. Such independent studies have the potential to lead to honors thesis projects upon agreement between the instructor and student.

**Diggle Lab: (**[**https://diggle.lab.uconn.edu/**](https://diggle.lab.uconn.edu/)**)** We study “eco-evo-devo”, the intersection of development, ecology, and evolution of plants. Current projects include developmental responses of arctic plants to climate change and developmental diversification of flowers and fruits. Approaches range from field and greenhouse experiments, to various microscopy techniques.

**Garcia-Robledo Lab:** The García-Robledo lab studies plant-insect interactions in a changing world. Research opportunities are available for undergraduate students. We are starting a new project on how global warming is affecting pollination. Honor thesis opportunities available. http://carlosgarciarobledo.org/UCONN/

**Goffinet Lab:** We study the evolution and systematics of bryophytes (mosses, liverworts, and hornworts) and lichens (see http://bryology.eeb.uconn.edu). We welcome motivated students and will seek to match their interest with need based opportunities in our lab. Past undergrads have completed projects addressing a variety of questions and acquiring experience in DNA extraction, amplification and sequencing, flow cytometry, analysis of morphological differentiation following genome duplication, sterile cultures techniques for moss propagation, and lichen barcoding. Current student projects include: **1)** a revision, based on DNA sequences and chemistry, the diversity of two genera of lichenized fungi in Chile, and **2)** a survey of the ability to induce whole genome duplications in mosses. **3)** We are also currently in need of students interested in describing variation in secondary chemistry of lichenized fungi via thin layer chromatography as part of a study on lichen diversity in southern Chile and the Pacific coast. **4)** We are seeking a motivated student that will be on campus in the fall/spring (and possibly in the summer) to engage in DNA barcoding lichen symbionts, to identify both the algal and fungal partners to better understand the specificity of this obligate symbiosis. **5)** Finally, I am looking for a student interested in what I tentatively call *‘modern scientific colonialism’*, pertaining to the fate of plants (and likely other organisms) collected in other countries. This project would consist of a comprehensive literature survey of species described new to science from exotic places, in the last five or more years and record where the specimens are kept. Interested students should contact bernard.goffinet@uconn.edu.

**Jockusch Lab:** The Jockusch lab studies phenotypic evolution primarily in arthropods and salamanders, aiming to understand how evolutionary, developmental and ecological factors interact to create these patterns. We use a diversity of techniques ranging from field sampling to RNA interference to DNA sequencing. We are always interested in hearing from undergraduates looking to get involved in research, especially students in their freshman or sophomore year. Current opportunities include assessing developmental phenotypes in treehoppers, milkweed bugs, flour beetles, and lace bugs, and looking at correlated evolution in treehoppers. After gaining some research experience, we encourage students to develop independent project ideas, and recent students have been successful in obtaining SURF funding to pursue these. Interested students can contact the Jockusch lab at [elizabeth.jockusch@uconn.edu](mailto:elizabeth.jockusch@uconn.edu).

**Knutie Lab:** Our lab uses experimental approaches with wild birds to determine the effects of parasites on hosts, especially during their early life stage. We also explore the evolution and development of host defense mechanisms against their parasites, at the individual, population, and species level, especially in the context of environmental change. Specifically, we study the effect of an introduced avian vampire flyon birds in the Galapagos, how birds defend themselves against the flies, and methods of controlling the fly. We also use coordinated, experimental approaches to determine how environmental factors affect interactions between nest parasite taxa (blowflies, fleas, mites) and their box-nesting host, eastern bluebirds across an environmental gradient. Furthermore, we are determining whether and how different stages of early-life host immunity and the thermal breadths of parasites mediate the effect of local environmental factors on host-parasite interactions, thus creating geographic mosaics. For fall 2025, we will be looking for 1 (paid) student that has at least 2 years left in their undergraduate career who are majoring in EEB or a related field, but we will also consider honor's thesis and work study students. Students also have the opportunity to apply for SURF funding for an independent research project, if interested. [sarah.knutie@uconn.edu](mailto:sarah.knutie@uconn.edu) <http://www.knutielab.com>

**Kremer Lab:** We study how environmental change affects the ecology and evolution of phytoplankton - photosynthetic microbes that are critical to marine and freshwater ecosystems. Basically, we want to know how the traits of diverse phytoplankton species help them to respond to changing conditions. Experimentally, we quantify phytoplankton traits in the lab, study their physiology, and explore how they interact with each other. We also use mathematics to develop theories and models to understand, explain, and predict interactions between ecology and evolution in changing environments. Current projects include studying cold-loving phytoplankton from the Arctic Ocean, dormancy in species from mountain lakes, phytoplankton-bacteria mutualisms, and more. Students with interests in biology or mathematics are welcome. Opportunities to join the lab on the experimental side are limited for fall 2024, although there are openings for students interested in computational/modeling work. Additional opportunities are possible in the spring, and for developing (funded) summer projects. Interested students should check out the lab website [colinkremer.wordpress.com/](http://colinkremer.wordpress.com/) and contact [colin.kremer@uconn.edu](mailto:colin.kremer@uconn.edu)

**Kuprewicz Lab:** We work to understand how plant-mammal interactions scale up to affect forest-level processes and how human activities (*e.g.*, climate breakdown, hunting) alter these interactions and their resultant effects on natural communities. While most of the lab’s projects are based in the Neotropics (Mexico, Costa Rica, Peru), there are ample opportunities for local undergraduates to work on projects in Connecticut. We have recently started a project affiliated with several collaborating labs in EEB, the Connecticut State Museum of Natural History, and the UConn Biodiversity and Research Collections. In this project, we aim to understand how terrestrial mammals affect the fates (dispersal and predation) and survival of differently-sized seeds in accordance with animal physiology (*e.g.*, gape width, feeding stance, bite force). Within this project, and also using samples from the tropics, we are pioneering a novel method for eDNA (=environmental DNA) collection using artificial seeds (aka. “science cookies”). Ideally, we will use this molecular method to explicitly identify what species of elusive mammals are interacting with seeds and how their behaviors impact seed survival and death. Interested students can reach out to: [erin.kuprewicz@uconn.edu](mailto:erin.kuprewicz@uconn.edu)

**Paul Lewis Lab:** My lab develops statistical methods for estimating phylogenies (genealogies relating species and higher groups to one another) and quantities related to phylogenies (such as the phylogenetic information content of DNA sequences). If you are interested in both mathematics and biology, statistical phylogenetics may be just what you are looking for! Some background in both statistics and computer programming is required, but please inquire if in doubt.

**Rubega Lab:** We study a diverse array of birds, across a variety of habitats; all our work is unified by an interest in answering the questions How Does That Work? and How Does it Matter? We approach questions in avian conservation, ecology and evolution mechanistically, using tools from animal behavior, functional morphology (anatomy), biomechanics, and physiology, and as necessary to produce explanations for why birds look, live and act as they do. Undergraduates generally join the lab on work study, for independent study credit, or for honors projects; in 2024/25 there is some opportunity for paid technician work, as well. Students in the lab gain skills, depending on their interests, that may include field skills such as censusing and trapping wild birds, along with data entry and proofing, dissection, specimen preparation, microscopy, digitizing and motion analysis. Current projects in the lab include colonial seabird breeding biology on an island in Long Island Sound, where we are studying breeding behavior, nest site characteristics, survival and movement of chicks, and disease in two threatened species of tern. We also study the physical and mechanical properties of feathers, with particular interest in how the structure and materials of feathers contribute to waterproofing and thermoregulation. We welcome students interested in addressing barriers to equitable participation in ornithology and birding. We support independent thinking in undergraduate researchers, and work to help students become researchers in their own right.

**Schultz Lab:** We study the ecology and evolution of freshwater and marine fishes. We are full for the fall semester but may have space for the spring semester. We are interested in honors students who are looking for a lab to work in for a thesis project. We are also frequently looking for students who are not planning on a thesis project but would like to enroll in independent study. We announce these opportunities in EEB classes, but if fish are your thing just contact me.

**Simon Lab:** We use phylogenetic trees to answer questions related to the origin, spread, maintenance, and documentation of biological diversity. The ultimate goal of my group is to understand speciation, biogeography and interactions at species' contact zones. The information we produce is valuable for phylogenetics, evolution, conservation biology and biodiversity preservation. We use cicadas as model organisms. We work in North America to understand how life history changes can affect speciation and in New Zealand to understand the influence of landscape and climate change on species biodiversity. We work on cicadas worldwide to understand how various subgroups originated and spread around the world during the wide climatic swings of the last 65 million years. We are also studying the unique manner in which bacterial and fungal endosymbionts coevolve with cicadas, including domestication of former parasites, unprecedented lineage splitting and accumulation of pseudogenes. Finally, we plan to explore how the endosymbiont consortium--made up of the host cicada along with obligate, and facultative microbes and the gut microbiome--has influenced colonization and diversification worldwide. We currently have three undergraduate research students in our lab. Contact me to inquire about future opportunities.

**Trumbo Lab:** At the Waterbury campus we offer research in burying beetle behavior and ecology. Our recent focus has been on the regulation of brood size. How do parents adjust the brood size with the size of their resource? Does population density matter? Does age matter? What is the mechanism of plasticity in brood size regulation? Does it involve changes in methylation patterns? Students can work in the lab for independent study credit, as a work-study student, or paid off of a grant.

**Urban Lab:** We study how ecology and evolution interact to determine the diversity of life and its threats from human activities like climate change. Our specific questions include: How will climate change alter biodiversity and can we predict these changes? How does evolution affect community diversity and dynamics? At what scale do populations adapt to the environment? We work at a variety of levels including field work, experiments in the field and the lab, and even using computer simulations. Our main study systems are diverse, but generally wet: temporary pond amphibians in New England, fish in Arctic Alaska, and zooplankton in coastal Maine rock pools. We are interested in working with students who want to study populations and communities of any kind in synergistic and creative ways. For examples of our research, see our website: [https://ecoevolutionlab.eeb.uconn.edu/](https://nam10.safelinks.protection.outlook.com/?url=https%3A%2F%2Fecoevolutionlab.eeb.uconn.edu%2F&data=05%7C01%7Cdana.drake%40uconn.edu%7C10798b4592414464542408dbab0dc629%7C17f1a87e2a254eaab9df9d439034b080%7C0%7C0%7C638291847873760698%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=FtzyrZtnHP1ShMdFGLsfykpOrbcIggpR4kZirtwraK8%3D&reserved=0)

We offer a range of opportunities for course credit or pay and are always looking for motivated and independent thinkers to join the lab group.

**Wagner Lab:** Members of my lab are generally interested in the biosystematics and conservation of insects and terrestrial arthropods. Recent projects relating to invertebrate conservation have examined the importance of early successional habitats to invertebrates, insect decline, pollinator (bee) diversity, forest fragmentation, rare and endangered species, and threats to arthropod biodiversity. Several lab activities are anchored to caterpillars, most of which relate to an on-going effort to write a field guide and natural history to *Caterpillars of Western North America*. This latter project includes travel opportunities for students. Unpaid honors and independent study opportunities are available for 1-2 students a semester. The lab normally has 1-2 paid, part-time opportunities for undergrads during the school year, and full time positions over the summer. Most undergrads start on a part-time volunteer basis. Hiring preference, especially for full-time summer employment, is dependent on previous experience and relevant coursework. Contact me directly if interested!

**Wegrzyn Lab:** The Plant Computational Genomics lab develops software solutions to integrate, visualize, and analyze genetic, phenotypic, and environmental data. We utilize high throughput sequencing and genotyping technologies to evaluate the impact of climate change and invasive pests and pathogens on tree populations in North America. With knowledge gained from these integrated approaches, we aim to improve forest health. The lab also develops software to solve challenges associated with genome assembly, gene annotation, and gene expression analysis. We offer both paid and volunteer undergraduate research opportunities. Undergraduates are also encouraged to work with us on independent projects that can be supported through the OUR's IDEA or SURF programs. More information on current projects is available at: http://plantcompgenomics.com

**Yuan Lab:** The Yuan lab studies the genetics, development, and evolution of flower diversity – – how and why flowers become so beautiful and diverse. We use a wide range of techniques to address these questions, from greenhouse crosses to gene expression analyses, from computational analysis of genome data to transgenic manipulations, and from microscopy to pollinator observations. Typically undergraduates work with us as independent study students. https://monkeyflower.uconn.edu/

**UConn Botanical Conservatory:** The UBC offers volunteers an opportunity to work with our extensive plant collections. Volunteers typically assist keeping the teaching collections tidy; updating inventory and flowering databases; inspecting for pests and beneficial insects; and propagating and repotting plants. Advanced volunteers may help lead tours for outside groups (K-12, seniors, garden clubs). A small number of paid student labor positions involving more advanced horticultural activities in the collection are often recruited from the existing volunteer pool. Students interested in volunteering in the greenhouses in the spring should contact manager Meghan Moriarty (meghan.moriarty@uconn.edu) for more information. http://florawww.eeb.uconn.edu/

**EEB Biodiversity Research Collections:** Research on specimens in the collections can include identification and curation of a specific group of organisms, or testing a specific hypothesis, through Independent Studies of variable credits; students can also receive basic training in museum techniques. We recently received a National Science Foundation grant to help digitize our bee collection, and are currently hiring undergraduate students to assist. Contact Katrina Menard (invertebrates), Sarah Taylor (plants) or Erin Kuprewicz (vertebrates) for more information. http://biodiversity.uconn.edu/people/