Research Opportunities for Undergraduates for Fall 2020 and Spring 2021
*if modality is not indicated contact the instructor / lab leader directly!
(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 paid/unpaid 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.

Modality: in-person (fieldwork) or online (data management and analysis)

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.

Modality:

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.

Modality:

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.

**Modality:**

**Diggle Lab:** 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.

**Modality:**

**Garcia-Robledo Lab:** The García-Robledo lab studies plant-insect interactions in a changing world. Research opportunities are available for undergraduate students. Together with undergraduate students we are building equipment to assess insect physiologies, survival and fitness under projected global warming. We are starting to rear insects in the laboratory to determine insect physiological and demographic responses to global warming.  
http://carlosgarciarobledo.org/UCONN/

**Modality:**

**Goffinet Lab:** We study the evolution and systematics of bryophytes (mosses, liverworts, and hornworts) and lichens (see http://bryology.uconn.edu). Past undergrads have done 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. We welcome motivated students and will seek to match their interest with need based opportunities in our lab. We are also currently in need of students developing and maintaining our sterile culture collections. For this spring we are seeking a motivated student that will be on campus in the spring (and possibly in the summer) to engage in barcoding lichen symbionts, to identify both the algal and fungal partners to better understand the specificity of this obligate symbiosis. Interested students contact bernard.goffinet@uconn.edu.

**Modality:**
**Jockusch Lab:** The Jockusch lab studies phenotypic evolution in arthropods, salamanders and skinks, aiming to understanding 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, including especially students in their freshman or sophomore year. Current opportunities include assistance with scoring salamander phenotypes from photos and analyzing video battles of social insects. 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.

*Modality:*
- Video analysis of social insects= hybrid, with more in-person at first, then transition to virtual/ at-home work

**Kuprewicz Lab:** We work to understand how plant-animal 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 undergraduates to work on projects in Connecticut. We have recently started a local project affiliated with several collaborating labs in EEB, the Connecticut State Museum of Natural History, and the UConn Biodiversity and Research Education Collections. In this project, we aim to understand how forest fragmentation affects the fates (dispersal and predation) and survival of differently-sized seeds. 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.

*Modality: In-person (lab work/museum work), virtual (databasing)*

**Knutie Lab:** The overarching theme of the Knutie lab explores how animal hosts defend themselves against parasites, particularly in response to environmental change. Specifically, we study on the effect of an introduced parasitic nest fly *Philornis downsi* on birds in the Galapagos, how birds defend themselves against *P. downsi*, and methods of controlling the fly. We also study the role of host-associated gut microbiota in disease ecology of frogs and, in particular, whether early-life microbiota of hosts mediate the effect of environmental factors, such as pollutants, on later-life resistance to infections. The lab uses a combination of field and molecular techniques for this research. I am interested in students that are early in their undergrad (~sophomores) who are majoring in EEB or a related field but also would consider taking on honor's thesis students.

*Modality:*
**Louise Lewis Lab:** We study the diversity of microscopic algae in aquatic and terrestrial habitats, the adaptations of algae for living in deserts, and the symbiosis of algae with fungi and animals. Past undergraduate researchers in my lab learn how to grow algae, do DNA sequencing and data analysis, and light and fluorescence microscopy. Students are guided in grant writing to fund their research, they participate as authors on scientific papers, and may write an Honors thesis. Most students start in the lab first through volunteering and then independent study. We are currently looking for undergraduate students to help with identification of algae from Chile, Malaysia, South Africa, and Namibia. Similarly, we are looking for help with a project barcoding the algae which are found in lichens to better understand the specificity of this obligate symbiosis. We will teach you how to grow algae, conduct microscope photography, extract DNA, run PCRs and sequencing reactions, edit sequences, and make phylogenetic trees. Interested students should contact louise.lewis@uconn.edu.

**Modality:**

**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 looking to find ways of applying your interest in mathematics to biology, statistical phylogenetics may be just what you are looking for. Some background in both math and computer programming is helpful, but please inquire if in doubt - the main ingredient is interest and motivation.

**Modality:**

**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 functional morphology (anatomy), biomechanics, physiology, and animal behavior 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. Students in the lab gain skills, depending on their interests, that may include dissection, specimen preparation, microscopy, digitizing and motion analysis, or field skills such as censusing and trapping wild birds. Current projects in the lab include properties of feathers, colonial seabird breeding biology, shorebird migration and movement. We would also 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.

**Modality: (Hybrid, in-person, or online)**

**Schultz Lab:** We study the ecology and evolution of freshwater and marine fishes. We are always 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.

Modality: (hybrid, in-person, or online)

**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.

Modality:

**Trumbo Lab:** At the Waterbury campus I offer research in burying beetle behavior and ecology. Our recent focus has been on beetle interactions with the microbial community on a small vertebrate carcass. Most typically, students are earning credit as independent study students.

Modality:

**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: [http://hydrodictyon.eeb.uconn.edu/people/urban/]
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.

**Modality:**

**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 or consider attending our informal lab meetings on Mondays in TLS Room 313 from 12:20 to 1:15 PM to find out more about what we do. (Lab meetings are undergrad friendly--three undergrads are attending this semester.)

**Modality:**

**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 and productivity. 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

**Modality: online (scientific data viz, genomic data analysis, software development, web development)**

**Willig Lab:** The Willig lab actively engages undergraduates in research opportunities via a two general mechanisms. The **first** involves conducting field work in the Luquillo Mountains of Puerto Rico during the summer as part of my NSF-funded Long-Term Ecological Research Project. That project examines the responses of populations, communities and metacommunities to various pulse (e.g., Hurricane Hugo or Maria) or press disturbances (e.g., warming), as well as to legacies of previous human land uses. This research leverages long-term
observational or manipulative experiments in tabonuco rain forest. Similarly, the project explores responses to environmental gradients (temperature and precipitation) and forest heterogeneity (tabonuco forest, palo colorado forest, elfin forest, palm forest) that is associated with elevation. The research primarily involves gastropods and insects, and does so via non-manipulative and manipulative experiments. This is an annual research project that usually involves 2-5 undergraduates per summer. Keep your eye out for posters/information in the Spring semester or directly contact me for more details. The **second** involves using data gathered by our team over the past 30 years to explore spatiotemporal variation in the distribution, abundance, and diversity of animals in the Luquillo Forest. Finally, students may engage in projects involving both mechanisms. All undergraduates are encouraged to work on developing independent research projects that can be supported through the UConn OUR's IDEA or SURF programs.

**Modality:**

**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/](https://monkeyflower.uconn.edu/)

**Modality:**

**EEB Greenhouse:** The EEB Plant Biodiversity Conservatory 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 involve 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/](http://florawww.eeb.uconn.edu/)

**Modality:** *in-person*

**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. Contact Katrina Menard (invertebrates), Sarah Taylor (plants) or Eric Schultz (vertebrates). [http://biodiversity.uconn.edu/people/](http://biodiversity.uconn.edu/people/)

**Modality:**