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TROUBLING TRENDS IN NATURE

This summer, Kurt Schwenk, along with his Master's student, Jack Phillips, and their Field Herpetology students booted up in waders and descended on a flooded meadow just off the Storrs campus. The field trip was intended to locate vocal spring peepers, *Pseudacris crucifer*, in the act of mating.

Schwenk primarily studies the functional morphology and evolution of lizards and snakes but lately his interests have turned to the peculiar way that frog larvae (tadpoles) breathe air despite having perfectly good gills. The task that night was to determine the feasibility of obtaining spring peeper eggs from mating pairs.

As the group quiets, the frogs close by eventually start to sing again and the students scan the water for paired frogs which float at the water's surface in a mating behavior called amplexus.

Soon a peeper is caught and while Schwenk carefully holds the squirming frog, he explains that "crucifer" in the frog's Latin name comes from the markings on its back that resembles a cross.

"You see the extra skin on the frog's throat," says Schwenk, "this fills with air and is important when they vocalize."

As the evening proceeded, the high pitched 'cheeruping' of the peepers was met with cheerful and low-pitched trilling of the gray tree frog. These calls are the familiar sounds of spring in Connecticut.



Spring Peeper. (Kurt Schwenk /UConn Photo)

Schwenk says these field outings have changed over the 28 years he has taught at UConn. The animals they search for have become fewer and fewer. The declines are most likely due to human encroachment, habitat fragmentation, habitat destruction as well as climate change, notes Schwenk. "I'm not a climate scientist by any stretch of the imagination," he says, "but I have noticed clear changes in some species and the big question is why?"

A troubling trend Schwenk mentions is that of spring peepers, whose familiar song is no longer simply a springtime phenomenon. "We have winters now in which we either have several feet of snow or 65-degree days—when snakes and frogs come out. That would have been unheard of 20 years ago," says Schwenk.

As the field trip winds down, Jack shouted "There's a snake in the water!" Most students rushed toward rather than away from him to sneak a peek or, perhaps, even hold the snake.

Even if spending an evening handling snakes and frogs isn't your idea of a good time, it's important to get outside to develop an appreciation for nature says Schwenk. With knowledge and appreciation, people are better equipped and more likely to preserve these resources. Schwenk notes, "How can we preserve what we don't appreciate or understand?"

— adapted from a UCONN TODAY article by Elaina Hancock

CITIZEN SCIENTISTS HELP TRACK CONNECTICUT'S WILDLIFE

An extensive citizen science project, the Connecticut Bird Atlas, is currently underway. This state -wide project relies heavily on volunteer data from hundreds of bird watchers, enthusiasts and amateurs alike.

EEB's Chris Elphick and Morgan Tingley, along with Min Huang, a Department of Energy and Environmental Protection wildlife biologist, are leading the project. Elphick says there is a long history of bird atlases and systematic surveys of breeding species. "The basic idea is to take a geographic area, make a grid, and collect data within each block on the grid."

The current atlas project will repeat a breeding bird atlas conducted in the 1980s, but will also collect much more data than the previous atlas. Elphick says the new atlas will not only describe distributions of breeding birds, but also non - breeding birds, and birds during migration. Data on relative abundance will also be collected.



Wild turkeys captured on camera by UConn researchers. (Jennifer Kilburn/UConn photo)

Another innovation is that the new Atlas will start by developing models with existing data already available before the project began, and will then use the help of citizen scientists to collect new data to test and improve those models. The models can then be applied to studying how populations have changed over time, how they may change in years ahead, and for making conservation decisions. The project will take another three years to complete. "There are a lot of good reasons to collect these data," says Elphick, "But most importantly, we want to provide data that is useful for the Department of Energy and Environmental Protection." To protect Connecticut's birds, it is imperative to know where they are.

Anyone can get involved, even if they aren't trained naturalists, says Elphick, who is frequently asked by inexperienced birders if their data is good enough to be included. He says that even though experienced birders are needed for much of the work, anyone who can identify the birds they see in their own backyard can provide important contributions. For additional information, please go to the Connecticut Bird Atlas home page at http://www.ctbirdatlas.org/.

HURRICANE IMPACTS ON ECOSYSTEMS OF PUERTO RICO

Mike Willig is part of an international team of scientists that have spent the past 30 years studying the ecosystems in hurricane-prone Puerto Rico and how they respond to climate-driven disturbances.

The study is part of a NSF program called Long-Term Ecological Research (LTER). Each summer over the past several decades, members of the team travel to the remote study site to run experiments and make observations. Some summer research has followed a quiet year weather-wise and other years, research has followed storms or droughts when ecosystems have been in "recovery mode," i.e., following Hurricane Maria in 2017.

During the study Willig has documented population attributes and species richness of invertebrates in the rain forests of the Luquillo Mountains in Puerto Rico. There have been decreases in rare snail populations after hurricanes in the past but the drop in numbers following Hurricane Maria was striking. After comparing data to those collected following Hurricane Georges in 1998, it was noted there was a 76 percent decrease in the total snail population following Maria; approximately twice the decrease observed after Hurricane Georges.



Caracolus caracolla, a Puerto Rican tree snail, is one of the gastropod species that Mike Willig has tracked over the years in the rain forests of the Luquillo Mountains. (Jason Lech/UConn Photo)

"We saw changes in the abundances of species and the loss of species," said Willig. "Overall things were much

worse with Maria than with Georges." This precipitous decrease and the ability to compare data over such a long period of time illustrates the importance of long-term studies like those of Willig's.

Willig uses an analogy of an ecosystem and a movie to underpin the significance of long-term ecological research. He says "watching 5 minutes of a movie may give the viewer a good idea of what is happening but not a full understanding of the story or the characters." With LTER researchers get the long-term view from a diversity of perspectives and can really investigate how the plot unravels. In keeping with the analogy, storm-generated disturbances are like "plot twists" — radical changes in the direction or expected outcome of the plot — that drives species interactions over time.

Willig says species on Caribbean islands such as Puerto Rico have evolved to cope with hurricanes. Historically, one major storm would make landfall in the forest every 30 years or so. Yet these plot twists are becoming more frequent and more intense. When the team first started studies at this site, it hadn't experienced a major hurricane in more than 30 years. The first they witnessed was Hugo in 1989, and in the 30 years since then, there have been four major hurricanes.

How will the story hold up if, as in the case of the snails, 76 percent of the characters are removed? Snails are among the species that play a critical role in the recovery process after a major disturbance. Along with some frogs and other invertebrate species, they proliferate in the debris ripped from trees that settles on the forest floor following a storm.

While frogs take refuge and breed in the debris, the gastropods clear the detritus and enhance the recycling of critical nutrients. Such species flourish in the destruction caused by a hurricane. But once the debris clears, their numbers decline, and other species become important. If the data were only collected at isolated points in time, this ebb and flow would be missed.

Willig has two sayings to which he likes to refer, one is that it is important for ecologists to be at the right place at the right time. More importantly, he says, "To get the full picture, it's really about being at the right place all the time."

THE LEGACY OF A LIFETIME OF COLLECTING: THE CARL AND MARIAN RETTENMEYER STORY



On October 28, the Babbidge Library on the Storrs campus was the site of the opening of a new AntU traveling exhibit honoring Carl and Marian Rettenmeyer, who spent more than 50 years studying army ants and their guests in the jungles of Central and South America.

The new interactive exhibit's opening events were held during UConn Homecoming 2018.

The exhibit takes visitors on a journey from those tropical rainforests to the Biodiversity Research Collections at UConn, and explores

the Rettenmeyers' lives, research, and the vital role of biological collections in scientific discovery.

The exhibit will reside in the Stevens Gallery (Babbidge Library Level B) until Summer 2019 when it will travel to UConn regional campuses. Members of the AntU Team, who designed and created the exhibit, include faculty, staff and students from the Departments of Ecology and Evolutionary Biology and Digital Media and Design, and the CT State Museum of Natural History at UConn.

To learn more about the truly unique university-wide AntU Initiative, and exciting plans for 2019 and beyond, please go to https://www.facebook.com/UConnArmyAntGuests



Visitors exploring the exhibit/photos by Elizabeth Barbeau

UCONN ARBORETUM COMMITTEE REKINDLES TREE PLANTING TRADITION

On October 23, 2018 the UConn Arboretem Committee rekindled a UConn tradition of planting "class" trees with the establishment of an endowment fund. The committee, made up of University faculty, staff, students, and community members, hopes that each graduating class will support the arboretum endowment fund and identify a tree tribute for their year.

The first tree planted as part of this initiative was a fastigiate tulip tree which was planted along Fairfield Way near Hall Dorm. The fastigiate tulip, a member of the magnolia family, has an upright form with large, bright green, smooth lobed leaves that appear in the spring and turn golden yellow in the fall. It's late spring flower attract bees and hummingbirds and the seeds are eaten by both birds and small mammals.



Photo by Peter Moreneus/UConn Photo

The class tree initiative is led by emeritus professors Greg Anderson, Distinguished Professor of Ecology and Evolutionary Biology, and Richard Brown, Distinguished Professor of History. Both are members of the committee, with Anderson serving as one of its cochairs.

"There are actually class trees all over campus from the 1895 that are now very mature," says Anderson. "We would like the current students to take ownership of this and have each class contribute to and plant trees. It brings people back to campus after they graduate. They can show their children and grandchildren that this is a tree their parent or grandparent planted." Support for planting other unusual trees will also be a part of the focus of the endowment.

Trees are an everyday part of campus life at UConn. They help measure the passing of time from fall to winter to spring, provide the campus with shade and places of reflection, and add to the health of the environment.

For many of those passing by each day, the trees may go unnoticed. For the UConn Arboretum Committee, the trees are sights of majestic glory that make the campus the beautiful environment it is. The current UConn administration, under President Susan Herbst, has been very supportive of the work of the Arboretum Committee and the overall landscaping of the campus according to Anderson and Brown.

The Committee works closely with UConn's Landscape Services and University Planning, Design, and Construction. Sean Vasington, associate director of University Planning, Design and Construction, and the university tree warden, Eileen McHugh, are among the University staff that serve on the committee.

UConn is recognized as a TreeCampus USA by the Arbor Day Foundation, the only school in the state of Connecticut and one of just three in New England, to have that distinction.

The endowment will be managed as part of the Campus Beautification Fund at the UConn Foundation. To make a donation to the fund, please visit https://uconn.networkforgood.com/causes/13163-campus-beautification-fund

AWARDS

GRADUATE STUDENTS

Annette Evans, (Elizabeth Jockush, advisor), received a Doctoral Dissertation Fellowship from the UConn Graduate School for the Spring 2019 semester.

Cera Fisher, (Elizabeth Jockusch, advisor), received the top prize in the student poster competition at the Euro Evo Devo meeting in June in Galway, Ireland. Cera's winning poster was entitled, "Comparative transcriptomics support the wing gene cooption hypothesis for the origin of the novel treehopper helmet."

Jacob Kasper, (Eric Schultz, advisor), received a Clark Hubbs Research Assistant Award from the American Institute of Fisheries Research Biologists. In addition, **Jacob** was nominated by NOAA-Fisheries to serve as the U.S. Representative on the Methods Working Group of the International Council for Exploration of the Sea (ICES). In addition, **Jacob** won the Northeastern Division Best Student Poster at the 2018 American Fisheries Society meeting.

Jason Lech (Mike Willig, advisor) and **Austin Spence** (Morgan Tingley, advisor) received Doctoral Dissertation Fellowships from UConn's Graduate School this fall.

Chris Nadeau (Mark Urban, advisor), Kristen Nolting (Kent Holsinger, advisor), and Katherine Taylor (Charlie Henry, advisor) received Doctoral Student Travel Awards. These travel awards are provided by UConn's Graduate School.

Kristen Nolting, (Kent Holsinger, advisor), received a Graduate Student Research Award from the Botanical Society of America for her proposal, *What makes a 'biodiversity hotspot' hot? Trait mediated species coexistence in seedling communities in a fire-driven ecosystem.* **Kristen** also received a Doctoral Dissertation Fellowship from the UConn Graduate School for the Spring 2019 semester.

Dustin Ray, (Cindi Jones, advisor) received a Developmental and Structural Section Travel Award from the Botanical Society of America for his presentation, *Mechanical and physiological traits do not trade off in petioles*.

Eileen Schaub, (Pam Diggle, advisor) received a Physiological Section Student Presentation Award from the Botanical Society of America for the best paper presented in this section.

Anna Sjodin, (Mike Willig, advisor) received a Doctoral Dissertation Fellowship from the UConn Graduate School for the Spring 2019 semester.

Lauren Stanley, (Yaowu Yuan, advisor) received a Doctoral Dissertation Fellowship from the UConn Graduate School for the Spring 2019 semester.

Andrew Stillman, (Morgan Tingley, advisor) received a Doctoral Dissertation Fellowship from the UConn Graduate School for the Spring 2019 semester.

AWARDS

AWARDS AND RECOGNITION

Gene Likens, EEB Distinguished Research Professor and National Academy of Sciences member, has been awarded the 2019 Benjamin Franklin Medal in Earth and Environmental Science, for his pioneering long-term studies of forest, stream, and lake ecosystems, and for his efforts to educate the public and the U.S. government about acid rain and other environmental issues. Gene joins the ranks of Nikola Tesla, Thomas Edison, Rudolf Diesel, Pierre and Marie Curie, Orville Wright, Albert Einstein, Frank Lloyd Wright, Jacques Cousteau, and Stephen Hawking in receiving this award. For more information about the award (and Gene) please go to: https://www.fi.edu/laureates/gene-e-likens

Morgan Tingley was made an Elected Fellow of the American Ornithological Society earlier this year. It's the highest membership award of the society (the largest ornithological society in the western hemisphere). Morgan is the first UConn faculty to receive the honor since 1975.

EEB has two of the three UConn Highly Cited Researchers* recognized by Clarivate Analytics (formerly *ISI*). **Rob Colwell** and **Robin Chazdon** have both been cited in the new **Cross-Field** research category, created to recognize researchers who have highly cited work across multiple disciplines.

*Highly Cited Researchers are selected for their exceptional research performance, determined by production of multiple highly cited papers that rank in the top 1% by citations for field and year in Web of Science.

Post doc **Christina Baer**, working in Carlos Garcia-Robledo's lab, recently received a Postdoctoral Seed Grant for her project "Predicting climate-driven changes in tropical communities through temperature preferences and experimental warming."

ALUMNI NEWS

Dr. Dustin Ray, (Cindi Jones, advisor) Ph.D. 2018, accepted a post-doc position with the University of Minnesota.

Dr. Kerri Mocko, (Cindi Jones, advisor), Ph.D. 2017, accepted a post-doc position with Cal State University, Fullerton.

Jaleigh Pier, (Andy Bush, advisor), M.S. 2018, accepted a Research Assistant position at the Paleontological Research Institute in Ithaca, NY.

EEB Post Doc, **Nic Herndon**, Dr. Jill Wegrzyn's lab, accepted a Teaching Fellow position with the College of Information and Computer Sciences at UMASS Amherst.

Dr. Chris Martine, (Greg Anderson, advisor) Ph.D., 2006, the Burpee Chair in Plant Genetics and Research and Director of the Manning Herbarium at Bucknell, is the recipient of the 2018 Peter Raven Award, This award is presented annually to a plant systematist who has made exceptional outreach efforts to non-scientists.

Dr. Nora Mitchell, (Kent Holsinger, advisor) Ph.D., 2017, accepted a faculty position in the Department of Biology at the University of Wisconsin Eau Claire.

EEB IN THE NEWS

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This Tiny Songbird Rolls Its Head to Break Its Victim's Neck - Ed Yong - The Atlantic - Rubega & Sustaita - (9/5/18) https://nam01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.theatlantic.com%2Fscience%2Farchive%2F2018%2F09%2Fthis-tiny-songbird-rolls-its-head-to-break-its-victims-neck%2F569341%2F&data=02%7C01%7Cschlicht%40uconn.edu%7C28809c109bbd460357c408d61

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COLLECTIONS

The EEB's Biodiversity Research Collections reflect the richness of the world's biodiversity. The vertebrate holdings consist of fish, bird and mammal collections, with a particularly strong emphasis on South American mammals. The invertebrate holdings focus on insects of New England, army ant "guests," parasites of Connecticut vertebrates and tapeworms from sharks and rays from around the world. In combination, the George Safford Torrey Herbarium and the EEB greenhouses maintain remarkable fossil, preserved and living plant collections with special concentrations in native New England plants and the region's imperiled and invasive species.

There is always something interesting and exciting happening in the Collections. For the most up-to-date news, please visit the Collections and Greenhouse websites at: https://biodiversity.uconn.edu/ and http://florawww.eeb.uconn.edu/

EEB's Biodiversity Research and Education Greenhouse is mentioned in an article of the latest issue of <u>Public Garden</u> published by the <u>American Public Garden Association</u>.

The article entitled "What's our backup plan? A look at living collections security" highlights our greenhouse holding the only known representatives of <u>Solanum ensifolium</u>, an endemic species of Puerto Rico, now considered extremely endangered and potentially extinct in the wild. Clinton Morse and colleagues in EEB are now seeking to propagate the samples to create additional backup collections and repatriate the material back to Puerto Rico.



The EEB Greenhouse may be toured between the hours of 8 a.m. and 4 p.m. weekdays and 10 a.m. to 2 p.m. on Saturdays. To set up a group tour please contact the Greenhouse Manager, Clint Morse, at clinton.morse@uconn.edu

Did you know the mission of the Biodiversity Research Collections is 3-fold? It focuses on scholarship, education, and outreach.

More than 1800 general education students learn about CT and global natural heritage annually; it also serves as a resource, through it's tours, for 5 Biology courses and 11 EEB courses. Specimens from the BRC are studied by 10 more EEB courses and at least one Biology course.

The BRC provides training opportunities for 10-15 students annually, grows 4000 plants for Biology courses, and provides 1600 species for 40 courses. Art and Journalism courses also use the Collections as a resource as well.

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