



Notes from the Field

Spring
2017

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Purple trillium (*Trillium erectum*) flowers from April to June in forests around Penn State. Despite its beauty, this native flower attracts flies as pollinators with a foul odor. (Photo by Erynn Maynard)

Science Café hosts seventh successful series in spring 2017

By Courtney Davis

The Pennsylvania State University Ecology Graduate Student Organization began a Science Café initiative in 2014 to: 1) engage the broader community in discussions on science-related topics; and 2) provide students with an opportunity to broaden outreach and communication skills in an informal setting. Since its inception, Science Café has hosted 15 events focused on topics such as invasive species, deep-sea exploration and fungal threats to biodiversity. This semester we hosted a diverse set of events that highlighted speakers within the Ecology Program as well as the departments of Ecosystem Science and Management, Biology, and Agricultural Economics, Sociology, and Education. We also hosted speakers from graduate degree programs in Architecture, Arts Education, and Environmental Engineering.

Topics in the spring 2017 series included:

1) Chemical contaminants in our environment, featuring Alison Franklin and Michael Shreve;

2) People and the natural environment, featuring Elyzabeth Engle and Christopher Hazel; and

3) The future is here, featuring David Stupski and Alyssa Pittenger.

Each event began with ‘Ignite’ style presentations, with an allotted thirty seconds and a maximum of 10 words per slide. Audience members then participated in a fierce round of topic-specific trivia for highly coveted bragging rights. For more information on this initiative, please visit: sites.psu.edu/science_cafe.

The Ecology Graduate Student Organization would like to thank the Penn State Ecology IGDP, the Institutes of Energy and the Environment, and the Earth and Environmental Systems Institute for supporting this initiative.

Evolutionary Ecology Research Symposium: an afternoon with PSU ecologists

By Courtney Davis

Ecology-minded folk across the university gathered on April 20 for the Evolutionary Ecology Research Symposium, hosted in association with the Ecology Program's Spring Seminar Series, Evolutionary Ecology: Organisms, Populations, and Ecosystems.

The event consisted of lightning talks by faculty and postdoctoral researchers and culminated in a keynote address by Dr. W. Chris Funk. Penn State ecologists who presented at the symposium included: Dr. Paul Bartell (Animal Science), Dr. Heather Hines (Biology), Dr. Iliana Baums (Biology), Dr. Lua Lopez-Perez (Biology), Dr. Christina Grozinger (Entomology), Dr. Andrew Read (Entomology), Dr. Eric Yip (Biology), and Dr. Li Tian (Biology). Dr. Funk, joining us from the Global Biodiversity Center at Colorado State University, then spoke on the topic of "My population is screwed. Will genetic rescue help?," bringing the afternoon to a close with a fascinating look at his research on gene flow in Trinidadian guppy and Island Scrub-jay populations.



Jack-in-the-pulpit (*Arisaema triphyllum*), one of the rare species of plants in which individuals change sexes based on maturity and size. Small plants don't reproduce, but large plants produce male flowers and the largest produce female flowers. The true flowers are protected inside of the green tube-like 'flower' with the hood over it.

(Photo by Erynn Maynard)

Our goal in hosting this event was to build and foster a community of ecologists across disciplines, departments, and programs campus-wide. This symposium provided an opportunity for researchers to share a wide variety of research under the over-arching theme of evolutionary ecology. The Spring Seminar Series organizing committee would like to thank the Ecology Institute and the Ecology IGDP for funding this symposium and for institutional support in the planning of this event. We would also like to thank the faculty, staff, postdoctoral scholars and graduate students who presented or attended the research symposium. It was certainly an afternoon well-spent!

(left to right)
Ted Primka,
Matt Toenies
Staci Amburgey



(left to right)
Erynn Maynard
Steve Bean
Warren Reed



(Photos by
Robert Newton)

Ecology retreat: an opportunity to bond

By Erynn Maynard

The 2017 Ecology Graduate Student Organization (EGSO) retreat was an ideal setting, beautiful weather, and great company! We were fortunate to be able to use Warren Reed's family cabin near Oil City, Pennsylvania on April 15-16. The picturesque cabin is directly on the Allegheny River, so we explored in canoes and kayaks and enjoyed a scenic view including bald eagle sightings. A bonfire facilitated lively conversation into the evening (and delicious s'mores). Overall, the retreat provided a wonderful opportunity to escape to nature and bond with like-minded folks in a non-academic setting.

Ecology students win prestigious National Science Foundation (NSF) Graduate Research Fellowships

By Ismaiel Szink, Rachel Rozum, Shuang Liang

In the spring semester, Ecology students Ismaiel Szink from Dave Eissenstat's lab and Rachel Rozum from Armen Ke-manian's lab received prestigious NSF Graduate Research Fellowships, which provide three years of funding to support outstanding graduate studies.

Ismaiel's research is on tree roots and their exudates, and whether they are produced facultatively or at fixed rates. Exudates are any compounds released by roots into surrounding soil and may be responsible for weathering rocks, stabilizing soil particles, mobilizing nutrients, stimulating microbial activity, and even signaling between plants. With this fellowship, Ismaiel plans to study exudates from deep roots that are located near bedrock to discover how trees may be acquiring phosphorus, an essential element for plant development, at the Susquehanna-Shale Hills Critical Zone Observatory. With atmospheric CO₂ levels on the rise we could be seeing an increase in plant productivity, causing elements like phosphorus to suddenly become scarce in temperate settings.

Until now, little is known about root and microbial exudates under field conditions. Through this research Ismaiel aims to develop new methods for measuring exudates in field settings. "With the support of the NSF, I will be able to make a greater contribution to the field of ecology than I would have otherwise." said Ismaiel.

Rachel's research entails creating a computer model to characterize how nutrients such as nitrogen and phosphorus move through ecosystems. This will allow farmers to determine the best management practices for their crops, while also considering the effects of their management practices in surrounding watersheds.



Ismaiel Szink at one of his field sites.

(Photo by Ismaiel Szink)



Rachel Rozum

(Photo by Rachel Rozum)



Left: Wood geranium (*Geranium maculatum*), a common, native woodland flower in central Pennsylvania. The veins on the petals serve as landing strips guiding pollinators to their nectar near the pollen.

Right: Shinleaf (*Pyrola elliptica*), an evergreen plant with leaves staying through the winter. The common name comes from its medicinal purposes. It has been used as a poultice on bruised shins and other wounds. It is in the same family as blueberries.

(Photos by Erynn Maynard)

Ecology student receives award from Chinese government

By Shuang Liang

Ecology doctoral student Weile Chen, who recently graduated from Dave Eissenstat's lab, has been granted the Chinese Government Awards for Outstanding Self-Financed Students Abroad. This government-sponsored award honors Chinese doctoral students studying overseas for their outstanding academic accomplishments and is granted across all fields of study.

Weile's research focused on mycorrhizal fungi and their relationship with plants in acquiring nutrients, with the aim of providing guidance for ecosystem management under changing climate. He has published a number of peer-reviewed articles in international journals. His dissertation research, for the first time, evaluates the degree that mycorrhizal fungi may substitute for roots in the deployment of the absorptive surface area for nutrient acquisition across plant species.



Weile Chen (left) and his adviser David Eissenstat (right) at the award ceremony at the Chinese Consulate General in New York on April 28.

(Photo by Shuang Liang)

Weile was recognized during the award ceremony held at the Chinese Consulate General in New York City on April 28, together with other 34 doctoral students primarily from disciplines of biology, medicine, engineering, and material science. During the ceremony, China's consul general in New York presented the awards to the recipients of the Chinese Government Award in front of their advisers, families and a group of news media.



Left: Root tips (brown) colonized by ectomycorrhizal fungi (white).

Right: Study site of the Eissenstat lab, a common garden plantation at Rock Spring Ag Center, Penn State.

(Photos by Weile Chen)



Recent Publications

- Chen W, Koide RT, Eissenstat DM.** 2017. Root morphology and mycorrhizal type strongly influence root production in nutrient hot spots of mixed forests. *Journal of Ecology*. DOI: 10.1111/1365-2745.12800.
- Davis CL, Miller DAW, Walls SC, Barichivich WJ, Riley JW, and Brown ME.** 2017. Species interactions and the effects of climate variability on a wetland amphibian metacommunity. *Ecological Applications* 27: 285–296.
- Davis CL, Miller DAW, Walls SC, Barichivich WJ, Riley JW, and Brown ME.** 2017. Life history plasticity does not confer resilience to environmental change in the mole salamander (*Ambystoma talpoideum*). *Oecologia* 183: 739-749.
- Hasenmueller EA, Xin G, Weitzman JN, Adams TS, Stinchcomb GE, Eissenstat DM, Drohan PJ, Brantley SL, Kaye JP.** 2017. Weathering of rock to regolith: The activity of deep roots in bedrock fractures. *Geoderma* 300: 11-31.
- Hunter MC, Smith RG, Schipanski ME, Atwood LW, Mortensen DA.** 2017. Agriculture in 2050: Recalibrating Targets for Sustainable Intensification. *BioScience* 64: 386-391.
- Lessios HA, Baums IB.** 2017. Gene Flow in Coral Reef Organisms of the Tropical Eastern Pacific. In: *Coral Reefs of the Eastern Tropical Pacific: Persistence and Loss in a Dynamic Environment* (eds. Glynn WP, Manzello PD, Enochs CI), pp. 477-499. Springer Netherlands, Dordrecht.
- Liang S, Hurteau MD, Westerling AL.** 2017. Response of Sierra Nevada forests to projected climate-wildfire interactions. *Global Change Biology* 23: 2016-2030.
- Liang S, Hurteau MD, Westerling AL.** 2017. Potential decline in carbon carrying capacity under projected climate-wildfire interactions in the Sierra Nevada. *Scientific Reports* 7:2420.
- McCormack ML, Guo D, Iversen CM, Chen W, Eissenstat DM, Fernandez CW, Li L, Ma C, Ma Z, Poorter H, Reich PW, Zadworny M, Zanne A.** 2017. Building a better foundation: Improving root-trait measurements to understand and model plant and ecosystem processes. *New Phytologist*. In press.
- Milner-Gulland EJ and Shea K.** 2017. Embracing uncertainty in applied ecology. *Journal of Applied Ecology*. doi:10.1111/1365-2664.12887.
- Murrell EG, Schipanski ME, Finney DM, Hunter MC, Burgess M, LaChance JC, Baraibar B, White CM, Mortensen DA, Kaye JP.** 2017. Achieving diverse cover crop mixtures: Effects of planting date and seeding rate. *Agronomy Journal* 109: 259-271.
- Rauschert ESJ and Shea K.** 2017. Competition between similar invasive species: modeling invasional interference across a landscape. *Population Ecology* 59: 79-88.
- Rich LN, Davis CL, Farris ZJ, et al.** 2017. Assessing global patterns in mammalian carnivore occupancy and richness by integrating local camera trap surveys. *Global Ecology & Biogeography*. In press.
- Sezen Z, Johnson DM, Shea K.** 2017. Individually-Mark Mass-Release Resight study elucidates effects of patch characteristics and distance on host patch location by an insect herbivore. *Ecological Entomology* 42: 273-282.

"The ecosystem is greater than the sum of its parts." - E. P. Odum



Colt's foot (*Tussilago farfara*)



Rue anemone (*Thalictrum thalictroides*)



May apple (*Podophyllum peltatum*)

(Photos by Erynn Maynard)

Fellowships, Awards, Grants, and Achievements

David Eissenstat received the Alex and Jessie C. Black award and was elected Fellow of Ecological Society of America.

Micheal Sheriff received the George A Bartholomew Award from the Society of Integrative and Comparative Biologists (SICB).

David Miller received the Edward D. Bellis Award.

Weile Chen received the Penn State Alumni Association Dissertation Award and the Chinese Government Award for Outstanding Self-Financed Students Abroad.

Ismail Szink won the National Science Foundation (NSF) Graduate Research Fellowship.

Erynn Maynard received the National Science Foundation (NSF) Doctoral Dissertation Improvement Grant and the J. Brian Horton Award.

Warren Reed received the Center for Landscape Dynamics Graduate Research award.

Shannon White received the Frank A. Andersen Travel Award.

Chad Nihranz received the J. Brian Horton Award.

Mitch Hunter received the Gerald O. Mott Meritorious Graduate Student Award from the Crop Science Society of America and the Paul Hand Award for Graduate Student Research Achievement from the College of Agricultural Sciences. Mitch was also awarded Best Graduate Student Paper from the Global Climate Change Community of the American Society of Agronomy and was elected as Graduate Student Representative to the Board of Directors of the American Society of Agronomy.

Andie Chan received the NASA Pennsylvania Space Grant Graduate Fellowship and attended the AAAS/CASE (Catalyzing Advocacy in Science and Engineering) workshop in Washington, DC where she spoke with policymakers about supporting funding for basic science.

Shauna-Kay Rainford accepted a student internship with International Center of Tropical Agriculture (CITA) for creating digital soil maps of the Orinoquia region in Colombia.

Rachel Rozum won the National Science Foundation (NSF) Graduate Research Fellowship.

Kathryn Barlow was awarded a John W. Humke Student Scholarship to attend the 2017 Natural Areas Conference.

Recent Program Graduates

Congratulations to spring 2017 Ecology graduates!

Douglas Manning (M.S.) Shuang Liang (Ph.D.)

Lillian Hill (M.S.) Laura Radville (Ph.D.)

Weile Chen (Ph.D.)

Ecology Program Donations:

A gift may be made by phone at 814-863-2052 or toll free 1-888-800-9163. An online gift may be made at giveto.psu.edu by checking the "Other" box under University-wide giving and following the steps, noting one of the following designations in the appropriate box: Andersen Ecology Travel Award or the Ecology Graduate Degree Program.

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Andie Chan meeting with Congressman Glenn Thompson to advocate for increased funding for basic science.



Andie Chan collecting tissue samples from *Porites* corals in Palau for genotypic diversity analyses.

(photos by Andie Chan)