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Female wood frog (*Lithobates sylvaticus*) found moving between ponds. (Photo by Braulio Assis)

Science Café is back and better than ever!

By Courtney Davis

The Ecology Graduate Student Organization's Science Café Initiative has officially concluded another successful series! For those who are unaware, Science Café began in 2014 to: 1) engage the broader community in discussions on ecological topics; and 2) provide graduate and postdoctoral students with an opportunity to broaden outreach and communication skills in an informal setting. This semester we hosted a diverse set of events that highlighted speakers within the Ecology Program as well as the Departments of Biology, Plant Pathology & Environmental Microbiology and Entomology.

Topics in the spring 2016 series included:

1) The science of homebrewing, featuring Staci Amburgey and Erynn Maynard;

2) Fantastic fungi and where to find them, featuring Christopher Smyth and João Araújo;

3) Life in the abyss: impacts of the Deepwater Horizon Oil Spill on deep sea communities, featuring Samuel Vohsen and Fanny Girard; and

4) Science in the movies, featuring Eric Yip and the EGSO Science Café committee.

The series format was heavily restructured from previous semesters; speakers were asked to give 'Ignite' style presentations, with an allotted thirty seconds and a maximum of 10 words per slide. Between presentations, audience members were then able to compete for highly coveted bragging rights in a fierce round of topic-specific trivia. While this certainly encouraged more community engagement and discussion throughout the series, we look forward to further developing this initiative in the fall to benefit student presenters and the broader nonscientific community in State College. For more information on this initiative or to view a calendar of our upcoming events, please visit: sites.psu.edu/sciencecafe.

We hope you will come support your fellow ecologists and engage the broader community in the ecological research conducted at Penn State when we return in the fall semester. For questions, to suggest topics or speakers, or to volunteer, please contact psu.sciencecafe@gmail.com.

Tech offers detailed look into animal social networks (with a catch): what you should know before using proximity loggers for research

By Christina Aiello

Studying social behavior in wild animals in their natural habitat has always presented numerous challenges to researchers. To document interactive behavior, one must be able to locate, follow, identify, and observe individuals often in remote locations and ideally without influencing them with one's presence. This alone is challenging enough, but the task becomes even more insurmountable when working with secretive species that spend most of their time hidden from observers. Our research examining desert tortoise social behavior in relation to translocation and disease transmission required we tackle these difficulties. This species spends nearly 90% of its time underground in burrows with few bouts of observable surface activity, so the task was daunting to say the least.

Technology to the rescue...sort of.

To acquire detailed data on these rare moments of tortoise fraternizing, we turned to developing technology that has recently been applied to wildlife studies: proximity loggers. On paper these devices sound like the silver bullet of social studies: using radio-frequency identification (RFID) the devices document the timing and duration of interactions unperturbed by the presence of a pesky human observer. However, as with many emerging gadgets, proximity loggers come with a variety of disadvantages (some obvious, some not-soobvious) that we've learned both from delving into literature on the topic and through first-hand experience. Here follows a list of things to consider before you commit to proximity loggers as a means to social data.



Desert tortoise fitted with custom Encounternet proximity logger (Photo by C. Aiello)

1. Limited options and high costs Because these devices are new to the market, few companies offer them and many models are designed for collar deployment on large mammals. Sirtrack Ltd. (Hawkes Bay, New Zealand) and Encounternet LLC (Portland, OR) offer a ready-touse device or will custom-design models for your needs. We have dealt with both brands and found Sirtrack's customer service to be excellent, but their devices are singleuse and expensive (custom-designed models ranged \$385 - \$413 ea.). Plus, the loggers need to be directly plugged into a laptop or tablet to access data. Sirtrack loggers have been available for many years and used in a variety of published studies, so not surprisingly, we found their devices to be more reliable.

Encounternet provides a more attractive rechargeable model at a better price (\$215-\$250 ea.) with a wireless download feature that can't be beat when you're studying an animal that's often tucked deep in a burrow. While this company in theory provides all the ideal features, we found Encounternet's more limited experience resulted in a very inconsistent product and the customer service was poor to non-existent at times.

2. Multiple trials and tests are a must prior to research

Make sure you devote a significant portion of time to testing the devices on models and ideally, on your species of interest. Proximity loggers can be set to record data in a variety of ways depending on your research goals. Also, logger signals tend to vary from device to device, in different environments, when attached to an animal, and potentially over time as battery life wanes. Some of this variation can have a substantial effect on your data and should be considered when designing your study.

3. Are there alternatives that would be as effective?

While high tech devices are attractive for their novelty and potentially high-resolution data, your lab may not have the time or funds needed to pursue this method. Consider other lower-cost or more established alternatives such as cameras, observational sampling, PIT tags, or GPS units, which can be used to record or infer social interaction. Due to glitches and problems we experienced while testing proximity loggers, we found large-scale, field situations presented too many challenges and costs for this method. A captive and controlled study allowed more adaptability and we are successfully using proximity loggers at smaller- scales.



Final thoughts

Proximity loggers offer a new way to collect

Encounternet's wireless download feature works well even when tortoises are underground (Photo by C. Aiello)

detailed social data from wild animals, but due to their novelty, require substantial time and effort to work out initial kinks and produce the desired result. When and if the devices can be mastered, a broad spectrum of ecological questions might be tackled that were previously unavailable to researchers. While we encourage the use of these devices, we do recommend caution and advanced planning/testing before committing to their use. Better-yet, future ecologist - engineer collaborations could do wonders for improving this technology for application in a variety of field settings. Proximity loggers can provide detailed social data that can be used to investigate the role of social structure in population-level processes such as pathogen transmission



Proximity loggers can provide detailed social data that can be used to investigate the role of social structure in populationlevel processes such as pathogen transmission (Photo by C. Aiello)

Andersen award reflection

By Laura Radville

This past December, I was able to attend the American Geophysical Union conference in San Francisco, CA. This was the largest Earth and space science conference in the world, with about 24,000 attendees. This is, by far, the largest conference I have ever attended, and I admit that I was a bit overwhelmed when I first looked at the program. I ended up finding smaller sessions that pertained to my research interests, however, and made some great connections with scientists in the field of plant phenology and saw some interesting talks.

I ran into colleagues that I had met at previous conferences, and I also met up with a former field assistant who is now a climate scientist in Washington state. I attended the exhibit hall, where I was able to see new technology by NASA, such as a pair of 3D goggles that allows the wearer to see global air patterns (see photo of me trying out the new technology). I presented my research on the timing of plant growth in Greenland. My research suggests that increased air temperatures as a result of global warming may have a smaller impact on the timing of root growth than on the timing of aboveground plant growth. It was exciting to discuss this work with others, and I received some interesting feedback. I would certainly attend the AGU conference again.

I sincerely thank Frank A. Andersen and the Andersen Travel Award Committee for making this travel possible.



Trying on NASA goggles that give a view of global air flow patterns

(Photo by Laura Radville)





Recent Publications

- Adams TS, Eissenstat DM. 2015. On the controls of root lifespan: assessing the role of soluble phenolics. Plant and Soil 392:301-308
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- Brantley SL, DiBiase RA, Russo TA, Shi Y, Lin H, Davis KJ, Kaye M, Hill L, Kaye J, Eissenstat DM, Hoagland B, Dere AL, Neal AL, Brubaker KM, Arthur D K. 2016. Designing a suite of measurements to understand the critical zone, Earth Surface Dynamics 4: 211-235, doi:10.5194/esurf-4-211-2016
- Cahoon SMP, Sullivan PF, Gamm C, Welker JM, Eissenstat DM, Post E. 2016. Limited variation in proportional contributions of auto- and heterotrophic soil respiration, despite large differences in vegetation structure and function in the Low Arctic. BiogeochemistryDOI:10.1007/ s10533-016-0184-x
- Carlson B.E. and Langkilde T. The role of prey in microgeographic variation in Red-spotted Newt (Notophthalmus Herpetology. In press.
- Carlson, B.E., C.J. Thawley, S.P. Graham. 2016. Natural History of the Valley and Ridge Salamander (Plethodon hoffmani): Demography, Movement, Microhabitats, and Abundance.Herpetological Conservation and Biology. Accepted.
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- Gaines KP, Stanley JW, Meinzer FC, McCulloh KA, Woodruff DR, Chen W. Adams TS. Lin H and Eissenstat DM. 2016. Reliance on shallow soil water in a mixed-hardwood forest in central Pennsylvania. Tree Physiology 36: 444-458 doi:10.1093/treephys/ tpvll2
- v. viridescens) head width. Journal of Herndon EM, Jin L, Andrews DM, Eissenstat DM, and Brantley SL. 2015. Impact of vegetation on manganese cycling in temperate forests. Global Biogeochemical Cycles 29: 160-174.
 - Herr M., Robbins T.R., Centi A., Thawley Tennessen J.B., Parks S.E., Tennessen T.P. C.J. and Langkilde T. Irresistible ants: Exposure to novel toxic prey increases consumption over multiple temporal scales. Oecologia. Available online: DOI 10.1007/s00442-016-3596 -3
 - Klodd AE, Eissenstat DM, Wolf TK, Centinari M. 2016. Coping with cover crop competition in mature grapevines. Plant and Soil 400: 391-402. DOI: 10.1007/s11104-015-2748-2
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- and Langkilde T. 2016. Raising a racket: invasive species compete acoustically with native tree frogs. Animal Behavior 114: 53-61.
- Thawley, C.J., M. Herr, and S.P. Graham. Pantherophis guttatus (Red Cornsnake): defensive behavior. Herpetological Review. 47(1):151-152
- Thawley C.J. and Langkilde T. Invasive fire ant (Solenopsis invicta) predation of eastern fence lizard (Sceloporus undulatus) eggs. Journal of Herpetology. In press.

Fellowships, Awards, Grants, and Achievements

Christina Aiello won Best student presentation at the Desert tortoise council symposium for talk entitled: "Upper respiratory tract disease dynamics: insights from transmission studies"

Joe Keller was awarded anAFRI ELI Predoctoral Fellowship funded by the US Department of Agriculture National Institute of Food and Agriculture entitled "Weed Management Under Global Warming: Biocontrol Agent Phenological Mismatch"

Ty Wagner received the 2015 National Fish Habitat Award for Scientific Achievement in support of Fish Habitat Conservation for work eastern brook trout. Ty Wagner also received the United States Geological Survey's Excellence in Science Award for outstanding research/

Katy Barlow was awarded the Frank A. Andersen Travel Award

Gail McCormack was awarded the J. Brian Horton Memorial Award

Christian John was awarded an Arctic Institute of North America grant

Mitch Hunter was awarded the Harold F. Martin Graduate Assistant Outstanding Teaching Award

Gail received the Alumni Association Dissertation Award.

Chris Thawley received the Intercollege Graduate Stu-

dent Outreach Achievement Award

Carolyn G. Mahan received a Northeast Associate of Fish and Wildlife Agencies grant entitled "Intervention Strategies for Allegheny Woodrat Recovery". This is a multi-University effort (Frostburg University, Penn State Altoona, Montclair State University). Dr. Mahan also received a grant from Asplundh, First Energy, Dow entitled "Biodiversity Associated with Rights-of-Way Corridors" .

Recent Program Graduates

Congratulations to the Ecology Program's spring graduates!

-Chris Thawley (Ph.D.)

-Xin Peng (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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