



Ecology

Notes from the Field



Pennsylvania State University

Biannual Newsletter

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Best spring photo on Penn State property ~ Brad Carlson

An Eastern red-spotted newt (*Notophthalmus viridescens*) travels through the Rock Springs research facilities this spring.

Andersen Award Endowment

Dr. Alan Andersen (Ph.D. Biophysics, PSU) has decided to endow the Frank A. Andersen Ecology Travel Award for Graduate Students, that he created in memory of his late father, Frank Andersen. The well-known "Andersen Travel Award" honors outstanding achievement by an Ecology graduate student and financially assists that student in their travel to a professional conference to encourage interaction with colleagues and scholars in their respective field. The Ecology program will be offering one \$500 reward annually through 2015 while the endowment builds. At up to 5% interest of the endowment, the program will subsequently offer two \$500 awards. The Andersen Travel Award has been an invaluable asset to Ecology students wishing to attend conferences. Dr. Andersen, former Director and Scientific Coordinator of the Cosmetic Ingredient Review, has received numerous awards for his work and has been an indelible force in the Penn State graduate school alumni community.



Photo: Dr. Alan Andersen, founder of the Frank A. Andersen Ecology Travel Award for Graduate Students.

Larry York: World Traveler & International Ecologist

South Africa encompasses about twice the land area as the state of Texas and contains about 10% of the world's known plant species. I have been living in a bush savanna here since January at the Ukulima Farm Research Center. Mostly I am just driving by that scrubland to go to one of the many 20 hectare center-pivot irrigated fields where I have planted an experiment investigating maize root traits and planting practices for greater nitrogen acquisition. If the area planted in maize each year was a country then it would be the 19th largest country in the world, or about 1% of the Earth's land area. The amount of nitrogen leached or volatilized in developed countries causes massive amounts of pollution at great cost to farmers. On the other hand, subsistence farmers simply need to get more out of their infertile soil, both through soil enhancement and improved germplasm. My experiment here is investigating the utility of the growth angles of the major root axes of maize (nodal roots) in both low and high nitrogen plots. These monocultures serve as controls for a second study investigating the effects of mixing maize genotypes with contrasting root traits, called multilines. Based on ecological theory and a long history of polyculture work in agricultural science, it is expected multilines will exhibit less competition and greater soil exploration and exploitation. On the way to my study plots someone told me, "Buy a donkey" the other day. I replied, "A horse would be faster." Someone later told me that the expression meant, "Thank you" in Afrikaans. I still don't get the connection but think it's sharp anyways. <http://borlaug.tamu.edu/ukulima/> & <http://roots.psu.edu/ukulima/>



Photo by Larry York, standing in one of his maize nitrogen level split-plots at the Ukulima Root Biology Center, a research cooperative between the Lynch Lab at Penn State and the Howard G. Buffett Foundation, in the Republic of South Africa.

Reaching Out: Outreach Opportunities for Graduate Students ~ Laura Russo

Sharing one's research with others is one of the most important, and most difficult, things for a scientist to do. There are many ways to communicate research to other scientists (conferences, posters, papers, etc.), but it is difficult to make your research appealing to a broader audience. In fact, this is such an important and timely topic that both the Ecology Seminar Series and a class (led by new faculty Dr. Matthew Hurteau) are focused on communicating science. There are also lots of small ways to reach out and share your passion for science with the community. My favorite way involves volunteering to teach children. The Great Insect Fair (October) and Exploration Days (April) are two huge events where more volunteers are always needed. For Exploration Day, you can design your own exhibit to show off your trendy research.

At almost any time of year, the Girl Scouts and Bellefonte Children's Garden need volunteers. You can even be opportunistic in your outreach activities: last year an opportunity suddenly appeared to work with 5th graders at the Penn State Arboretum with the NSF's CarbonEARTH project. It was a great opportunity to teach them about pollinators! Another example was the WPSU (the local NPR station) "Cat in the Hat" day. A group of Ecology and Biology students developed some games and activities for children to learn all about felines. You can also be a mentor to a group of underprivileged high school students as a part of Penn State's SEECoS (Summer Experience in the Eberly College of Science) program. These students come to Penn State for 6 weeks to do a small research project in a lab while taking courses. 99% of the students in these programs go on to graduate from high school and are subsequently accepted into postsecondary educational institutions.



Families examine and interact with a pollinator exhibit at Penn State's Exploration Days, April 2011. Photo by Laura Russo.

So there's no excuse *not* to get involved! Whether you want a 2 hour or a 6 week commitment, whether you want to share your research through art or through play, there is an opportunity waiting for you to get out there and share your research with young minds. I've listed some contact information for various opportunities below, but don't hesitate to contact me (lar322@psu.edu) if you are curious and want more details.

Penn State Outreach Office: Mary Hudson meh25@psu.edu
 SEECoS Program Coordinator: Jackie Bortiatynski jackie@chem.psu.edu
 The Great Insect Fair (Entomology Department): entomology@psu.edu
 Exploration Day: Shannon Palma scp164@psu.edu
 Bellefonte Children's Garden: Steve Conaway sac327@psu.edu

Saving a Changing World: Ecology in the Public Eye ~ Britta Teller

As part of our annual tradition, the Ecology graduate students enthusiastically hosted the 2012 Ecology Spring Seminar Series. This year's theme, "Saving a Changing World: Ecology in the Public Eye," focused attention on the science and the scientists that are of interest to policy makers, stakeholders, and members of the public. We invited influential ecologists from outside the university, such as Dr. Shahid Naeem (Columbia University), Dr. David Wolfe (Cornell), Sam Droege (USGS), Dr. Bob Steneck (University of Maine) and Dr. Don Waller (University of Wisconsin). We also showcased influential scientists from Penn State including Dr. Christina Grozinger, Dr. Matt Hurteau, Dr. Scott Isard, and Dr. David Mortensen. Each of these scientists described both their scientific approaches, and their personalized approaches toward interacting with people outside of academia.

Through the 2012 Ecology Spring Seminar Series, we have learned that there are many different ways to communicate science with those outside academia, and each method serves a unique purpose to help achieve a more ecologically friendly society in the future. While some scientists choose to focus on public outreach or stakeholder involvement, others focus on interacting with policy makers, and some choose to focus entirely on science. Each approach seems to have its own benefits and pitfalls. This seminar series has raised the question whether early-on scientists who endeavor to spread their science outside of academia could be better informed about the investments their efforts will require, and how they could be better equipped with the skills to more easily achieve their ambitions.

Significantly, the Penn State Ecology Program is already hot on the heels of this topic. This semester Professor Matt Hurteau's course, "The Science-Policy Interface," has helped students think about their role in the policy process. Students have practiced preparing science briefs for both policy makers and stakeholders, and the students even met with Congressman Glenn Thompson in an effort to improve the students' understanding of how scientists can better fulfill their role in the policy process. These skills will certainly help Ecology students in the future when they wish to spread the ideas and implications of their research beyond academia.

Steadily Plowing the Way: Jason Kaye Lab Pioneer organic Cover Crop Research

A research collective of Penn State ecologists, spear-headed by Jason Kaye, was awarded a \$2.3 million grant by the USDA. Their research will test the ability of diverse cover crop species mixtures in organic systems to provide improved ecosystem functions compared to traditional monoculture agriculture. The replicated research plots are underway at Penn State's Russell E. Larson Agricultural Research Center at Rock Springs, but some of the cover crop combinations will be replicated with three Pennsylvania farmers on field-sized plots. "We try to think about [the farmers'] ideas and think about the ecological rigor that we have to have to publish, and to mesh those ideas together," said Kaye. "We want this to work...to see if real farmers would actually implement some of these practices. There are going to be tradeoffs," said Kaye, between "profitability, nitrogen retention, weed suppression, and pollinator services. We're looking for systems that don't have serious trade-offs or at least systems where we understand the trade-offs and can make an informed choice." Balancing the responsibilities of running such a large project with all of the other responsibilities in the assistant professor's life would seem to be a formidable task. Kaye cited two contrasting mentors in his life, who collectively taught him that "you have to have a realistic vision of your role so you don't develop a false sense of importance, which leads to an unbalanced approach in your research."



Hairy vetch, red clover, tillage radish and oat cover "cocktail". Taken by Denise Finney at Penn State's Russell E. Larson Agricultural Research Center, Rock Springs.

Open Door, Quirky Humor, and a 1995 Geo Prism: Distinguished Professor Roger Koide

For the past 26 years, Roger Koide, professor of horticultural ecology, has become a well-known fixture of the Headhouse complex and the Ecology Program. In addition to teaching “plant ecology” and “plants in the human context”, Roger has built a renowned research program focusing largely on mycorrhizal fungi in agricultural and forested landscapes. Born in Berkeley, California prior to 1960, Roger had intended on a career in medicine. When it came time to decide on colleges, he was torn, and (using a crude factorial design) flipped three coins three times to determine where he would attend college: Pomona College. He shortly thereafter realized he liked plants and fungi, and he graduated with a Biology degree, after having completed his senior thesis on mycorrhizal fungi and the distribution of plants. He earned his Ph.D. at the University of California, Berkeley, studying botany under Robert Robichaux, “who was just an awesome person, and still is,” said Roger. He chose to work with Robichaux, partly so his wife, Claudia, could pursue cello at Berkeley.

“Robert was interested in plant-water relations...and he knew nothing about mycorrhizal fungi! He always took time [to meet with me], his door was always open and we talked a lot. He had a great influence on the way that I do science.” In his quest for information about mycorrhizal fungi in the pre-internet days, Roger started a prolific international letter writing campaign to communicate with other mycologists about his research. “Robert was just barely older than I was, and when I finished my Ph.D. there, we were both applying to the same jobs,” exclaimed Roger.



But Roger did manage to find a post-doctoral position at Stanford University with Harold Mooney. Roger remembered him as “half-man, half-legend...with a big lab. We were lucky to get one-half hour [of face time] a week with the guy.” Getting used to such a large lab took some time, as Robichaux’s Lab was small and intimate. The contrast between the two management styles left a lasting impression on Roger. “I think you just have to enjoy what you do. And that should be good enough.”

“It was scary for me to come to the east coast,” Roger said of his move to Penn State in 1986. He had lived in California his entire life. “Of course, we had to do it, because there were no other jobs available. I knew nothing of the vegetation.” And after 26 years of teaching and mentoring in Happy Valley, Roger has accepted a professorship in the Biology Department at Brigham Young University, in Provo, Utah for the upcoming academic year. “The irony is now that I’m going back west...I feel as if I don’t know anything about the vegetation there.” He will miss State College, but “What the heck,” he shrugged. “I’ll just shake it up and do something new.”

Roger will also miss his 1995 Geo Prism LSI, “with the 1.8 L, not the 1.6 L, engine,” Roger emphasized. “It’s deeee-luxe. 210,000 miles. I’ve told many people that I am probably a better mechanic than I am a professor. Buying an old car and driving an old car is a *pleasure*,” Roger cooed with genuine enthusiasm, a smile on his face and his eyes rolled back. “It’s almost, sort of, a source of pride. My wife won’t let me take it to Utah, though.” So the Prism is for sale--anyone? “It’s still going strong,” Roger said confidently about his car. Just like Roger.



A red trillium (*Trillium erectum*) emerges this spring at Ricketts Glen State Park, Pennsylvania. Photo by Glenna Malcolm.

Quanying Du (MS), Dave Lieb (PhD) and Rebekah Wagner (PhD) recently completed their Ecology degrees.

The following students recently passed their thesis defenses: **Nick Polato, Kristen Granger, JB Moon.**

Penn State Ecology students and faculty recently received the following awards and fellowships:

Denise Finney, Ph.D. student, was recently award the following grants: 1) Penn State University College of Agricultural Sciences Graduate Research Grant. 2011.

Cover crop mixtures: Harnessing diversity to enhance nitrogen retention in agroecosystems. 2) Northeast Sustainable Agriculture Research and Education. 2011. Cover crop cocktails: Harnessing diversity to enhance nitrogen retention in agroecosystems.

Franklin Egan - Intercollege Graduate Student Outreach Achievement Award

Alison Grantham - NSF Graduate Research Fellowship

Gail McCormick - NSF Graduate Research Fellowship

Jenny Tennesen - NSF Doctoral Dissertation Research Improvement Grant (DDRIG)

Jackie Harth - NSF GFRP Honorable Mention

Chris Fernandez & Lindsey Swierk- Andersen Awards

Anjel Helms & Franklin Egan- Ecology Travel Awards

Tracy Langkilde - 2011 Mercer Award

The Ecology Program would like to wish **Susan Parks** (Syracuse University), **Beth Shapiro** (UC Santa Cruz), and **Roger Koide** (Brigham Young University) the best of luck in their new endeavors.



A plain's zebra (*Equus quagga*) forages in the Republic of South Africa. Photo by Larry York.

Cahoon, S., M.P., P.F. Sullivan, E. Post & J.M. Welker. 2012. Large herbivores limit CO₂ uptake and suppress carbon cycle responses to warming in West Greenland. *Global Change Biology* 18: 469-479.

Egan, J.F., & D.A. Mortensen. 2012. A comparison of land-sharing and land-sparing strategies for plant richness conservation in agricultural landscapes. *Ecological Applications* 22: 459-471.

Egan, J.F., & D.A. Mortensen. 2012. Quantifying vapor drift of dicamba herbicides applied to soybean. *Environmental Toxicology and Chemistry* 31(5).

Mortensen, D.A., J.F. Egan, B.D. Maxwell, M.R. Ryan, & R.G. Smith. 2012. Navigating a critical junction for sustainable weed management. *BioScience* 62: 75-84.

Abrams, M. D., & S.E. Johnson. [In-press]. Long-term impacts of deer exclosures and land-use history on forest composition at the Valley Forge National Historical Park, Pennsylvania, USA. *Journal of the Torrey Botanical Society*.

Parks, S.E., C.F. Hotchkin, K.A. Cortopassi, & C.W. Clark. [In-press]. Characteristics of gunshot sound displays by North Atlantic right whales in the Bay of Fundy. *J. Acous. Soc. Am.*

Kristine Averill, Ph.D. Candidate in Ecology, won "Best Graduate Student Presentation" at the Northwestern Weed Science Society's annual meeting.

Freidenfelds N.A., T.R. Robbins, & T. Langkilde. [In-press]. Evading invaders: the effectiveness of a behavioral response acquired through lifetime exposure. *Behavioral Ecology*.

Du, W., D.A. Warner, T. Langkilde, T., T.R. Robbins, & R. Shine. [In-press]. The roles of pre-hatching and post-hatching growth rates in generating a latitudinal cline of adult body size in the eastern fence lizard (*Sceloporus undulatus*). *Biological Journal of the Linnean Society*.

Swierk, L., & T. Langkilde. [In-press]. Female lizards discriminate between potential reproductive partners using multiple male traits when territory cues are absent. *Behavioral Ecology and Sociobiology*.

Rollinson, C.R., & M.W. Kaye. 2012. Experimental warming alters spring phenology of certain plant functional groups in an early successional forest community. *Global Change Biology* 18: 1108-1116.

Salvanes, A.G.V., A.C. Utne-Palm, B. Currie, & V.A. Braithwaite. 2011. Behavioural and physiological adaptations of the bearded goby to the extreme environment of the Benguela upwelling. *Marine Ecology Progress Series* 425: 193-202. Summary: Nutrient-rich, upwelling marine areas with high productivity often produce sediments dominated by organic-rich mud where intense decay processes create hypoxic conditions with high concentrations of hydrogen sulphide and methane. Such environments are inhospitable to most forms of life, however, we have discovered a small goby fish that has physiological and behavioral adaptations allowing it to exist in the hypoxic muddy sediments for hours at a time. When the fish move into these areas, they go into a resting state and they shut down their respiration, but we found that they remain sufficiently alert to detect and if necessary flee from the threat of predation.

Runner-up, 2nd best spring photo by Laura Russo of emerging *Hepatica nobilis* at Fisherman's Paradise, Central Pennsylvania.

Newsletter edited by Jason Hill. Thank you for this privilege. It has been a pleasure serving our program this past year. Best of luck to Chris Fernandez as he takes over these duties as the new program assistant. Cheers, JH