



Department of Plant Biology, Ecology, and Evolution

# Bluestem

Summer 2016

Dear Alumni and Friends,

What a busy year! We welcomed a new faculty member, Dr. Henry Adams. We have a new Administrative Assistant, Sarah Scroggins. Sarah was an OSU employee at University Mailing Services, and is a people-centric person who is quickly learning the academic side of OSU. Our former Administrative Assistant, Mary Jane Kendall, decided to retire this year to spend more time with grandchildren. And if you were still wondering about Paula Shryock, our former administrative assistant of many years, she is thriving in the OSU Office of Internal Audits.

We changed our departmental name to Plant Biology, Ecology, and Evolution! Botany has become a dated name over the years, and fewer than 20% of textbooks use the word botany. It was time to modernize our name to attract today's students who may not even know what botany means. We also changed our undergraduate degree name to *Plant Biology* with two degree options: *Ecology and Evolutionary Biology* and *Cell Biology and Molecular Genetics*. We changed our MS to *Plant Biology*, although the name of the PhD *Plant Science* remains unchanged.

Our students continue to be successful! Mylissa Stover was named the 2016 Botany Outstanding Senior. She has been accepted into our PhD program to work with Dr. Schoenknecht starting this fall. Our undergraduate scholarship went to Julia Clark, a Biochemistry-Botany double major who conducted research with Dr. Steets, and the Speairs Herbarium Fellowship will support Alex James this summer.

Among our graduate students, Nicole Parker (PhD) received the OSU Otto Cox Distinguished Graduate Fellowship in Genetics, and Justin Dee (PhD) received the first OSU Morris Gray Distinguished Graduate Fellowship. Our graduate scholarships went to Ky Shen and Justin Dee. In addition, several graduate students competed in OSU's 3MT (3 minute thesis) competition and the Department received one of three \$2000 participation awards to support graduate student travel that has helped fund field work and conference travel for many students.

The Department hosted the 8th annual Botany-Library Seminar Series, co-hosted with the Cross Timbers Chapter of the Oklahoma Native Plant Society and OSUBS. This year we invited Dr. Carlos Cordova, a paleoecologist in the OSU Geography Department, who presented a public seminar on his new book, *Crimea and the Black Sea: An Environmental History* (2016).

Dr. Susan Barber, Provost Emeritus of Oklahoma City University, was selected for the Department's Distinguished Alumnus Award, and was recognized at the College of Arts and Sciences Hall of Fame Banquet. Dr. Barber received her MS Botany at OSU under the mentorship of Dr. Ron Tyrl, and then pursued her PhD at University of Oklahoma before embarking on a distinguished career in academia.

Lastly, this year is my second and final term as department head. I have sincerely enjoyed the past 8 years working with our energetic and collegial faculty and students. I look forward to being a regular faculty member once again, and plan to reinvigorate my research program on the systematics and evolution of the sunflower family by taking a long overdue sabbatical next year.

Best regards,  
Linda E. Watson



Linda Watson



Sarah Scroggins



Susan Barber



Dr. Ron Tyrl



Mylissa Stover

## Dr. Henry Adams joins the department of Plant Biology, Ecology, and Evolution

Dr. Henry Adams joined the department in the fall semester of 2015. Dr. Adams is a plant ecologist interested in how plants interact with their environment. He has depth of experience in plant physiological ecology, ecohydrology, and tree-ring science and is broadly interested in plant response to climate change. Dr. Adams was raised in upstate New York where he earned his BA in Biology and Environmental Studies in 1999 at Alfred University. He then relocated to the southwest USA, where he earned an MS at Northern Arizona University in Forestry (2003), worked as a research technician at the University of Colorado, Boulder at the Institute of Arctic and Alpine Research (2004-2006), and then earned a PhD in Ecology and Evolutionary Biology from the University of Arizona (2012). Dr. Adams comes to OSU from a 3-year postdoc at Los Alamos National Laboratory in Los Alamos, NM where he worked in the Earth and Environmental Sciences Division on forest response to climate change. The themes of his recent research have been the response of trees and forests to drought, including how trees die from drought, with a focus toward anticipating the effects of global change on ecosystems. He is excited to apply his research perspective and approach formed in dry forests of the Southwest to study trees in the Oklahoma Cross Timbers living on the dry, hot edge of the vast eastern US forest. Dr. Adams co-taught General Ecology in fall 2015, a class he thoroughly enjoys teaching, and will continue to co-lecture (in collaboration with instructors from Integrative Biology) and run the laboratory sections both semesters of the 2016-17 academic year. Additionally, two graduate students will start in the department in fall 2016 under Dr. Adams' supervision, joining his Environmental Ecology Lab. He and his wife also recently celebrated the birth of his second son in Stillwater earlier this summer.



*Dr. Henry Adams*



*Justin Dee in the field taking some measurements*

## Morris Gray Fellowship

Justin Dee, PhD candidate in the Biodiversity Laboratory under the direction of Dr. Mike Palmer, is one of the two first recipients of the Morris Gray Fellowship. This fellowship supports research and communication of such research to the general public. It will allow Justin to pursue pioneering research on herb chronology. This is a new discipline similar to the science of tree rings (dendrochronology) except that it studies the rings formed in wildflower roots. Justin is studying species from Oklahoma, Minnesota, and Kansas. He has recently returned from a trip to Brazil, where he is beginning a collaboration with root ecologists investigating the vast cerrado ecosystem.

## Sigma Xi Young Investigator of the Year at OSU!

Congratulations! Dr. Janette Steets was named Sigma Xi Young Investigator of the Year at OSU in recognition of her research successes and productivity.

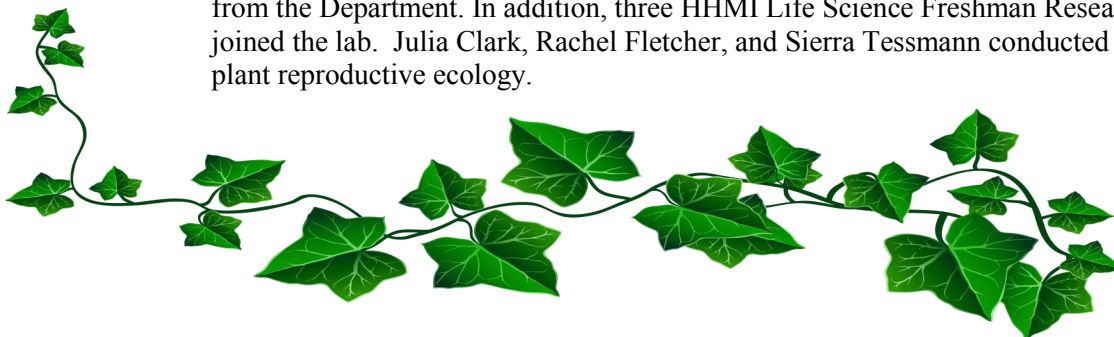
Dr. Steets and her collaborators, Drs. Tiffany Knight (Helmholtz Centre for Environmental Research, Martin Luther University, and German Centre for Integrative Biodiversity Research) and Tia-Lynn Ashman (University of Pittsburgh), were awarded funding from the Synthesis Centre of Biodiversity Sciences (sDiv) in Leipzig, Germany to organize a working group on plant-pollinator interactions. Through this funding, 16 scientists in the field of pollination ecology met at the sDiv research facility in Leipzig in January 2016. The group will also meet in Hamburg, Germany in July for continued collaboration. The group will quantitatively synthesize hundreds of studies on pollen limitation of plant reproduction to provide a global assessment of how human perturbations to the environment influence plant-pollinator interactions and plant reproductive success.

Dr. Steets is also a co-investigator on a recently funded \$1.5 million Howard Hughes Medical Institute (HHMI) grant to OSU to integrate authentic research experiences into the undergraduate life sciences curriculum. Janette is revising the laboratory component of the freshman-level introductory plant biology class in which students will identify novel research questions and plan and conduct an experiment to address them. The newly revised course was offered for the first time in 2015-16.

Dr. Steets' PhD student, Sally Kittrell, continued her research on plant-mycorrhizal fungi interactions in prairie wetlands. Sally received a Robberson Summer Dissertation Fellowship and an OSU Foundation Distinguished Graduate Fellowship. Dr. Steets' MS student, Ky Shen, is examining how the presence of non-native, co-flowering species influences the pollination and reproductive success of native plants. Ky is conducting a large-scale manipulative experiment, funded in part by a McPherson Award from the Department. In addition, three HHMI Life Science Freshman Research Scholars joined the lab. Julia Clark, Rachel Fletcher, and Sierra Tessmann conducted research on plant reproductive ecology.

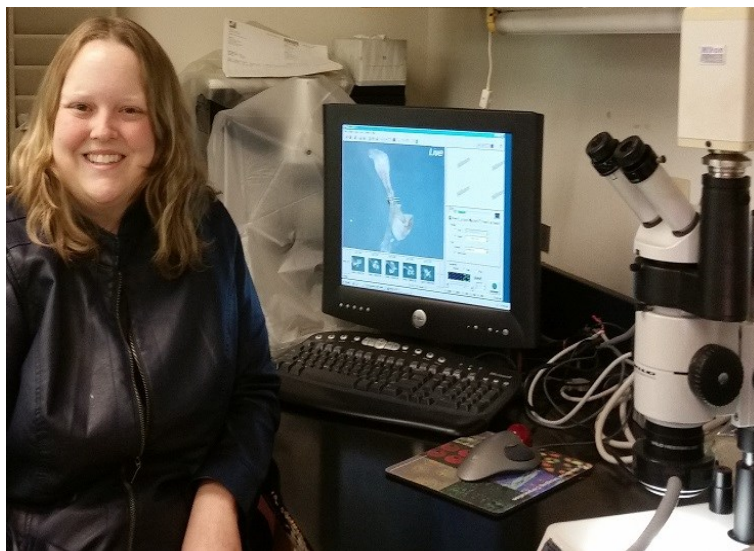


*Dr. Janette Steets*



Nicole Parker, PhD candidate in Dr. David Meinke's laboratory, was recently awarded the Otto S. Cox Graduate Fellowship for Genetics Research at OSU. These fellowships are designed to help support outstanding graduate students with a proven record of research in genetics, regardless of discipline. Nicole continues to make steady progress in her research, which is focused on the importance of chloroplast translation in Arabidopsis, and she is highly regarded for her TA contributions in General Genetics and Plant Biology. Nicole also attended the International Conference on Arabidopsis Research last June, which was conveniently located in Paris. Otherwise, you are likely to find Nicole working in the basement of Life Sciences East, when she is not upstairs tending to the plants. With data collection for another lab manuscript nearing completion, and a final set of experiments planned for the coming year, the next hurdle for Nicole will be writing a dissertation. Stay tuned!

## Otto S. Cox Graduate Fellowship

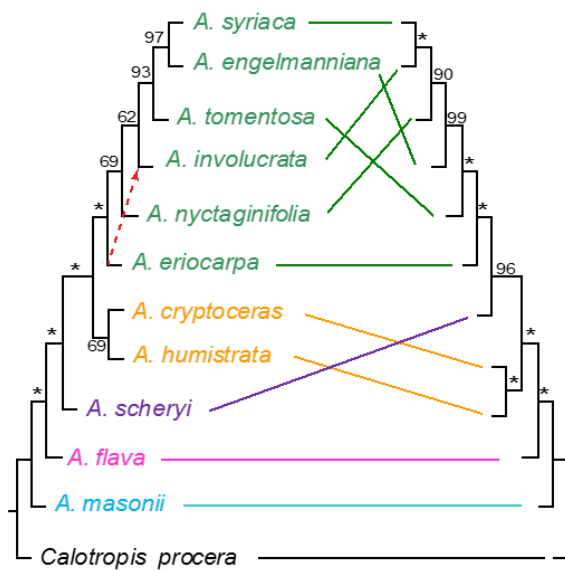


*Nicole Parker*

## Mark Fishbein's Sabbatical on Milkweed Phylogenomics



Dr. Mark Fishbein



In Fall 2015 Dr. Fishbein received the Bass Fellowship from the Field Museum in Chicago to pursue research on computational methods used in phylogenetic analysis of genome sequences. He was hosted by Curator Richard Ree, a theoretical phylogeneticist. Together they worked on developing new methods to visualize the distinct evolutionary histories present across genomes of plant species. This is a computationally complex problem because there is no one common history across all the genes especially for groups undergoing rapid speciation. This occurs because recent species retain the ability to hybridize and genes can “jump” from one species into another when their hybrids continue to cross with members of one or both species. It is also problematic when speciation occurs so quickly that new species do not evolve distinct characteristics that separate them from their ancestors. When both of these processes occur, gene sequences across the genome may reflect speciation history, or may conflict with that history due to hybridization or the failure of unique mutations to occur between speciation events. Fishbein and Ree worked on methods of visualizing the different “stories” that genes comprising the genomes tell in an effort to improve best estimates of evolutionary history of species—their phylogeny. Fishbein and Ree also organized and hosted a workshop at the Field Museum on new methods for efficiently obtaining and analyzing DNA sequence data from hundreds of genes across the genome, which was attended by 25 researchers from 4 institutions across the Chicago region. These methods are being employed in Fishbein’s research on the phylogenomics of American milkweeds.



Alex James examining plant life in the Herbarium

## New OSU Herbarium Speairs Fellow Alex James

The OSU Herbarium and Department of Plant Biology, Ecology & Evolution are pleased to announce the awarding of the Drs. Betty and Richard Speairs, Jr. Fellowship to Alex James. Alex is a Natural Resource Ecology and Management major with interests in wildlife and plant ecology. With support of the Fellowship, Alex will learn the skills used in the curation of natural history collections, in particular those used in herbarium curation. He will also contribute to research on the flora of the Beaver River Wildlife Management Area in western Oklahoma through critical study of specimens in the OSU Herbarium. The Fellowship was established and supported by the generous donations of Betty and Richard Speairs and others who value the importance of undergraduate training in collections based research and education.

## 2016 OSU National Lab Day

Faculty and graduate students in the Department participated in National Lab Day again this year. We had high school classes from Guthrie, Tishomingo, and Broken Bow visit, with each group comprised of ~8 students plus their Biology teacher.

Our sessions on “Is There DNA In Our Food?” took place in the Biodiversity lab in the Henry Bellmon Research Building. Chris Wood, Clinical Instructor, along with Drs. Doust, Scheets, Schoenknecht, and Steets and several graduate student volunteers led the sessions. The high school students extracted DNA from bananas and strawberries while the faculty described what plant biologists do with DNA and the information obtained from DNA sequences. Afterwards the students were treated to banana-strawberry smoothies while the faculty and grad students talked about research opportunities in plant biology.

National Lab Day is a volunteer initiative to form local communities of support around science, technology, engineering and mathematics (STEM) to connect teachers with STEM professionals who share their expertise as well as their excitement and passion for their disciplines. OSU-National Lab Day is a collaborative outreach effort between five OSU colleges and is geared toward exposing Oklahoma high school students and their science teachers to STEM education. Visiting high school student groups attend three different sessions with researchers throughout the day.

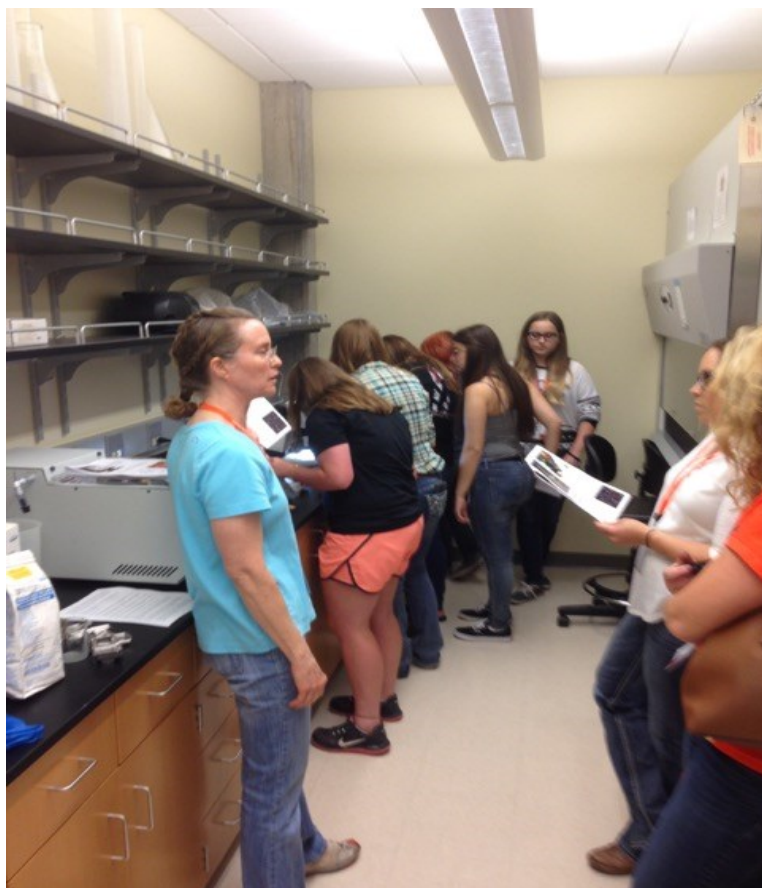
# Natl. Lab Day



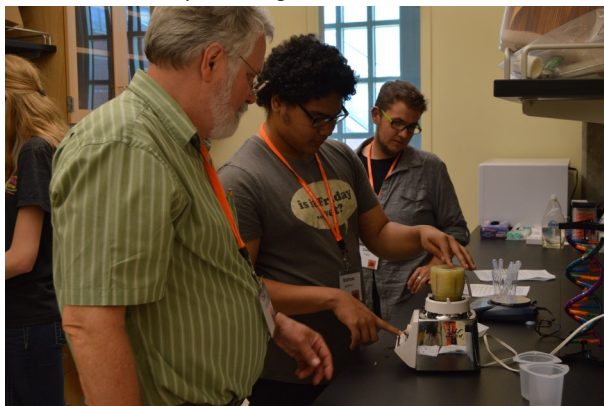
*Lab Day Participants with Dr. Schoenknecht*



*Lab Day Participants with Dr. Steets*



*Lab Day Participants with Dr. Scheets*



*Lab Day Participants with Clinical Instructor Chris Wood*



Mike Palmer

**Regents Professor Michael Palmer** recently completed a four-year term as a Vice President of the International Association for Vegetation Science (IAVS; iavs.org). This organization has European roots, but has expanded to represent the discipline from all continents (including a few scientists studying Antarctic plants!) A benefit of the association is the annual symposium, which has recently been held in Estonia, Korea, Australia, Czechia, Mexico, and France. The symposium features not only formal talks, but excursions to visit natural vegetation and cultural landscapes. The US has more IAVS members than any other country – and one of Mike’s largest challenges is to encourage these members to be more active in the affairs of the Society. In particular, relatively few American students take advantage of the generous travel support offered by IAVS. Another challenge is to expand membership in underrepresented regions such as Asia and sub-Saharan Africa. Mike initiated the IAVS FaceBook Group, which has become an active site for sharing job announcements, events, and photographs of vegetation from around the world. Mike continues as editor of the Forum section of the two journals published by IAVS: The Journal of Vegetation Science and Applied Vegetation Science. Forum papers are meant to be an outlet for creative ideas that could be controversial or speculative, but which are also likely to spur future discussion and research. Mike engages the Young Vegetation Scientist section of IAVS in reviewing manuscript submissions to IAVS journals. This June he will lead a workshop in Brazil on how to write an effective manuscript review in Vegetation Science.



## OSUBS 2016 Photo Contest Winners Announced!



**1st Place Winner** *Echinocereus Coccineus*,  
taken by Frankie Coburn



**2nd Place Winner** *Groundcover*,  
taken by Angela McDonnell



**3rd Place Winner** *Aspen Canopy*,  
taken by Henry Adams



## SUMMER INSTITUTES on Scientific Teaching



*Dr. Linda Watson*

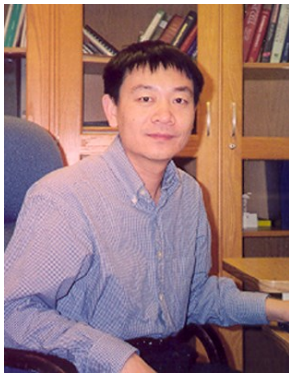
*Dr. Janette Steets*

**Drs. Janette Steets and Linda Watson** were selected to serve as OSU's team at the Gulf Coast Summer Institute at Louisiana State University in Summer 2015. This week-long workshop was sponsored by the National Academies of Science and the Howard Hughes Medical Institute. The objective of these regularly held institutes across the Nation is to improve life science education through the integration of interactive and experimental exercises into the classroom. Dr. Watson will return for the Summer 2016 workshop to present what changes have been made to courses following the first workshop, and to interact with new participants to assist them with developing more hands-on activities for their classrooms.



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**The Yang lab** continued to work on molecular mechanisms in reproductive processes such as meiotic cell cycle progression, fruit dehiscence, and seed dormancy. As part of a long-term investigation, Dr. Ming Yang and Dr. Yixing Wang are making progress in identifying genes that suppress the defects in male meiosis in *Arabidopsis*. Once these suppressor genes are identified, they can help to understand a regulatory process that seems to exist in meiosis in diverse species including plants, animals, and fungi. Dr. Yang, in collaboration with Dr. Hong Wu's group at South China Agricultural University, recently characterized the male meiotic process in a cycad species which suggests that initiation of cell wall formation before nuclear division is an ancient feature in plants. The Yang lab is also hosting a visiting PhD student, Hanjun He, from Dr. Wu's group. Hanjun is finishing his research focused on how genes of cell wall degradation enzymes affect fruit dehiscence in *Arabidopsis*. Hanjun's findings indicate that fruit dehiscence results from the actions of different cell wall degradation enzymes, and that it is possible to achieve different kinetics of dehiscence in fruits or other organs in crops by manipulating the activities of genes of cell wall degradation enzymes. Ming and Yixing are also finishing an OCAST-funded project focused on three genes that function in protein degradation in *Arabidopsis*. Two of these genes are part of the signaling process involving the hormone auxin. What biological process the third gene is involved in is currently unknown. Interesting observations have been made on how the two auxin-signaling genes act in maternal tissues that control seed dormancy. Dr. Yang has been invited to give a talk on the findings in seed dormancy regulation at the annual meeting of American Society of Plant Biologists in July 2016 in Austin, Texas.



*Dr. Ming Yang*



### STAY IN TOUCH WITH US!

Remember to check the Department of Plant Biology, Ecology, and Evolution out on Facebook at <https://www.facebook.com/Oklahoma-State-Plant-Biology-Ecology-Evolution-142257229155141/>.

Our departmental website is always up to date with all of our happenings at <http://plantbio.okstate.edu/index.html>.

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**Yes**, I want to support the PBEE Department at OSU. Please direct my gift to the following:

- Botany Excellence Fund** (223840) [supports PBEE Seminar series ]
- Botany Scholarship Fund** (2290090) [supports undergraduate student scholarships and awards]
- James K. McPherson Fund** (225090) [supports graduate student field research and conference travel]
- Betty & Richard Speairs Fellowship** (223250) [supports an undergraduate herbarium assistant]

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