

Botany & Conservation

A newsletter for alumni of Botany and Biological Aspects of Conservation • Fall/Winter 2014



The group at Waikamoi Preserve on Maui



Daniel Hein

Kalalau Lookout, overlooking the Na Pali Coast on Kauaʻi

Fieldwork in Paradise by Tom Givnish

The Hawaiian Islands form the greatest natural laboratory for the study of ecology and evolution on Earth. Eight major islands – ranging from Hawaiʻi, the largest and youngest, to Kauaʻi, the oldest – formed volcanically over the past five million years as the Pacific Plate moved past the Hawaiian hot spot. Earlier islands have since worn down to pinnacles, atolls, and a long line of seamounts that ultimately plunge into the Aleutian Trench. Today, the major islands offer an extraordinary range of habitats, soaring up to 13,000' in elevation and including the rainiest and some of the driest spots on Earth. They are also extremely isolated, so few plant and animal species ever reached the Hawaiian chain. But the successful colonists speciated and diverged from each in the most spectacular fashion, generating more than 1100 species of native flowering plants, 5800

native insects, 780 land snails, and 80 land birds. Eighty percent of the flowering plants are found nowhere else on Earth, 94% of the insects, and 97% of the land snails – all on a land mass less than one-fifth that of Wisconsin. Evolution thus made Hawaii a lush, biologically rich set of tropical islands, far richer in species and specialized adaptations than the Galápagos that so inspired Darwin. But its small area and isolation has also left Hawaii exquisitely sensitive to extinction due to habitat destruction and the introduction of exotic species. Hawaii thus holds many lessons for those interested in speciation, adaptive radiation, extinction, and restoration.

In May and early June this year, my post-doc Becky Kartzinel and I led an avid group of 13 UW-Madison students to Hawaii for a two-week field course exploring the rich field of Hawaiian ecology and evolutionary biology, supported in part by a generous gift from the Theophrastus

Fund. After two days of lectures and orientation in Madison, we flew to the Big Island (Hawaiʻi) for a week of field instruction and research, ranging from cloud forests to lava tubes and kipukas, mesic forest, alpine scrub, black sand beaches, and colorful coral reefs. We made our headquarters in Volcano, a small village at 4000', just outside Hawaii Volcanoes National Park. We spent most of our days in cool, misty cloud forests dominated by *Metrosideros* trees (related to *Eucalyptus*) and massive tree ferns, observing several plant species found nowhere else on Earth, and native birds that hover near extinction as a result of introduced diseases.

While on the Big Island, we began studying genetic variation and gene flow in an understory treelet, *Cyanea pilosa*, a member of the Hawaiian lobeliads, the largest Hawaiian lineage to have descended from a single colonist. Students precisely mapped (continued on p.6)



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Chair's Letter: Learning in the Field

On a grey and cold January day in my first winter in graduate school, I boarded a plane to fly to a remote and mountainous island in the Caribbean. After hours over the ocean, we landed and taxied up to the small building in the early evening. Passing through the hatch, I was immediately enveloped by a blanket of warm air full of damp scents. I'd never been to the tropics before, yet I instantly relaxed, feeling oddly at home. Upon reflection, I realized that I was, like all great apes, a creature of the tropics, even if some recent ancestors temporarily adjusted to northern climes.

Our trip included tedious delays, stinging insects, threats from a machete-wielding farmer, wounds, mechanical problems, a deluge-driven stream through one of our tents, and times when food was short. I also got to hold birds with iridescent feathers in my hand, see my first palms and epiphytic orchids, and taste local rum poured in a cane field from a jerrycan. The smells, images, and memories jump immediately to mind even after 36 years. I was hooked on field biology.

We all learn in different ways. But research and our own experience teach us that certain forms of learning really work. Involving students directly as we do every day in labs and discussions has

value, particularly for students who find lectures or textbooks difficult or dull.

No course provides more active learning, more vivid memories, or more student contact hours than a field course. So much is new and unexpected. "Teachable moments" come in quick succession, often in a compelling cultural context. This is why those of us who have taken field courses are so committed to teaching them – despite the time, trouble, and risks involved.

What will become of field courses, field trips, and lab courses in coming years as administrators seek metrics like student credit hours per instructor to judge and compare departments? Field courses appear inefficient, yet they reliably yield the richest and most meaningful experiences of college careers if we believe our students and our own memories. I predict our field courses will continue for these reasons: We have students who treasure these courses, faculty willing to teach them, and generous friends who recognize the special roles they play. May we continue to have the chance to travel, suffer and enjoy journeys together, and learn the lessons of a lifetime.

Jim Bennet named preservation Chair

Dr. Jim Bennett, Honorary Fellow of the Dept. of Botany, has devoted most of his career to the study of lichens, but also to the conservation of their rapidly disappearing habitats. Jim retired from the US Geological Survey in 2011, but remains an active researcher in the UW-Madison Herbarium. This year Dr. Bennett was appointed Chair of the WI Natural Areas Preservation Council, which advises the Department of Natural Resources on issues relating to the establishment, protection and management of State Natural Areas throughout Wisconsin. Jim is also a member of the Board for the Natural Resources Foundation of Wisconsin, where he helped to establish that organization's Rare Plant Preservation Fund.

Farewell from Cheryl Rezabek

After 30 years in state government, including the 3+ years here in the Botany Department, I have decided to retire. These last few years have been some of the best of my career. What made it so special is the people

– staff, faculty, students, and friends. I was lucky that you took a chance and hired someone from outside the University. It took a while to come up to speed but the positive and helpful atmosphere in the department provided a network of support. My last day will be January 2, 2015 and my hope is to have a new Administrator in place and oriented as I leave.

Thank you for allowing me to come full circle in my career – starting as a student in Biological Aspects of Conservation and ending as the Administrator in the department.



Cheryl c.1982 with a wood duck box

Suzy Will-Wolf retires

After 35(!) years in the Botany Department coordinating General Ecology and conducting lichen research, Suzy Will-Wolf retired this summer. As with many Botany retirees, however, "retirement" does not mean slowing down. No sooner did she leave than she took on another responsibility — Secretary for the American Bryological and Lichenological Society. Suzy also plans to continue her lichenology research as an emerita, so she will happily remain a presence in the Botany Department. Congratulations, Suzy!

This newsletter is published by the Department of Botany at the University of Wisconsin-Madison for alumni, colleagues and friends. Editorial team: Anna Berberet, Ken Cameron, Carmela Diosana, Sarah Friedrich, Cheryl Rezabek, and Kirsten Schultz. Submissions are welcome. Please send comments, ideas and photos to: Alumni News Editor
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Botany welcomes Tricia Fry and Carmela Diosana



Tricia Fry joined the Botany Department in January of 2014 as the Ecology Course Coordinator. She completed her MS in Wildlife Ecology at UW Madison

in 2004 and returned to Madison after working as a wildlife biologist at the USDA National Wildlife Research Center in Fort Collins, CO, where her research focused on diseases of wildlife. She's eager to broaden her teaching experience and looks forward to introducing students to ecology. Tricia is happy to have returned home to Wisconsin with her husband Jed, daughters Addie and Tess, and her good ol' dog Riva. Tricia's favorite tree is *Pinus strobus*, with *Silphium terbinthinaceum* topping her forbs chart.



Carmela Diosana joined the Botany Department in September 2014 as the Student Services Coordinator. She has been at UW-

Madison for fourteen years, between the Nelson Institute and the Wisconsin Center for Educational Research. Her experience includes being a department administrator, managing an NSF IGERT, co-developing the Community Environmental Scholars Program, career advising and conference planning. She enjoys working with students as they develop their short term goals and long term dreams. Her favorite tree is *Populus tremuloides*.

Join the Society for Conservation Biology!

The Wisconsin Chapter of the Society for Conservation Biology (WSCB) had its kick-off meeting in early October. The WSCB mission is to foster collaborative relationships among conservation professionals, NGO and agency leaders, higher education faculty and students throughout the state of Wisconsin - all are welcome! Participation in WSCB is a great way to help promote an integrative approach to conservation biology, advance conservation positions in public policy, develop professional and leadership skills, and network with community members all over the state.

Check out WSCB's website (wisconbio.org) for upcoming activities and events, as well as information on how to get involved!

IT Cooperation to Better Serve UW

Recently, the UW Botany and Math departments embarked upon an experiment. By joining together, we have created a team to serve the administrative, instructional and research IT needs of both departments. Two staff were hired as joint Botany and Math IT staff; Steven Goldstein as the new Research IT Facilitator and Henry Mayes as a IT Help Desk Assistant. Two of Math's current staff agreed to help with ongoing issues to assist the two new employees, Sara Nagreen, Math IT Coordinator, and John Heim, Math Linux Systems Administrator. We hope to serve as a model to others within the college on how to best share and allocate resources by sharing knowledge and duties.



Henry Mayes (lt) and Steven Goldstein (rt)

Cameron receives national award

The American Society of Plant Taxonomists awarded Dr. Ken Cameron, Professor of Botany and Director of the Wisconsin State Herbarium, the Society's 2014 Peter Raven Award. The award is named for Dr. Peter Raven, eminent botanist and President Emeritus of the Missouri Botanical Garden who has made outstanding contributions to science education and outreach.

Throughout his career, Ken has engaged with audiences ranging from professionals to chefs to horticulture enthusiasts about systematics and orchid biology. He is an in-demand speaker with "a unique ability to explain complex scientific concepts in a way that everyone

in the audience can understand." His work has been frequently featured in the popular press, including an article in the New York Times and coverage on NOVA and HGTV. Ken has written on natural history topics for non-technical audiences, including his popular book, *Natural History and Cultivation of Vanilla Orchids*, and several children's books about plant biology. Most recent-

ly he has involved his graduate students in authoring monthly articles for the American Orchid Society and crafting award-winning public outreach displays at major orchid society meetings.



Project prepares collection for 21st-century challenge of invasive species

Excerpted from the original news story by David Tenenbaum, Sept 12, 2014

UW-Madison sophomore Alex Idarraga [a Botany major] carefully feeds a paper sheet holding a pressed, dried plant into a light box, closes the door and triggers the camera mounted overhead. Each click of the shutter moves the Wisconsin State Herbarium where he works one step closer to a long-sought goal: entering photos of its plant specimens into a database together with information on the collector, collection date and location. As the name implies, the herbarium has the world's largest collection of Wisconsin plants. And Wisconsin, with more than 1,000 miles of shoreline along two Great Lakes, is ground zero in the ongoing transformation of lakes great and small by exotic species — invaders that come from different places and prosper in waters that lack natural controls and predators.

At the herbarium, director Kenneth Cameron is spearheading a new, three-year project to “digitize” images and data on aquatic and wetland plants, mollusks and fish from the Great Lakes basin. The \$2.5 million collaborative grant from the

National Science Foundation will also be disbursed to natural history museums at UW campuses in Stevens Point, Milwaukee and La Crosse, and in other Great Lakes states.

Together, these institutions expect to digitize 1.73 million specimens related

now nearing Chicago. The new project will not fund data analysis, and therefore will not directly slow the tide, “but the more information we can put out there, the better,” Cameron says.

Access matters, adds Cameron. “It’s kind of a shame that we have museums

and herbaria sitting on such a treasure trove. Anybody can use it, but only if they know about it. We want to get the data out.” A second goal is to harness the explanatory power resident in those collections to document species invasions, with an eye, eventually, toward prevention. The digitized data will shed light on the movement of invasives, Cameron says. “Our collections go back more than a century, and spread far beyond the state,” says Cameron, “so we will

be able to track the arrivals back to their origin. That should help us prepare for new ones, or better yet, to prevent them. Ultimately, Cameron says, “I hope people will realize that invasives have been with us for a long time, but their rate of spread is accelerating, and our collections can document that. That may create a greater sense of urgency and concern.”



Alex Idarraga photographs a plant invading the Great Lakes basin.

to Great Lakes invasives. The project has targeted 2,550 species, including known invaders and their close relatives. At least 180 nonindigenous species are living and reproducing in the Great Lakes basin, and many wreak havoc. Old invaders, like the zebra and quagga mussels, already have had enormous economic and environmental impacts, even as new ones knock on the door, like the Asian carp

Consider helping our Department's people and programs

Botany Department General Fund (fund # 1216106)

The generosity of our donors allows the Botany Department to help our students, faculty and staff reach their full potential via grants, awards, travel support, internships, guest lectures, and buying critical equipment. Please consider making a donation to via the UW Foundation. See: <http://www.supportuw.org/giving?seq=1254>
Additional targeted funds are available at: <http://www.botany.wisc.edu/giftgiving/>

Biological Aspects of Conservation Major Fund (fund # 12168143)

Please join us in our efforts to provide support for important BAC program priorities. Gifts to the Biological Aspects of Conservation Major are used to recognize outstanding BAC undergraduates, support various activities such as research and study abroad, and to sponsor special lectures and other professional development opportunities for students. See: <http://www.supportuw.org/giving?seq=19206>

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How plants adapt: Calcium waves help the roots tell the shoots

Excerpted from the original news story by Kelly April Tyrrell, University Communications, April 3, 2014

For Botany Professor Simon Gilroy, sometimes seeing is believing. In this case, it was seeing the wave of calcium sweep root-to-shoot in the plants he is studying that made him a believer.

Gilroy and colleagues, in a March 24 paper in the Proceedings of the National Academy of Sciences, showed what long had been suspected but long had eluded scientists: that calcium is involved in rapid plant cell communication.

It's a finding that has implications for those interested in how plants adapt to and thrive in changing environments. For instance, it may help agricultural scientists understand how to make more salt- or drought-tolerant plants.

Calcium is involved in transmitting information in the cells of humans and other animals, contracting muscles, sending nerve signals and more. Scientists believed it had to also play a role plants, but no one had ever been able to see it before. Even Gilroy's team found it by accident.

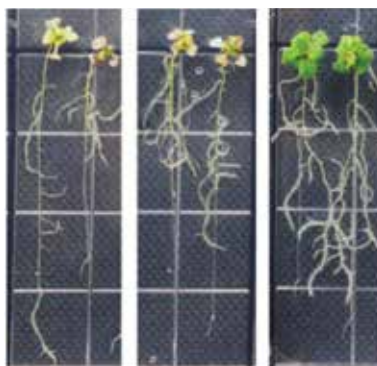
The team was using a specific calcium sensor they thought wasn't going to work. They speculated it could serve as a control in their studies.

The sensor's brightness changes in the presence of calcium, displayed on screen

as a change from green to red through a process known as fluorescence resonance energy transfer, or FRET. When researchers applied stress to the tip of a plant's roots — a high concentration of sodium chloride salt — it triggered a wave of red that traveled rapidly from the root to the top of the plant.

The calcium wave traveled on a scale of milliseconds, traversing about eight plant cells per second — too quick to be explained by simple diffusion of salt.

"It fit with a lot of our models," Gilroy says. "But the idea that it's a wave is one step beyond what our models would predict."



Arabidopsis thaliana growing in salt water. The plant on the right has more of the protein channel TPC1, thought to be involved in calcium signaling in plants. The plant at center has less TPC1 than normal, and the one on the left is considered normal. (Photo by Won-Gyu Choi, Gilroy Lab)

Within 10 minutes of applying a small amount of salt to the plants' roots, typical stress response genes were turned on in the plant. Also turned on was the machinery to make more of a protein channel called two pore channel 1 (TPC1). Within one-to-two minutes, there was 10 times more of the building blocks needed to make the channel, which is thought to be involved in calcium signaling.

Gilroy and his team then looked at plants with a defect in TPC1. They had a much slower calcium wave — about 25 times slower — than plants with normal TPC1. When they studied plants expressing more of the TPC1 protein, the calcium wave moved 1.7 times faster.

Plants with more channels also grew larger and contained more chlorophyll than plants with normal or mutated TPC1 when grown in salt water.

The protein channel is present in all land plants, says Gilroy, and it's found throughout the plant. This is one of the many reasons it surprised the team to learn the calcium wave moves only through specific cells in the plant, like electrical signals moving through nerve cells in humans and other animals.

"We weren't expecting that," Gilroy says. "It means specific cell types have specific functions ... there must be something special about those cells. We're really at the beginning."

Lab Notes: Jason Holman

Jason Holman is a BAC major graduating in December 2015.

I'm working in Professor Irwin Goldman's Lab to help figure out the threshold time period required for *Allium cepa* (onion) to complete its vernalization (wintering) process so that it may develop a flower and therefore be able to yield viable seed. We're using a wide variety of seed ranging from Cortland, an American classic onion and a standard in organic cropping, to Rijnsburger, a variety imported from the Netherlands. Eventually we hope to

be able to find some sort of correlation between the minimum time requirement for the onion to flower and to what degree that variety has been genetically altered.

Working with the Goldman lab has greatly enhanced my understanding of cultivation in agriculture, plant development, breeding techniques and the complexities of bulk research. I hope to apply what I've learned in the field to a career in sustainable vegetable cropping, or perhaps even plant breeding itself with hopes of developing crops that work well in organic systems and overall are more



friendly to the environment they are grown in.

Botanists in Paradise

(continued from p.1)

individuals, collected leaf tissue, and preserved samples in silica gel for DNA extraction in Madison. A week later, we conducted a similar study 300 miles away on closely related *Clermontia fauriei*, growing on forest edges in the Alaka'i Swamp atop Kaua'i. Both areas are clothed in cloud forest, dripping with mist and mosses and elfin herbs and gigantic ferns. We were intent on using data on gene flow to test the hypothesis that understory *Cyanea* formed far more species than forest-edge *Clermontia* because it relied on sedentary forest-interior birds to disperse its fleshy fruits, and thus could undergo genetic differentiation at small spatial scales. While on the Big Island, we studied succession as a function of distance from a volcanic eruption near the Devastation Trail. Finally, we visited Maui for three days, and had an opportunity to observe extremely rare honeycreepers and other birds in the Waikamoi Preserve in wet mossy forests at mid elevations, and see the famous silverswords on volcanic cinder deposits at high elevations atop spectacular Haleakalā. Silverswords are some of the most striking plants on Earth, and adapted to some of the most extreme conditions – their silvery leaves reflect away most of the intense sunlight at high elevations near the equator, and reduce evaporation in an arid habitat that freezes every night and thaws every day. Alas, after conservationists helped the silverswords stage a comeback by fencing out introduced goats, and protecting its pollinators

from attack by introduced ants, the Maui silversword now appears to be doomed ... by us. Due to global warming, populations at the lower edge of the silversword's elevational range have been shrinking for more than a decade, and further warming may reduce rainfall



Silverswords in Haleakalā crater

at the high edge as well.

After returning to Madison, our students worked intensely entering the field data into computer files, extracting DNA from our plant samples, and processing those samples to obtain a highly variable set of RADSeq genetic markers via

next-generation sequencing. NGS is a state-of-the-art approach that enables

us to sequence over a hundred million short “reads” or sequences for each population, and then assess genetic similarity from thousands of loci scattered through the genome. Once this sequencing was completed, our students ana-

lyzed the results and assessed genetic variation and the spatial scales of gene flow in *Cyanea* and *Clermontia* populations. As the capstone to the course, our students have met frequently during the fall semester to analyze the data and write a scientific paper, which they will submit for review and possible publication by the end of the semester. As a result, our students have obtained a unique, first-hand view of Hawaiian ecology and evolution, tested an important theory for the rapid rates of speciation seen in many tropical plants with fleshy fruits, learned how to generate and analyze population genetics data using next-generation sequencing, and how to work together effectively as a group to produce a scientific paper suitable for publication.



Kelly Wallin, Stephaney Olson and Rebecca Kartzinell analyze samples back in Madison

“Very few people get to see the Hawaiian Islands the way our class did, and I benefitted from the mentorship and instruction I’ve received in the class so far. I’d been considering a career in bio/genetics research and so the trip and class have been very ‘career affirming’ for me.”

– John Brennan

“The Puaiohi - lives only in the Alaka'i Swamp. Remember us all soaked, the slippery boardwalk, the thick closeness of life all around us, in every direction a new wonder? Our new friends all about us as we worked together? Such a happy memory for me. Thanks!”

– Daniel Hein

Field Notes: Brendan Hobart

Brendan Hobart is a BAC major graduating in May 2015.

I am currently volunteering with a graduate student studying how resident winter bird foraging behavior is affected by spatially varying microclimatic conditions. The project utilizes feeders equipped with radiofrequency identification units that detect when individual birds (that are banded with transponders) visit the feeder. I am responsible for regularly checking and filling feeders, downloading the data they collect about bird feeding frequency, and occasionally assisting with bird banding. While my coursework within the BAC program



has been exceptional, being involved in various projects through volunteering will likely be the highlight of my UW experience. Engaging in hands-on field

work has allowed me to get a “behind the scenes” view of conservation efforts and gain a deeper appreciation for the work being done to protect ecosystems worldwide. Working with researchers at UW-Madison has helped me realize that I would like to remain actively involved in management efforts and conduct my own research at the graduate level and beyond. I would encourage younger students in the BAC program to become involved in research projects as early as possible. Begin exploring your options; the conservation field is broad but getting field experience can really help you narrow it down and find something you’re truly passionate about.

Profile of a Pine Relict

Mary Ann Feist and Mark Wetter

This summer herbarium curators Mark Wetter and Mary Ann Feist, along with student workers and volunteers, undertook a floristic inventory of the Ridgeway Pine Relict State Natural Area



Rock outcrop at Ridgeway Pine Relict SNA

(SNA) in cooperation with the Wisconsin Department of Natural Resources (WI DNR).

The Ridgeway Pine Relict SNA is a unique site in Iowa County covering 327 acres. It occurs within the Driftless Area and features dramatic sandstone cliffs, rock outcrops, rock shelters, bottom wetlands, and a small patch of remnant tall-grass prairie. Pine forests were once extensive throughout southwest Wisconsin, but as the climate warmed oak forests and prairies replaced them. The pine relicts persisted only on the rocky cliffs and steep slopes of the Driftless Area where they were protected from fire. All three of Wisconsin’s native pine species grow within the SNA. White pine (*Pinus strobus*) dominates, but red pine (*P. resinosa*) and jack pine (*P. banksiana*) are also common. On one small slope within the SNA we saw all three of these species growing together side by side! Beneath the pines, the understory consists of an interesting mix of southern and northern species. Characteristic species that we observed included huckleberry, northern bush honeysuckle, rock cap fern, bracken fern, Canada mayflower, goldthread,

starflower, rattlesnake plantain, Indian pipe, and wintergreen.

We visited the SNA once every two to three weeks throughout the summer. During each visit we collected plant species that were either in flower or fruit and recorded detailed information about each specimen including locality, habitat, and associate species. Our objectives for this project were three-fold: 1) to provide the WI DNR with a comprehensive vouchered species list for each community type within the SNA, 2) to provide the students with valuable field experience, and 3) to get out, enjoy the fresh air and just have some fun!

During our first year of the project, we collected over 300 specimens that will be kept at the Wisconsin State Herbarium. In addition to the vouchered species lists, we gathered occurrence records for threatened or endangered species and species of special concern. We also noted occurrences of non-native or invasive species, woody encroachment, and other disturbances. This information will be used by WI DNR to allow them to develop more-informed management plans for the SNA.

Many hands make research lighter in the Sylvania Wilderness

Kristin Michels

I've had the pleasure of working in the Upper Peninsula of Michigan over the last three summers for my dissertation to evaluate edge effects on the Sylvania Wilderness. My field work relied on field assistants for reconnaissance visits, forest surveys, and plant identification. Several people contributed to this effort, including my advisor Dr. Sara Hotchkiss, current Botany PhD students John Zaborsky and Samuel Lopez-Nieves, Botany faculty and staff, and Zach Michels (current Geoscience PhD student). But most of all, I had incredible support from undergraduate and prospective graduate students. The first summer of data collection, my advisor introduced me to Katie Laushman, the primary field assistant and a prospective student at the time. Katie is currently a M.S. student advised

by Dr. Hotchkiss and is now developing a project at the UW-Madison Arboretum. The second summer of data collection I worked briefly with Leah Dittberner, a Biological Aspects of Conservation undergraduate, and agency volunteers I met networking in northern Wisconsin. But again, I was lucky to have extensive help from Emily Blessing, an undergraduate who is a triple majoring in Botany,

Environmental Studies, and Music at UW-Madison. Emily met Dr. Hotchkiss as her student in Historical Ecology and became enthusiastic about the prospect of field work and completing a senior thesis. Once we finished the data collection for my research, we were able to collect additional data for her independent senior project. While I am researching the edge effect of land use change along

the Sylvania Wilderness boundary, Emily is specifically looking at the effect of roads on the periphery of the Sylvania border. Her work will augment my dissertation findings and inform conservation efforts to mitigate road impacts. This support was invaluable to the completion of my field work and integral to my dissertation. Many thanks to everyone!



Kristin Michels (left) and Katie Laushman (right) in the U.P.

ALUMNI NEWS

Thank you to all the alumni who took the time to send us their updates. Please keep the news coming!

Fred Swan (MS Botany, 1961) recently spent 3 weeks in Hawaii, where they took a helicopter tour of Kauai and saw excellent specimens of the silversword plant at high elevation.

Jonathan Gressel (PhD Botany, 1962) is very busy as an emeritus professor at the Weizmann Institute of Science in Rehovot, Israel. He is the Review Editor for the journal *Plant Science*, always looking to commission speculative/synthesis type reviews from fellow alumni, an associate editor in two other journals, consulting, developing novel ways to inexpensively mass cultivate microalgae, lecturing, and mentoring - he does so much that his garden suffers!

Jeanne Evert (BS BAC, 1965) has been retired from a working career with the Wisconsin Dept. of Natural Resources

for 15 years. She worked in the Wildlife Management program for the first several years and the remainder of her career in the agency real estate program. Since retirement she has been actively involved in civic organizations and presently serves on the Boards of two local historical societies. Jeanne lives on a 150 acre farm where she is able to apply some of the land and wildlife management practices she learned years and years ago.

Don Wicklow (PhD Botany, 1971) retired from the National Center for Agricultural Utilization Research at the USDA in July of this year. The fungus *Wicklowia aquatica* was named after him "for his outstanding studies of the nature and role of fungal secondary compounds" (pg. 211, *Mycoscience* 51, 2010).

Brian Vivona (BS BAC, 1986) worked a police officer in a Chicago suburb after graduation. Always enjoying the

nature of science, Brian's career went into forensics and he became a Crime Scene Investigator (and no it's not like TV). He was able to use some of the fundamental teaching of BAC such as organism biology and complex ecological interactions (loving forensic entomology!) to perform his work. Brian's forensic work then led to teaching as an adjunct at a local university. He finished doctoral studies at Northern Illinois University, retired from police work, and is now a tenure track Assistant Professor of Criminal Justice at Governors State University in Illinois.

Emmet Judziewicz (PhD Botany, 1987) recently published *Field Guide to Wisconsin Grasses* (ISBN 978-0299301347) with Robert W. Freckmann, Merel R. Black, and Lynn G. Clark.

Amanda Werhane (BS BAC, 1996) moved to California after graduation

where she worked as a National Manager for the Environmental Justice Fund, and then moved into the information services field. She returned to UW-Madison in 2002 to earn an MA in Library and Information Studies, and then worked as a science librarian for seven years, including three years at Steenbock Library where she served as a liaison to plant and insect science researchers. After two additional years of technical college studies, she has now transitioned into the information technology field. Currently, she provides web development, video conferencing, and general technical support for the Community and Regional Food Systems Project, community-food.org.

Jamie Radel (BS BAC, 1997) has lived in the Twin Cities metropolitan area for the last eight years and worked in urban planning for the last fourteen. She received an MS in Urban and Regional Planning from the University of Wisconsin in 2005, and is currently working as a city planner for the City of Saint Paul, Minnesota.

Vicki Lynn Ramsay (BS BAC, 1997) is in her 10th year of teaching Biology, Chemistry and Agriculture at Youth Initiative High School in Viroqua, WI. (www.yihs.net) YIHS is a democratic school, involving students in all issues of governance. Students are on the Board, Curriculum & Personnel committees among many, do fundraising, and work to help clean the school each day. Students also are responsible for service hours to the community each month, as well as participating in school-wide service projects twice a year in our greater community. She really loves working at YIHS: "It is a place where people who are truly interested in learning, teachers and students alike, can get a well-rounded and integrated education."

J. Chris Pires (PhD Botany, 2000) is currently an associate professor at the University of Missouri, focusing broadly on plant evolutionary biology. He recently traveled back to Madison to give a talk as a part of the joint Botany/

Zoology Biology Colloquia series on the topic of "Polyploidy and the origins of novelty: impact of duplication on genome and network evolution."

Archer Larned (BS BAC, 2001) worked all over the country after graduation (including northern Alaska!) as a seasonal field biologist. She drove back and forth across the country from job to job and spent time hiking at National Parks along the way. She also spent some time traveling in Europe (mostly Croatia and Italy) and Southeast Asia. Archer finally went back to school and got her MS in Biology from the University of Maryland studying bowerbirds in Australia. This meant she would spend half the year in Australia and half the year in Maryland - and she thought that was about perfect! Archer is currently in a PhD program at the University of Maryland Baltimore County working with conservation and recovery efforts for the critically endangered Florida Grasshopper Sparrow.

Chris McGuire (MS Botany, 2001) and his wife Juli raise organic vegetables and apples at Two Onion Farm in Belmont, WI. This year we celebrated our tenth year of growing produce for our community supported agriculture (CSA) farm members spanning from Madison to Dubuque.

Keri Kaczor (BS BAC, 2002) coordinates the Maine Healthy Beaches Program, a coast-wide effort to monitor water quality and protect public health on Maine's coastal beaches. She is a member of the Marine Extension Team, a collaboration of Maine Sea Grant and UMaine Cooperative Extension, providing educational and applied research programs in coastal community development, ecosystem health, fisheries, aquaculture, and tourism. Keri earned an M.S. in Marine Policy from the University of Maine in 2009. Keri is the author of *A Municipal Guide to Clean Water* and, in November 2013, she received the Northeast Sea Grant Consortium's Outstanding Outreach Achievement Individual Award for her work building

local capacity to identify, remove and prevent sources of bacterial pollution impacting valued beaches and shellfish growing areas. For the past 12 years she has worked in Maine on environmental monitoring, science literacy and stewardship projects. In August 2013, Keri and her husband Rob welcomed their son Isaac, and he has already had many travels including Alaska and Texas!

Bridget Borg (BS BAC, 2004) is currently working as a Wildlife Biologist in Denali National Park and Preserve, and is a PhD student at the University of Alaska-Fairbanks. She recently published research in the *Journal of Animal Ecology*, July 2014, titled "Impacts of breeder loss on social structure, reproduction and population growth in a social canid."



Stephen Schrader (PhD Botany, 2006) is a research scientist for DuPont Pioneer. He recently moved there after having worked for Monsanto for 7 years. Stephen really enjoys working in agriculture because he not only applies skills as a plant physiologist, but also gets to interact with a diverse group of people from engineers and crop breeders to physicists and economists and ultimately with farmers. He also just loves going out on the farm fields. Stephen is married with four kids.

Joshua Clements (BS BAC, 2007) continued his education at UW Madison in

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Urban and Regional Planning graduating in 2009. He stayed in Madison and served as a Community Development Educator with UW-Extension for five years. In January, Joshua relocated to nearby Dubuque, Iowa, to assume a position as Community & Economic Development Specialist with Iowa State University Extension & Outreach. His work is primarily to integrate triple-bottom-line sustainability best practices to municipal planning activities through technical assistance and cooperation, and to conduct applied research on successful strategies to incorporate environmental and social objectives into high-road economic development programs in industrial legacy cities. Joshua is a member of the American Institute of Certified Planners (AICP), serves on the City of Dubuque Plan Commission, and continues to be engaged with the UW community through service on the Department of Urban & Regional Planning Alumni Relations Committee.

Hannah Mitchell Graae (BS BAC, 2008) graduated from Duke University last year with a JD from the Law School and a Masters degree (MA) from the Nicholas School of the Environment. She is currently practicing environmental law in Washington, D.C. at Hogan Lovells, an international law firm based in D.C. While she was at Duke, Hannah had the good fortune of enrolling in the Duke Environmental Law and Policy Clinic for two semesters, and also working first as a staff editor and then executive editor of the Duke Environmental Law and Policy Forum (fondly referred to as DELPF), which is the environmental law journal at Duke. She also just got married this summer to fellow DC native Duke Schaeffer. Even after all of these years away from Madison, it is still one of Hannah's absolute favorite places. She always thinks about the amazing student body, the culture and art scene, and the wonderful environmentally-friendly atmosphere there. Also, she would never, ever root for the Blue Devils over the Badgers. BUCKY FOR LIFE!

Kelly Montenero (BA BAC, 2008) also majored in Psychology and went on to receive her masters of science in Marine Affairs and Policy from University of Miami's Rosenstiel School of Marine and Atmospheric Science (RSMAS) in 2013. She is now the Conservation Outreach Coordinator at Pacific Whale Foundation on Maui, Hawaii, and just got married in May! Congrats Kelly!

Emily Lewis (BA Botany, 2010) is currently finishing her third year of veterinary school in New Zealand. This winter she will be working on a project to educate veterinary wildlife researchers on improving their statistical methods. Her advice to anyone visiting New Zealand: cities are the same everywhere - go for the unique outdoor experiences you won't find anywhere else in the world!

Bryan Drew (PhD Botany, 2011) recently got an assistant professor position at the University of Nebraska at Kearney and is currently working on a project with our own Ken Sytsma on the evolutionary history of the entire genus *Salvia*.

Karolina Heyduk (BS BAC, 2011) is in the fourth year working towards a PhD in Plant Biology at the University of Georgia, working under Dr. Jim Leebens-Mack. Her research focuses on crassulacean acid metabolism (CAM), a photosynthetic pathway that has arisen in about 6% of flowering plants, allowing them to live in arid habitats. She's chosen to study members of the Agavoideae - Agaves and Yuccas - using an interdisciplinary approach, combining plant physiology with genomic



information to get at the key morphological, anatomical, and transcriptional regulators of CAM photosynthesis. Excitingly, Karolina and her advisor expanded her dissertation work for an NSF Dimensions of Biodiversity grant, which was funded earlier this year!

Her career in science has taken Karolina to some pretty great places - she's traveled up and down the southeastern coastline searching for Yucca species, had the chance to travel to the country of Colombia for collaborative research, and has explored parts of the Western states for work and conferences.

Darcy Widmayer (BA BAC, 2011) had difficulty finding an environmental job after graduating college, so she moved to Chicago and worked as a paralegal at a commercial real estate law firm downtown while sorting things out. She worked there for almost three years before moving back to Madison this past May to enroll in the Environmental Conservation Professional Master's Program through the Nelson Institute for Environmental Studies. Darcy is hoping that this will teach her the skills that she needs as well as help her develop connections that she can utilize to find a job with a non-profit conservation organization upon graduating this August!

Tiffany Blackley (BS BAC, 2012) currently works as an Associate Scientist at Pharmaceutical Product Development (PPD) in Middleton, Wisconsin. Her job mostly involves analytical chemistry, but surprisingly there are many biology related grads working there as well. Tiffany and her husband recently had their first child, Abellene.

Congratulations to **Deidre (maiden: Conocchioli) Jaeger (BS in BAC, Botany, and Environmental Studies, 2012)** on her recent nuptials! She is finishing up the field season as the Seeds of Success Coordinator at Red Butte Botanic Garden in Salt Lake City, UT, where she made native seed collections from flora of the Colorado Plateau near Arches, Canyonlands, and Zion National

Parks. These are her favorite national parks in the country and she was thrilled to do field botany in the canyon country of Utah. Soon Deidre will be starting winter lab work at the Rocky Mountain Research Station with the Shrub Science Lab in Provo, UT.



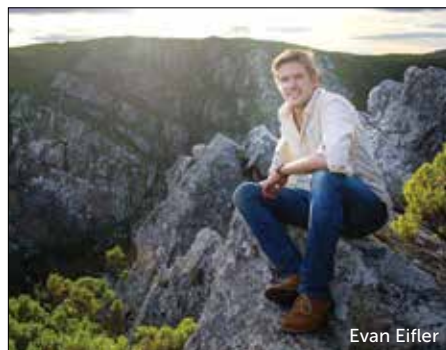
Diedre Jaeger collecting seeds of *Astragalus lonchocarpus* (rushy milk vetch) in the San Rafael Swell.

Chad Zirbel (BS BAC, 2012) is currently a PhD student at Michigan State University in the department of plant biology and the ecology, evolutionary biology, and behavior program. Right now, he is funded by an National Science Foundation graduate research fellowship studying trait-based community assembly and ecosystem function in restored prairies in Southwestern Michigan. The field based courses he took as a BAC major are part of the reason Chad decided to apply to graduate school and study plant communities.



Evan Eifler (BA BAC, 2013) is currently enrolled in Botany's PhD program working with Dr. Tom Givnish. He spent his gap year in South Africa working on a campaign to help conserve a critically

endangered and highly biodiverse vegetation type. He crowd-funded the campaign through Kickstarter and a Young Explorers Grant from National Geographic. During his time there, Evan found 76 previously un-recorded populations of threatened plant species and worked with many farmers to better understand and manage the globally significant floral diversity they are caretakers of. He developed a personalized booklet of information for each of the farmers they worked with closely. This included photos and IDs of the plants and animals on their farm, a background in Renosterveld ecology, personalized land-management suggestions, and conservation terminology. These were then translated into Afrikaans and provided a useful tool to engage with farmers in a conservation conversation around what is otherwise labeled as "uitvalgrond" or "wasteland" on their farm maps.



Evan Eifler

After graduating from the UW, **Jacob Zeldin (BA Botany, 2013)** worked for a time with the Madison Audubon Society (in concert with UW Madison Lakeshore Nature Preserve, Natural Heritage Land Trust, and the Pheasant Branch Conservancy) to restore state and local natural areas including prairies, savannahs, wetlands, and woodlands. This experience allowed Jacob to continue to polish his plant identification skills and he learned quite a bit about seed collection, rare species surveying, and invasive plant removal and mediation. Jacob now works for UW - Madison's School of Education managing computer laboratories and facilitating research

and instruction through the use of technology. He also volunteers with the UW Madison Lakeshore Nature Preserve while he explores graduate school opportunities.

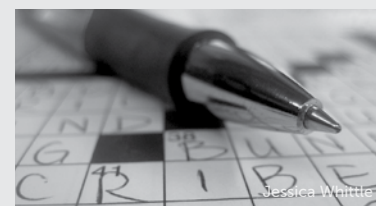
Arslan Ahmad (BS BAC, 2014) moved back to the DC area after graduation and is currently working at the Association of Zoos & Aquariums, in the Conservation and Science department. This job came about as a result of an internship last year. He feels incredibly lucky to have found something that's so relevant to his degree (Arslan also received a BS in Zoology and a certificate in Environmental Studies)



Left to right: **Andrew Hipp (PhD Botany, 2004)** of the Morton Arboretum, **Dan Larkin (PhD Botany, 2006)** and **Evelyn Williams (PhD Botany, 2012)** of the Chicago Botanic Garden, and colleagues received a grant from the National Science Foundation for "Collaborative Research: Testing the effects of phylogenetic diversity on restoration outcomes in tallgrass prairie." This 5-year project will evaluate whether increasing the phylogenetic diversity of planting mixes used in restoration leads to better results in terms of community structure and ecosystem function.

Miss the Botany Crossword?

Visit the UW-Botany alumni web page for a challenging new puzzle.



Jessica Whittle



Daniel Hein



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Above: Students in the Hawaiian ecology and evolution course hike among rare silversword plants in Haleakalā crater on Maui. Below: sea turtles. Story on p.1



Daniel Hein

Miconia friedmaniorum

This SEM image by Dr. Ricardo Kriebel, a Botany postdoc under the supervision of Drs. Ken Sytsma & Ken Cameron, depicts a flower of *Miconia friedmaniorum* (Melastomataceae) from the cloud forests of Costa Rica. It was one of just 10 images and two videos named as winners in the University's 2014 Cool Science Images contest. Dr. Kriebel's interest in plant morphology was the subject of an article in the *Wisconsin State Journal* on October 06, 2014.

