Botany & Conservation

A newsletter for alumni and friends of Botany and Conservation Biology

Fall/Winter 2018

The first Wisconsin Botanical Foray - page 3

Glyceria canadensis (rattlesnake manna grass) Photo: Paul Marcum

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Chair's Letter

Dear Alumni and Friends,

The 2018 midterm elections are over and there is hope that our divided country will find ways of working together to address serious issues that affect the entire planet. To do this will require patience, respect, compromise, ethics, historical perspective, and implementation of policies based on scientific facts.

I am optimistic about the future as I speak with an ever more diverse and engaged student body that passes through Birge Hall each semester. Our UW Botany and Conservation Biology majors and graduates are being trained by some of the most respected STEM educators and scientists in the country; at the same time they are being exposed to the full breadth of intellectual pursuits and human experiences offered by world-class scholars in the arts and humanities.

In his annual welcome address to first-year students, our Dean reminded us that "faculty and students in the College of Letters & Science engage in the 'fearless sifting and winnowing' that is the foundation of a liberal arts education at UW-Madison. L&S provides life-changing learning experiences, extends the boundaries of knowledge through research, and enhances understanding of the human condition, helping our students, faculty and alumni enrich their own lives as well as lives in our community and around the world"

This is an important reminder that our current students and alumni in Botany and Conservation Biology are not only gaining unparalleled experience in scientific research, but also learning to respect and empathize with their fellow humans. Some have recognized this unique form of technical but interdisciplinary education as the development of 'STEMpathy' and predict that career professionals with these skills will be in greatest demand on the world stage as we look to the future.

In his closing remarks, Dean Scholz also reminded us that "an L&S education is not only broad, but deep, allowing our graduates to make a good living and live a good life. The support and dedication of our alumni and friends is critical to our mission." On behalf of the entire Department of Botany, thank you for helping to keep our programs strong and for helping us to educate the next generation of global citizens.

Ken Cameron

Chair

This newsletter is published by the Department of Botany at the University of Wisconsin-Madison.

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Contending with the climate to keep plants growing Adapted from an article by Eric Hamilton

Managing greenhouses is a full-time job. Several, in fact. Aging structures, changing research and finicky plants provide plenty of work for greenhouse staff. Even the changing climate can affect greenhouses built for a Wisconsin climate now a century out of date.

The Botany Greenhouse at Birge Hall was built as part of the then-new biology building in 1912 and was expanded in the 1950s to a total of more than 8,000 square feet. The decision to place the greenhouse right up against the existing building would haunt future directors.

"When they started, they were just planning to grow plants for teaching," says Mo Fayyaz, who directed the Botany Garden and Greenhouse for 33 years before retiring last August.

In the decades since, botanical research has demanded increasingly controlled conditions. At the same time, the collection has expanded to include plants from all over the world. Climate control is more crucial than ever.

Ingrid Jordon-Thaden took over as the Director of Botany Garden and Greenhouse last year. The century-old decision to join the greenhouses to the rest of the building limits her ability to cool them off in the summer, because it restricts airflow — the biggest help in keeping temperatures down.

"In the summer when it gets really hot, some of our fragile plants die. In our first heat wave in May, we lost a handful of important plants," says Jordon-Thaden, who came to UW–Madison from the University of California, Berkeley. "So in the fall, we're spending a lot of time recovering from the summer, rejuvenating them, bringing them back from stress."

"We have some very special plants that are given to us from other collections from all over the world from a wide variety of climates," Jordon-Thaden says. "So, our climate control system really needs to be able to accommodate this plant diversity, making the need for improvements even more pressing."

That diverse collection supports studies of plant diversity and evolution. The greenhouse also grows plants to populate the Botany Garden, which organizes plants by their family relationships.

The First Annual Wisconsin Botanical Foray at Crex Meadows SWA by Mark Wetter

This past August, the Wisconsin State Herbarium and the Botanical Club of Wisconsin held our first annual Wisconsin Botanical Foray! The Foray was a weekend of camping, comradery, and, of course, collecting plants. It was held at Crex Meadows SWA (State Wildlife Area) and included exploration of the nearby Fish Lake SWA and Amsterdam Sloughs SWA, all in Burnett County in northwestern Wisconsin.

A Foray is different from your typical field trip or bioblitz because during a Foray voucher specimens are collected in order to document the vegetation of an area. All plant specimens collected during this first Foray will be deposited at the Wisconsin Sate Herbarium and other herbaria throughout the state. A Foray is also different because it is a multiday event. The Foray began Thursday August 9th and ran until Sunday August 12th. Our Foray headquarters and camping area was at the Crex Meadows Wildlife Education and Visitor Center, in Grantsburg. Participants could either pitch a tent or sleep in the barracks-style bunkhouse or rustic cabins.

On Friday and Saturday mornings we met at 8:30 a.m. and broke into groups of 4 to 5 participants. Each group went to a different section or community type within the SWAs and collected all plants that were either flowering or fruiting. Each group collected all day in their assigned area and then returned to camp late afternoon to put the specimens into presses for drying. Saturday evening, after the last specimens were in the plant presses, we had a pizza and salad supper and later gathered around the campfire for debriefing and campfire songs.

Foray participants. Back row: Ken Cameron, Brenda Molano-Flores, Chris Noll, Rick Haug, Derek Anderson. Front row: Paul Hlina, Mary Ann Feist, Kevin Doyle, Stephanie Lyon, Paul Marcum, JeanMengelkoch, Mark Allen Wetter, David Eagan.

Over the course of the two days we were able to collect 575 specimens in duplicate. An additional 271 vouchers were collected on separate spring and early summer scouting trips to Crex Meadows SWA for a total of 864 specimens. All of these specimens are currently at the Wisconsin State Herbarium where their 'field' identities will be confirmed and labels will be generated. The Botanical Club will hold a keying workshop over the winter to assist in this endeavor. We are planning another Foray in 2019. If you are interested in participating in next year's Foray or this year's keying workshop, please contact Dr. Mary Ann Feist [mfeist@wisc.edu].

BOTANY GARDEN AND GREENHOUSE
Renewal Project

We are planning to renew the Botany Greenhouse and its climate controls.
For more infomation please visit our website:
www.livingcollection.botany.wisc.edu

A tax-deductible contribution at any level helps us to achieve our goals of creating and maintain teaching, research and outreach facilities. To contribute electronically, visit our website, if you prefer via mail, please fill out the form below and mail it with your check to:

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Muir Woods research works to understand how plants have sex

by Eric Hamilton

Melody Sain collecting leaf samples to use for genetic analysis. She collected samples from 50 male and 50 female plants throughout Muir Woods. Photo: Cody Sain

When Melody Sain tells somebody about her research, they usually perk up.

"Sex is just interesting," she says. "Most people I bring it up to are always interested."

The object of her research, though? It's often overlooked.

Sain is studying how — and why — different plants have sex. Her main research subject is the ubiquitous early meadow-rue, a low-lying perennial plant found across the eastern half of the United States.

Unlike the vast majority of plants, early meadow-rue has separate sexes — male and female. This relatively rare trait puts the plant at risk of ending up too far away from a partner, unable to move to reproduce. So Sain, a doctoral student in the University of Wisconsin–Madison botany department, has set out to understand why early meadow-rue has risked its ability to mate and how it evolved a trait more commonly seen in animals.

A native of western Tennessee, Sain came to UW–Madison after finishing her master's at the University of Texas at Tyler. She met David Baum, a UW–Madison professor of botany, at a conference in North Carolina in 2014. The two connected over their shared interest in plant evolution and desire to understand how the world works, and Sain agreed to join Baum's lab for her doctorate.

"I'm not OK with just knowing something is because it is," says Sain. "I want to understand why."

Sain's research takes her on a five-minute stroll from her lab in Birge Hall to the Muir Woods situated on the northern slope of UW–Madison's Bascom Hill. The woods, part of the Lakeshore Nature Preserve, abound with early meadow-rue. The ambling commute is a welcome change from her previous work that required trips to Texas.

In the woods, Sain has protected several female plants with plastic-lined cages — the better to keep them from being pollinated by errant males. She then collected pollen from males to hand-pollinate the females earlier this spring. The fruits are growing now.

Since Sain knows both the male and female parents, their offspring's genomes will be a little bit less variable than those of the rest of the population in the woods. That will help her as she sequences the genomes looking for which genes control whether a plant produces male or female flowers.

Just why certain plant species develop different sexes remains a botanical mystery.

For the few that that do have different sexes, the advantages of mixing genes between two parents, which increases the diversity of the next generation, might help offset any downsides. But it's far from clear if that's what really drives this process across the plant kingdom.

Beyond the why, even the how isn't clear. Some plants can change sex from year to year — a behavior also seen in some fish and amphibians — which means that there aren't specific genetic differences between the sexes. Instead, the environment, or the plant's own life history, plays a role.

But early meadow-rue has stable sexes. Sain has uncovered a single German research paper suggesting that early meadow-rue's sexes are controlled by inherited sex chromosomes, similar to how sex is determined in animals. Sain doesn't read German, leaving these earlier findings muddled, but she's reaching out to the Department of German, Nordic and Slavic in hopes of making new connections and deciphering this previous research. Early meadow-rue is understudied, and Sain hopes her research sheds some new light on this common plant's unique lifestyle.

Sain had to contend with the cold, wet spring that delayed flowering this year. And her hand-pollinated fruits are smaller than what she was hoping for.

"This year has been completely off on everything," she says.

But her research plots, which dot the woods well off the main paths, have avoided any vandalism. And her plants have grown well under their protective plastic, something she couldn't be sure of when she started the project.

Although Sain is drawn to plants mostly because of their beauty and strangeness, she admits that studying sex in plants has one pretty big advantage.

"When it comes to doing research, they don't run away," she says.

Field Notes: Leah DiMaggio

Leah plans to graduate with Biology, Integrative Biology, and Conservation Biology majors as well as Global Health and Environmental Studies certificates.

During my first year at UW Madison I worked alongside microbiologists, environmental engineers, energy specialists, and environmental health specialists with the goal of gaining more knowledge on regenerative fuel, specifically focusing on how cellulose could be converted into chemical energy via anaerobic digestion.

This past summer, I had the incredible opportunity to study Asian elephants in Cambodia. I learned about the large amount of human and elephant conflict challenges throughout Cambodia due to increasing human populations and habitat destruction. I also learned about elephant behavior and their ecological importance in a tropical forest ecosystem. In Southeast Asia, elephants are an important cultural icon within the community. I interviewed the indigenous Bunong people on their feelings about elephants living within their community. We explored the rising conflicts due to elephants raiding the farmers' crops. Ultimately, I was able to propose a grant to mitigate human-elephant conflict, introducing management strategies concerning Asian elephants and the health of the community.

Currently, I am exploring the effects of eutrophication due to fertilizer runoff. The objective is to test hypoxia thresholds in lake trout to draw conclusions about the detrimental impact hypoxia has on this keystone species and the food web of Lake Michigan.

I am very grateful for the experience I gained participating in these conservation efforts both locally and globally. I feel incredibly lucky to have experienced the indescribable presence of Asian elephants in the Mondulkiri province of Cambodia and realize that we might be the last generation to see these remarkable animals in this location. The environment is largely interconnected with human activity and I have realized that many of the ecosystems and organisms that exist today are critically endangered. It is extremely crucial for individuals to be informed of the environmental issues that are occurring today and the actions they could take to protect the land.

Leah (at left) in Cambodia

Field Notes: Halle Lambeau

Throughout my time as an undergraduate, I have been fortunate enough to have been given multiple opportunities for hands-on experience in the conservation field. For the past three summers, I have worked with many different groups and agencies conducting lots of exciting projects to preserve and protect the environment and its resources.

Halle and wildlife biologist Karen Holtrop identify bumblebee species in Olympic National Forest

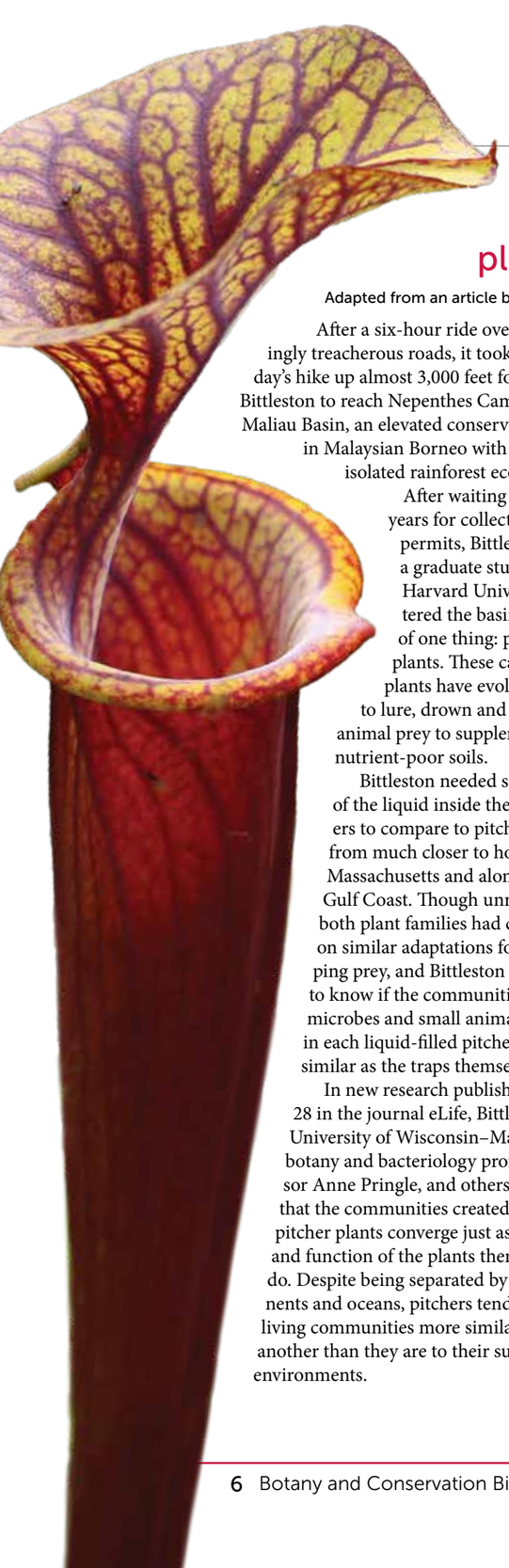
During the summer of 2016, I volunteered through AmeriCorps with American Conservation Experience (ACE) on a crew mainly tasked with constructing and maintaining trails and invasive species removal. My crew and I traveled all over California working with private land groups and public agencies . Perhaps the most notable project was deep in the backcountry of Sequoia National Park where we manually pulled invasive velvetgrass from fields in the middle of gorgeous mountain passes for a month straight.

The following summer, I was hired through the Student Conservation Association as a Wildlife Biology Intern with Olympic National Forest in Washington state. I worked with the forest's two wildlife biologists to conduct field surveys of the endangered Taylor's checkerspot butterfly as well as do field work with many other species like bumblebees, mountain goats, newts, and bats. I did a lot of hiking and backpacking and took on a lot of responsibility as the only intern for the forest.

Last summer, I received my first paid biology position as a Biological Science Technician with the Bureau of Reclamation in Southern New Mexico. I woke up before dawn every morning to independently conduct field surveys of the federally listed Southwestern willow flycatcher and yellow-billed cuckoo bird species. I received great technical experience with field equipment from this position.

From these amazing opportunities I have gained a diverse set of skills and perspectives from multiple agencies and organizations about working in the conservation field. These experiences reinforced my passion for the environment and led me to aspire to a future career in wildlife field biology.

CONVERGENT ECOSYSTEMS



An ocean apart, carnivorous pitcher plants create similar communities

Adapted from an article by Eric Hamilton

After a six-hour ride over increasingly treacherous roads, it took a full day's hike up almost 3,000 feet for Leonora Bittleston to reach Nepenthes Camp in the Maliau Basin, an elevated conservation area in Malaysian Borneo with a rich, isolated rainforest ecosystem.

After waiting three years for collecting permits, Bittleston, then a graduate student at Harvard University, entered the basin in search of one thing: pitcher plants. These carnivorous plants have evolved traps to lure, drown and digest animal prey to supplement nutrient-poor soils.

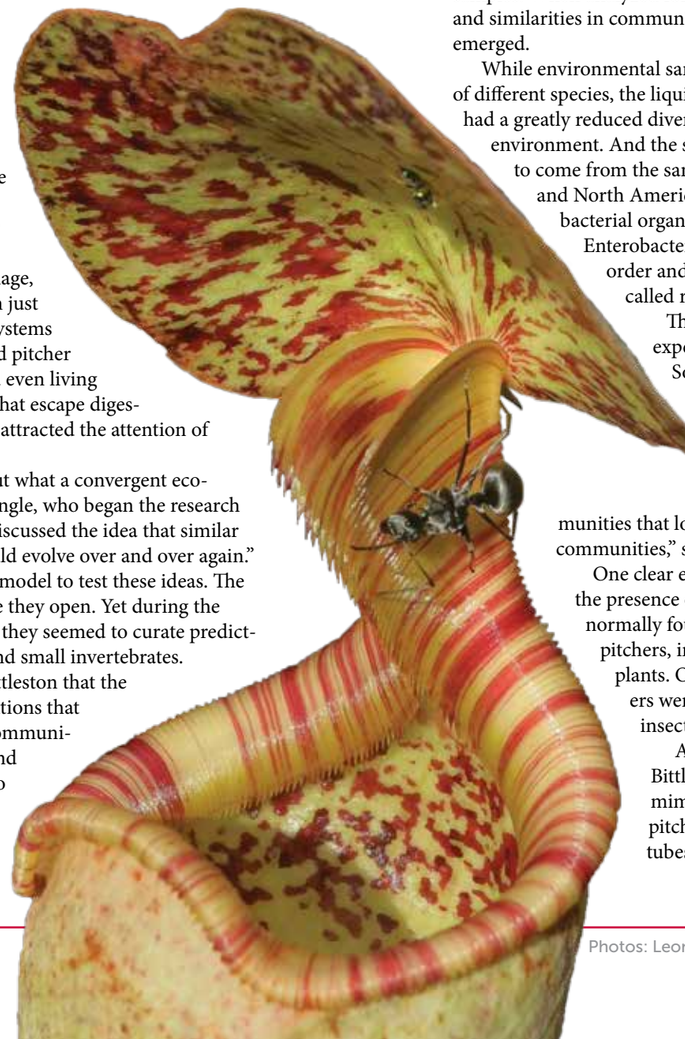
Bittleston needed samples of the liquid inside the pitchers to compare to pitcher plants from much closer to home in Massachusetts and along the Gulf Coast. Though unrelated, both plant families had converged on similar adaptations for trapping prey, and Bittleston wanted to know if the communities of microbes and small animals housed in each liquid-filled pitcher were as similar as the traps themselves.

In new research published Aug. 28 in the journal eLife, Bittleston, University of Wisconsin–Madison botany and bacteriology professor Anne Pringle, and others, reveal that the communities created inside pitcher plants converge just as the shape and function of the plants themselves do. Despite being separated by continents and oceans, pitchers tend to house living communities more similar to one another than they are to their surrounding environments.

Asian pitchers transplanted to Massachusetts bogs can even mimic the natives so well that the pitcher plant mosquito — a specialized insect that evolved to complete its life cycle exclusively in North American pitchers — lays eggs in the impostors.

The researchers say this work provides a much richer picture of how convergence can extend well beyond relatively simple functional roles, like plant carnivory, to include a network of interactions among different species that evolve under related conditions. Bittleston and Pringle collaborated with Naomi Pierce at Harvard, as well as researchers at the Universiti Malaysia Sabah, University of Malaya and Jiangsu University.

Pitcher plants are classic examples of convergent evolution, where unrelated organisms nonetheless home in on similar adaptations to their environment. Along with Venus fly traps and other carnivorous plants, pitcher plants also capture the imagination by turning the tables on animals as they devour them.



But despite that gruesome image, pitcher plants serve as more than just death traps — they are also ecosystems unto their own. Each liquid-filled pitcher houses diverse microbial life and even living complex organisms and insects that escape digestion. It's those communities that attracted the attention of Pringle and Bittleston.

"We spent hours talking about what a convergent ecosystem would look like," says Pringle, who began the research while she was at Harvard. "We discussed the idea that similar interactions between species could evolve over and over again."

Pitcher plants were a natural model to test these ideas. The traps are essentially sterile before they open. Yet during the lifespan of an individual pitcher, they seemed to curate predictable communities of microbes and small invertebrates. This suggested to Pringle and Bittleston that the pitchers created consistent conditions that repeatedly selected for similar communities. Since the Southeast Asian and North American pitchers were so outwardly similar, the researchers wondered if their miniature ecosystems would be as well.

It was a taxing research project that required collecting samples in dense, often inaccessible bogs. Bittleston traveled to state protected areas around the Gulf Coast and to bogs in the Harvard Forest to gather samples from the North American species. And in addition to the trek to the Maliau Basin, she collected fluid from pitchers in Singapore's protected parks, a comparatively easy, but memorable, venture.

"There were times I was on this very clean Singaporean subway in my field clothes, super sweaty, with these big bags full of tubes with pitcher plant samples," says Bittleston, who is now a postdoctoral researcher at the Massachusetts Institute of Technology. "So it was a funny scene."

With more than 330 samples from 14 species in hand, the researchers used advanced gene sequencing technology to get a snapshot of the various species making a home inside the pitchers, as well as the species found in nearby soil and water samples. When analyzed for the number and type of species and similarities in community structure, some clear patterns emerged.

While environmental samples contained a large number of different species, the liquid in both groups of pitcher plants had a greatly reduced diversity, indicating a more specialized environment. And the species that pitchers housed tended to come from the same families. Both Southeast Asian and North American pitchers greatly enriched for bacterial organisms like the Actinomycetales or Enterobacteriaceae as well as insects in the fly order and microscopic, filter-feeding animals called rotifers.

The researchers also set up a field experiment, transporting potted Southeast Asian pitchers to bogs in the Harvard Forest and looking at how the pitcher communities developed.

"And in fact, the Southeast Asian species assembled communities that looked like the North American communities," says Pringle. "That's cool."

One clear example of this similarity was the presence of pitcher plant mosquito larvae, normally found exclusively in North American pitchers, in the non-native Asian pitcher plants. Only the most acidic Asian pitchers were inhospitable to this specialized insect.

Alongside the pitcher plants, Bittleston set out test tubes that mimicked the cylindrical shape of the pitchers. Like the pitchers, these test tubes collected rain water and began to develop miniature ecosystems. But the biological communities in the test tubes assembled were off a bit from the natural pitchers, and the tubes never fooled the mosquitoes, which steered away from them.

"It's not enough to be a passive receptacle that captures rain water and some drowned insects," says Bittleston. "There really is something that's different about being this convergently evolved organism that creates a particular environment that curates a particular community."

The work lends support to ideas Bittleston and Pringle developed in previous work: that the interactions between different species can converge during evolution just as the forms and functions of individual species can.

"These pitchers are independently evolved, two very different families of plants, but they interact with the microbial communities that they're assembling within them in some similar manner," says Pringle. "And we're finding that those interactions are predictable in some way."

Inspecting pitcher plants in the field.

Photos: Leonora Bittleston

ALUMNI NEWS

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

Pat and Fred Swan (1961 MS Botany) visited Ireland in May 2018 as Road Scholars. They were amazed at the vigorous growth and flowering of invasive Rhododendrons there.

Wayne Rosing (1969 BS Botany) retired from Middle Tennessee State University in 2013 and from slime molds more recently. International travels have allowed him to photograph flora/fauna not frequently encountered in the suburbs of Nashville.

Robert K. Peet (1970 BA Botany, 1971 MS Botany) retired in July 2018. After completing his MS with Orie Loucks and then his PhD at Cornell with Robert Whittaker in 1975, he went on to serve on the faculty of the University of North Carolina for 43 years where he is now Research Professor. He has many fond memories of his time in Madison. Fieldtrips led by Hugh Iltis inspired a long series of extended excursions for UNC graduate students. It should surprise no one that UNC has a lab group (with an associated data archive) that has been called PEL since at least 1980 and which was inspired by experiences at UW. He looks forward to having more time to work on his many projects on the vegetation of the Southeast, long-term vegetation change, and the application of large databases to better understand global patterns of vegetation.


Vicki Watson

Vicki Watson (1981 PhD Botany) just retired from the University of Montana Environmental Studies program where she spent the last 35 years studying, enjoying, and working to restore western Montana's Clark Fork River, headwaters to the Columbia River. She retired from the university but not from watershed keeping.


Eric Singsaas

Eric Singsaas (1997 PhD Botany) is Initiative Director for Wood Products and Bioeconomy at the University of Minnesota's Natural Resources Research Institute. He recently worked on a fiber hemp products project for the Sisseton Wahpeton Oyate Sioux tribe in Minnesota and North Dakota.

J. Chris Pires (2000 PhD Botany) recently has been promoted to Associate Dean of Research, Arts & Science, University of Missouri. Other recent awards include: University of Missouri 2018 Presidential Engagement Fellow , Sigma Xi Scientific Research Honor Society Fellow 2018, American Association for the Advancement of Science (AAAS) Fellow 2017, Univeristy of MO Chancellor's Award for Outstanding Research and Creative Activity, 2017 & University of Missouri Eisenstark Faculty Fellow Mentoring Award, 2017


J. Chris Pires


Beth Ehsan (with Karl Osmundson)

Beth Ehsan (née Wilson) (2001 BAC) now lives in San Diego, where she works for HELIX Environmental Planning as a Biology Project Manager. Last month she was honored to accept the Outstanding Technical Report award from the San Diego chapter of the Association of Environmental Professionals for HELIX's work on the Sweetwater Vistas project, a residential development that will provide much-needed housing while also preserving and restoring habitat for the coastal California gnatcatcher and other species. Before starting at HELIX three years ago, Beth worked as a Land Use / Environmental Planner for the County of San Diego and as an Environmental Resource Specialist for the Fort McDowell Yavapai Nation in Arizona. Here is my picture accepting the award with co-author Karl Osmundson.

Catherine Hein (2002 BAC) stayed in Madison to pursue her Master's at the Center for Limnology studying invasive rusty crayfish. She followed up with a PhD in Aquatic Ecology at Utah State University studying migratory freshwater fish and shrimp in Puerto Rican streams. After that, she spent 4 years in Arctic Sweden studying the impacts of climate change on lakes. She's been back in Madison working for the WDNR for 5 years now as the Lake Monitoring


Catherine Hein

Lead for the Bureau of Water Quality. Catherine writes, "All I can say is, what an adventure! My studies and career have given me tremendous opportunities to travel, become a part of new cultures, and intimately get to know a wide variety of ecosystems. I hope my current work will have a lasting, positive effect on the health of Wisconsin's lakes."


Kieron Weidner

Kieron Weidner (2002 BAC) graduated from UW-Madison with a BAC degree in 2002. One of the most important and formative experiences during his college years was a study abroad program in Costa Rica through CIEE . Immediately after college he completed two year-long Americorps internships with SCA (Student Conservation Association) - first doing Desert Restoration with the BLM in California's Mojave Desert, and the second doing Fire Effects Monitoring for the North Cascades National Park in Washington State. After his internships he worked for the Washington State Dept of Ecology as a Crew Supervisor for a crew of Restoration Technicians focusing mostly on salmon habitat restoration.
In 2007 his career took a major turn when he decided to start working for an eco-tour company that was just getting started in Seattle called Evergreen Escapes. In addition to being one of their lead "naturalist" tour guides, Kieron helped the company become one of the most sustainable in the industry by eliminating waste products like plastic water bottles and other unnecessary packaging from its tours. After leading the expansion of Evergreen Escapes into Portland, Oregon, he started his own tour company in 2013 called First Nature Treks & Tours. First Nature offers custom private tours of the Pacific Northwest that combine professional guides, luxury transportation and expert destination knowledge. We also have a few international destinations like Peru and Costa Rica. Kieron writes, "Even though I'm not in the 'environmental field' I still feel like I'm making a difference in the world by creating educational and inspiring travel experiences that focus on natural and cultural history."


Sagan Friant

Sagan Friant (2006 BAC) recently started a position as Assistant Research Professor at Penn State University in the Department of Anthropology and Huck Institute of Life Sciences. www.saganfriant.com.

Justin Zweck (2006 BS Botany) became an Assistant Professor at the University of Minnesota-Duluth in January 2018.

Katrina Bussiere-Venhuizen (2007 BAC) has worked in incredibly fun jobs as an environmental educator in Washington and Connecticut before settling down in Maine to work at The Ecology School at Ferry Beach, Portland Water District, and Maine Audubon. She finally landed her dream job as Senior Environmental Educator at ecomaine in 2016, proving that professional and personal growth can be both a long and beautiful process. Ecomaine processes trash and recycling for 1/3 of Maine and it's Katrina's job to educate students and adults alike on how to reduce, reuse, recycle, and compost before throwing things away so that we can conserve resources and save money at the same time. She lives in Portland with her husband, who is a solar installer, the ultimate conservation couple!


Katrina Bussiere-Venhuizen

Maggie Hanes (née Koopman) (2008 PhD Botany) and **Rachel Jabaily (2009 PhD Botany)** along with three other colleagues have started a new section of the Botanical Society of America centered around professional development for professors and future professors at PUIs (Primarily Undergrad Universities).

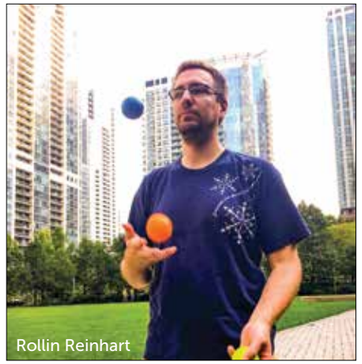
Maggie Hanes (née Koopman) (2008 PhD Botany) and **Lauren Moscoe (2016 PhD Botany)** work in Ypsilanti, MI, where Maggie is an associate professor in the Biology Department at Eastern Michigan University and Lauren is the Project Coordinator at the Farm at St. Joes (Michigan's first hospital-based farm). As it turns out, they work right across the street from one another and their UW Botany connection brought them together in late 2017. Since then they've developed a new initiative to create a series of science outreach events, on campus and for the greater community, called the Taste of Life. The aim is to use food to educate participants about diversity in all senses, including

organismal, genetic, ecological, cultural and nutritional. They also hope to empower participants to utilize this new knowledge in their everyday lives and educational development. This year they've held two events. The first was a strolling dinner on campus in which each course focused on a major lineage of life. For example, a salt tasting highlighted Archaea, and participants left in wonder at the deliciousness and diversity of fungi they'd never known. The second event was a six-course meal prepared by a local chef. We dined outside in a courtyard of a local coffee and tap house. Each course featured plants pollinated by a different pollination mechanism (bees, bats, wind etc.) and was accompanied by a paired mead, cider or beer. The third event will take place at Eastern Michigan University's annual Thanksgiving luncheon, which over two days will serve 800 people. Ingredients traditional to Thanksgiving will be highlighted from geographic, ecological and taxonomic perspectives.
Taste of Life website:
tinyurl.com/TasteOfLifeEMU
Farm at St. Joes:
stjoefarm.wordpress.com
Maggie's Website:
https://haneslab.wordpress.com/

Olivia Pszeniczny (2009 BAC) is a 3rd-8th Grade Science Teacher at Thorp Catholic School in Thorp, Wisconsin and is pursuing a Masters of Education Degree from St Mary's University of Minnesota. She's also the mother of two young daughters.

Sonya Jaworski (2010 BAC) lives in St Paul, MN teaching biology at a private school that is academically rigorous, Catholic, military, and all male. Her AP bio students find it fascinating how we tie in ecology, cell bio, evolution and genetics. She's been teaching for 19 years, and has taken educational trips to Costa Rica and the Galapagos islands.

Rollin Reinhart (2010 BS Botany) has been working with the Federal Emergency Management Agency (FEMA) as an Environmental Specialist Reservist in their Environmental Protection and Historical Preservation


Rollin Reinhart

cadre, since this past May. For the past several months, he has been working with the recovery efforts in Indiana after major flooding wreaked havoc on towns and cities along the Kankakee and Ohio Rivers. Reinhart's work focuses on helping public entities navigate the federal, state, and local environmental/historical protection laws and regulations. Soon he will be working with other states in the Midwest recovering from landslide, high wind, and flooding events from earlier this year. The work that he does with FEMA helps to ensure that recovery efforts are not only compliant with the law, but also keeps in mind the importance of environmental conservation, historical preservation, floodplain/wetland management, and environmental justice. This work helps communities receive the funding they need to rebuild after a disaster hits. So far, he reports that it has been a fantastic experience being able to assist communities in their time of need.

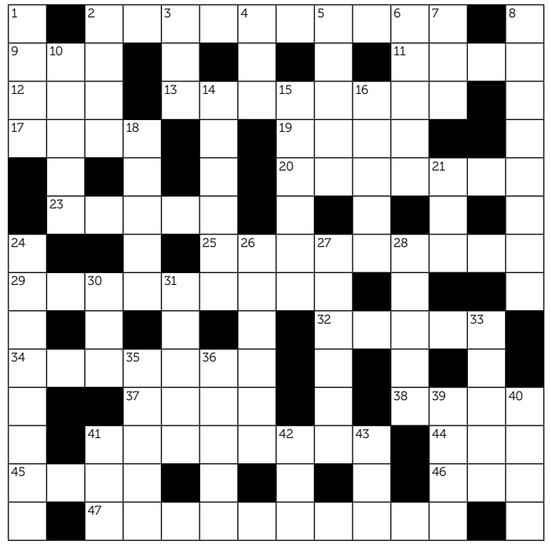
Samuel DiSalle (2016 Conservation Biology) graduated with a masters in Higher Education Administration from the Institute of Higher Education at the University of Georgia in May. After that he moved back to the Madison area and took a job with an energy efficiency start up called Rebate Bus. The company streamlines rebates on energy efficient products in multiple fields so that customers and businesses save money and use less energy, lightening the overall energy burden and cutting back on greenhouse emissions. Samuel also like to give back to the local Madison community by refereeing high school football and baseball. "It's great to be back in Wisconsin!" writes Samuel.

This fall **Rachel Keuler (2014 BAC)** started working toward a master's in biology at Brigham Young University in Provo, UT. She studies lichen phylogenetics and is making an inventory of the lichen species in the alpine peaks of the La Sal Mountains.

Matthew Pace (2015 PhD Botany) is serving as the lead PI for The New York Botanical Garden's recently awarded NSF Digital Thematic Collections (TCN) Grant entitled "Digitizing 'endless forms': Facilitating Research on Imperiled Plants with Extreme Morphologies". Matthew will lead a multi-institution effort to digitize 2 million herbarium specimens of epiphytic, carnivorous, and succulent plants. Ken Cameron, Botany Chair and Director of the Wisconsin State Herbarium, is also a participant in this exciting new grant. The "Endless Forms" TCN, composed of 17 collaborating U.S. herbaria from 11 states, will digitize specimens belonging to some of the most interesting plant species on Earth, including iconic species such as the Giant Saguaro Cactus, the Venus Fly Trap, and the leafless Ghost Orchid of southern Florida. These are just a few of the hundreds of thousands of plants that have evolved astounding adaptations allowing them to grow in extreme environments, including deserts, tropical rain forests, and nutrient poor bogs. The data from these digitized specimens can be used to test manifold evolutionary and ecological hypotheses; for example, these data can be used to explore trait development and evolution, species delimitation, and geographic distribution modelling and that can inform national and regional floristic projects. This TCN will also help provide critically needed information to overcome obstacles related to studying plant families which are very large, have cryptic diagnostic features, or occur in geographically challenging areas. NSF award #1802019.

Hexapod: A botanical puzzle

contributed by David Baum (answers at botany.wisc.edu/alumni-newsletter/)



Across

2. Kind of *Linum*
9. "Go saccharide!" prefix?
11. *Capital one*
12. *Marsh one*
13. Greenprophet.com, treehugger.com, and ethicsandclimate.org
17. Soil extract agar with sodium polypectate (abbr.)
19. European Initiative for Sustainable Development in Agriculture (abbr.)
20. Unhealthy state offset by eating legumes, nuts, and leafy vegetables
23. One DNA of strand
25. Hallowe'en-appropriate flowers from *Diphylleia grayi*
29. Double citrus flavor
32. Perfume source, *Polianthes tuberosa*
34. Wisconsin's hemlock species, for example
37. Shoot mass yield increase per kg fertilizer phosophorus added (abbr.)
38. *Eastern European one*
41. Just one *Cistanthe* (Montiaceae)?
44. *Commie one*
45. Doctrine of signatures association of Pulmonaria
46. Common chemical ending
47. *Genus of the imposter among the six*

Down

1. Thickened stems of some female inflorescence spikes
2. Plant genome size prefix
3. Alkaline solution
4. Certain nuclease
5. _____-Ciocalteu assay, used for phenolics
6. Non-embryophyte photosynthetic eukaryotes
7. Unsquared, count-based test-statistics
8. Swollen in a way leaf veins aren't
10. Aeolian sediment
14. Polish authority for Polypodiaceae (and many other names)
15. *Instructions to a pitcher to hit batters - or a clue to the six*
16. Orange of a kind
18. *Ford one*
21. ___porales (now in Scrophulariaceae)
24. A *Hyacinthoides* or *Mertensia*
26. *Excretory one*
27. Parasitic genus now in Boraginaceae
28. Tiny insect bane of *Arabidopsis* growers
30. ccs
31. Scottish *Brassica* root crops
33. Coated, perhaps with a canola product
35. A name for *Buxus microphylla* (not quite hemlock)
36. Corroded by Pucciniales?
39. Herbal "rhizoma iridis" root (alt.)
40. Archetypic garden
41. Nutrient medium used for germinating seedlings (abbr.)
42. Kind of heterostylous flower
43. Last syllable of quinoa

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Sipping pretty

A hummingbird clearwing moth (*Hemaris thysbe*) sips from *Verbena bonariensis* flowers in the Botany Garden this June.

Photo by Edgar Spalding