

# Botany & Conservation

A newsletter for alumni and friends of Botany and Conservation Biology

Fall/Winter 2016



Working to protect the  
Venus flytrap - page 6

*Dionaea muscipula*, commonly known as the Venus fly trap. photo: Jeff Miller

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planet and profit

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## Chair's Letter

Dear Alumni and Friends,

Though I am now half-way through my sixth year as chair of the Botany Department, I am still constantly surprised by the diversity of worthy activities that members of the department are involved in. Our role in the advancement of botanical knowledge is well known, but equally impressive are our contributions to undergraduate and graduate teaching, as well as campus and national service and outreach. I am truly proud of all that we accomplish and hope that the pages of this newsletter give you some flavor of many ways that Botany enriches UW-Madison and the broader world.



Another inspiring aspect of the chairship is the opportunity to see the widespread and generous support provided by you all: our many friends and alumni. Even the smallest gift adds to our financial flexibility and, equally importantly, helps to strengthen our sense of connection with the UW-Botany "family." But also, we have been so fortunate to have received larger gifts that allow us to provide better service to students, to start-up new research directions, and to expand our reach through outreach, service and support of educational innovations. Indeed, two generous individuals, who shall remain anonymous for now, recently signed memoranda of agreement to leave funds to the department: one for support of botanical research, and the other for support of graduate students in ecology. To these and all our kind donors, I offer a heartfelt thank you! We really appreciate your kindness, and always strive to use your gifts efficiently to advance our mission, namely to advance knowledge of the biology of plants (and plant-like organisms) and communicate this knowledge to students of all ages and stages.

I wish you all a joy-filled holiday season and a happy and healthy 2017!

David Baum  
Chair

## In Memoriam: Orie Loucks (1931–2016), Former UW-Botany Ecologist

—Don Waller, Professor of Botany, University of Wisconsin-Madison

The strength of our department's ecology section traces back to the era of J.T. Curtis and his students who founded UW's Plant Ecology Laboratory (PEL). One of John Curtis's outstanding students, and the scientist who succeeded him in 1962, was Orie Loucks. Orie grew up in Haliburton, Ontario, and earned his BS and MS degrees in forestry at the Univ. of Toronto in 1953 and 1955. The Canada Department of Forestry funded Orie to work on maritime forests while he pursued his 1960 PhD at UW with Curtis. Afterward he joined the UW-Madison Botany faculty and by 1967, he was Professor of Botany and Forestry.

Orie's graduate students recall that his courses covered the plant ecology literature in more depth than any textbook of the era. He soon expanded his domain of research from analyses of community structure to the study of ecosystem processes, working in both aquatic and terrestrial systems. His classic 1970 paper, *Evolution of diversity, efficiency and community stability*, described how natural disturbances play key roles and how suppressing them could spell disaster for ecosystems.

Rachel Carson's 1962 environmental classic *Silent Spring* struck a chord with Orie and he began working with colleague and friend Hugh Iltis, the Environmental Defense Fund, and others on the ecological effects of pesticides. This group convinced a judge to ban DDT from Wisconsin in 1969, contributing to the national ban three years later (see Bill Berry's book, *Banning DDT: How Citizen Activists in Wisconsin led the Way*). His and others' testimony led to a paper in *Science*, but Orie was just as proud to see the concept of bioaccumulation discussed in newspapers. During this time, he also became deeply involved with protecting and



managing natural areas. He served as Chair of Wisconsin's Scientific Area Preservation Council and with The Nature Conservancy on state and national governing boards.

In 1978, Orie joined the Holcomb Research Institute at Butler University in Indianapolis and in 1982 he became its director. During the 1980s, Orie was intimately involved in analyzing sources of air pollutants and their impacts across the Midwest and northeastern North America. He anticipated others in analyzing effects of acid rain on both farms and forests in the region, recognizing how ecosystems differed in sensitivity and expressed threshold effects before these became common parlance in ecology. His work with the National Acid Precipitation Assessment Program connected regional forest decline in the Northeast to power plants through the Ohio River valley, again using his science to connect local ecological changes to regional and global factors.

Orie left Holcomb in 1989 to accept an Eminent Scholar Chair at Miami University in Ohio. He remained active beyond his retirement from Miami University in 2002 and his return to the Madison area a few years ago. His many friends, colleagues, and former students all credit Orie for his insights, concern for students and others, and willingness to engage on important issues.

## Q&A with Catherine Woodward Associate Faculty in Botany



### Please describe your work.

You might have noticed that I live a dual life. I'm in Madison half of the year, and Ecuador for the other half. I do research and conservation in Ecuador with my non-profit organization, the Ceiba Foundation.

Here, I am first and foremost an educator, and have worked with a variety of audiences in many different educational contexts, from traditional classroom courses, to blended instruction with some combination of online, classroom and field, to service-learning and study abroad.

I believe far-reaching education on environmental and conservation issues is critical to the future of humanity. To be able to reach diverse audiences with coherent and convincing messages that not just increase knowledge, but change behavior is what drives me every day. We have so much great science being done that can help humanity confront the environmental challenges of our day — protecting biodiversity, climate, and water among them — but it is up to effective educators to see to that the science is applied and makes a difference in the world.

### You teach a “Rainforests and Reefs” First-Year Interest Group (FIG). What is special about that experience?

Freshmen often enter college bewildered with the plethora of options, but lacking direction. Many students enter my FIG because they were exposed to

and fascinated by rainforests and coral reefs on TV shows. I use the context of this exciting topic to teach them overarching ecological and environmental principles, science process skills, and engage them in their associated Chem 103 class. They spend the winter break in the Amazon rainforest carrying out field research after having designed their experiment and written a proposal through the fall semester. I delight in seeing students energized about field research as freshmen, and being influenced positively towards a major related to ecology or conservation.



Catherine and her FIG students on a night walk in Amazonian, Ecuador. The snake pictured is *Dipsas*, a snail-eating snake.

### Tell us about the Wisconsin plant keying app you are developing.

The original key was the idea of Corey Hart, an undergraduate student in my fall 2006 Dendrology class. He made a rudimentary but functional text version that worked on the old click-wheel iPods. The next iPhone version, expanded to include trees, shrubs, and vines with rich imagery, was developed in 2009 with

a WEEB grant. This year, I received a Baldwin grant in collaboration with the Wisconsin State Herbarium and the WID Field Day Lab to further update and expand the app to include most of WI's native plants and invasive exotics. The app will work on all platforms and will integrate crowdsourced data collection.

### You established the Ceiba Foundation for Tropical Conservation. Please describe the work that the foundation does.

I co-founded the Ceiba Foundation in 1997 as a graduate student at the University of Florida, and am its current President. Our work focuses on engaging smallholders in Ecuador in the conservation of biodiversity and ecosystem services through habitat protection, agroforestry, and sustainable microenterprise.

I also lead undergraduates from UW and elsewhere on the Tropical Conservation Semester program in Ecuador each Spring in which students earn honors credits in terrestrial and marine ecology and conservation, learn Spanish, and engage in real-world conservation projects through internships with a choice of organizations.

This newsletter is published by the Department of Botany at the University of Wisconsin-Madison for alumni, colleagues and friends.

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## Linda Graham's Dual Focus: Macroalgae for Clean Water & Biofuels

By Leslie Shown, Wisconsin Energy Institute



Members of Graham's team (pictured at right) optimize growth of macroalgae at UW–Madison's Biotron Laboratory. Pictured at left are strands of freshwater macroalgae from Madison's Lake Mendota. This alga is a feedstock super-producer (indicated by blue fluorescence) for which Graham's team has genomic data to aid development of industrial products.

For many of us, the thought of seaweed conjures up the slippery green strands we reluctantly wade through to reach the more inviting depths of our favorite summer swimming hole.

For Botany's algae expert Linda Graham, however, seaweed is "macroalgae", a resource for improving aquatic health in oceans, rivers, and streams as well as the source of potentially valuable industrial products.

Graham leads a research team with two connected focus areas: developing innovative algal farming systems that use macroalgae to remove nitrogen and phosphorus from the effluent of wastewater treatment plants; and using genetic analysis to identify marketable "extractives", products such as cellulose that can be easily extracted from macroalgae for a variety of industrial purposes.

"It's the simultaneity of these two areas that is most important to my team's work," Graham says, "solving the all-too-pervasive problem of phosphorus and nitrogen in wastewater effluent and, at the same time, producing materials that are useful to humans."

Traditional wastewater treatment plants are good at removing organic material from wastewater but they can't

remove all nutrients. And high concentrations of nitrogen and phosphorus, often the result of agricultural run-off, pose serious environmental problems as they fertilize sprawling blooms of microalgae in large bodies of water. Bacteria consume the available oxygen as they feed on the large algal mass, creating low-to no-oxygen "dead zones" that no longer support marine life.

"Wastewater from Madison ends up in the Rock River, which discharges into the Mississippi River and then flows into the Gulf of Mexico," Graham explains. "That makes Madison residents partially responsible for the 'dead zone' in the Gulf of Mexico, which is currently more than six-thousand square miles in size."

Graham's team is working to efficiently and cost-effectively absorb nitrogen and phosphorus by installing different types of algal cultivation devices at the discharge points of wastewater treatment plants.

"The algae we work with are just like big sponges," Graham says. "They soak up the nutrients and retain them for a long time. These guys are armor-plated, invulnerable to being eaten or broken down by microorganisms. They're also very easy to harvest."

Harvest in hand, the use of macroalgal genetic analysis to discover marketable extractives is an equally important part of the team's algal research. "The sale of these extractives," Graham says, "generates the income needed to subsidize the start-up, and maintain the costs, of algae-based wastewater remediation systems."

Cellulose is one of those valuable extractives. A long chain of linked sugar molecules, cellulose is the primary component of plant cell walls and the basic structural element for many types of paper and cloth. Celluloses are used in making products as varied as batteries, pharmaceuticals, and clothing.

In recent years, Graham's team has also focused on the biofuel industry, researching macroalgal celluloses that can be used as a feedstock for cultivating biofuel-producing microorganisms such as bacteria and yeast.

"The idea that algae could be a source of renewable energy derives basically from the recognition that our modern day oil deposits as well as methane deposits originated from algae," Graham says. "So why wait 300 million years to generate more, when we can grow algae and use it to generate renewable fuels right here and now?"

## Forensic botany course covers legal side of wood, pollen, contraband logging

By David Tennenbaum.

Whether it's a putative perpetrator with a peculiar pollen in his poncho, a possible plantation of proscribed opiates, or a shipment of lumber from a tree protected by international treaty, botanical identification can make or break a criminal case.



Sara Hotchkiss analyzes clues to vanished ecosystems contained in pollen. She occasionally offers an expert interpretation of pollen evidence in criminal cases. Photo: David Tennenbaum

This spring, UW–Madison students are getting a chance to expand their skills beyond the traditional academic realm in Botany 575: Forensic Botany.

The new course focuses on science as problem solving, but also fills utterly practical needs, says Sara Hotchkiss, professor of botany and an expert in pollen identification. “I have helped coroners analyze pollen found on a jacket sleeve. If you want to know where a person was — or was not — finding a lot of tree pollen creates a different set of possibilities than finding ragweed pollen.”

Forensics can provide a real-world use for esoteric knowledge, says course instructor Alex Wiedenhoef, adjunct assistant professor of botany and team leader of the Center for Wood Anatomy Research (CWAR) at the USDA Forest Products Laboratory. “I took plant anatomy at UW–Madison in 1995, and I was sitting in those chairs, thinking,

‘Am I ever going to use this information?’ This course gives that question a different context.”

CWAR holds the world's largest reference wood collection, with about 105,000 specimens representing roughly 20,000 woody species.

Criminology can benefit from knowledge of wood, leaves, diatoms, pollen and algae, adds Wiedenhoef, one of the world's foremost experts in identifying woody species. “These are questions that criminal investigators are not asking as regularly as they could.”

Not all of the samples that reach the lab and need identification are of legal import, Wiedenhoef adds. “I've gotten evidence from murders or plane crashes, ... from university museums investigating African tribal masks, from Blackbeard's ship, even wood from inside a saber tooth tiger's skull.”

In forensic terms, CWAR's prize exhibit is a pallet load of illegal mahogany veneer from Brazil. Although the shipment's paperwork declared the value at less than \$9,000, Wiedenhoef was told that based on quality and size, the real value is closer to a quarter-million dollars.

The large pile of mahogany veneer is emblematic of the size of illegal logging, Wiedenhoef says. “It's a \$30 billion- to \$100 billion-a-year global business, and that's something we did not understand at the outset. Something like 80 percent is done by organized crime; it's not just local people clearing land to grow crops.”

The instructors will grab

opportunities as they arise, says Wiedenhoef. “If something interesting happens on campus, like the President's Oak (a hollow bur oak, aged about 300 years, removed from Observatory Hill two years ago), we'll visit. There is so much you can learn while people cut up a gigantic organism like that.”

Although the course is experimental, it's more substantial than you might think, says Wiedenhoef. “There is ample science to back up the forensic application of botany, but there seems to be a lack of awareness of how powerful and ubiquitous it can be. We want to take students who are excited, passionate about botany, and show them what is out there.”

“Forensics is a great way to teach how science works,” says Hotchkiss. “It's problem-solving. This is changing, but too many introductory classes are about what I call ‘stuff scientists have learned.’ The forensic approach is about how scientific reasoning works. The fun of being a scientist is figuring out how stuff works and solving problems and mysteries.”



Alex Wiedenhoef directs the Center for Wood Anatomy Research at the Forest Products Laboratory. Photo: David Tennenbaum

## Don Waller leads petition to give Venus flytrap endangered species protection

Adapted from an article by David Tenenbaum

University of Wisconsin–Madison ecologists have played a key role in a petition filed with the U.S. Fish and Wildlife Service Friday seeking emergency Endangered Species Act protection for the Venus flytrap.

The unique carnivorous plant captures flies and captivates nature lovers, but in the wild is found only in North Carolina and South Carolina.

“Kids love them, adults love them. It’s a plant that captures the imagination of everybody who sees it,” says Don Waller, a professor of botany and noted expert in conservation biology at UW–Madison. “Darwin called them a ‘most wonderful plant’ and experimented on them for several years in the greenhouse, but these plants are threatened by a combination of development, poaching and rising sea levels, and so we are asking for an expedited ‘endangered’ designation for the Venus flytrap.”

The plant’s home turf is around bogs near Wilmington, in coastal North Carolina. This is a long way from its closest relative, an aquatic plant in South Africa. The Wilmington region is growing rapidly, and the bogs are being paved and built up, Waller says.

The plant’s very popularity is another key to its undoing, he adds. “People are fascinated by a plant that can move faster than the insects it eats, but ironically one result is a market for plants stolen from the wild.”

Stolen plants are usually sold as house plants, but “many people don’t know how, or can’t be bothered, to care for them,” Waller says. “Venus flytraps are high-maintenance plants, except in their native habitat.”

The Venus flytrap uniquely evolved a “snap-trap contraction” that closes in about one-tenth of a second, enveloping its insect prey so rain does not wash the food away before the plant digests it. The flytrap has three hairs in each leaf, and a snap requires triggering more than one hair. “The insect has to hit one hair and then within a limited period hit another,” says Waller. “Only after that double signal will the leaf close. It’s a pretty clever plant.”

Neither small insects nor raindrops will trigger a snap.



Photo: David Tenenbaum

As the number and size of Venus flytrap populations decline, the survivors face multiple threats: further habitat loss, diminished genetic diversity, predators and outbreaks of disease. According to the Endangered Species Act petition, a “viable population,” meaning one that is expected to survive and evolve over the long term, needs at least 1,000 plants. Only nine such populations are known.

The petition was written and signed by a national group of experts in conservation and ecology, including Waller

“We have reached a situation where there are more flytraps in captivity than in the wild.”

– Don Waller

Kandis Elliot

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and Tom Gibson of UW–Madison, Yari Johnson of UW-Platteville, and Robert Evans of the Virginia Natural Heritage Program. Waller has launched an online campaign in support of the petition (<https://goo.gl/U6RAqe>).

As collectors continue to snatch plants from declining wild populations, “we have reached a situation where there are more flytraps in captivity than in the wild,” Waller says. “That might be construed as good news, if it assures they will survive in captivity, but it’s distressing for ecologists and conservation biologists. A

population can only persist and evolve in its native habitat, and we’ve already seen the disappearance of 90 percent of wild plants. We have lost whole bogs, populations and individuals.”

Protection under the ESA would require the Fish and Wildlife Service to identify critical habitat for the species and takes steps to protect it, Waller says.

At stake is what Waller considers one of the most marvelous examples of evolution. “Snaptraps have only evolved once in the 3.7 billion-year history of life on Earth. This species is native to just one

area of North America, and represents a unique and fascinating offshoot in the tree of life. Having plants only in greenhouses is like having tigers only in zoos. It’s not the same.”

Change is normal in biology, Waller adds. “This plant, like any species, is a process connected to an ancient past and an indefinite future. That’s what we are trying to protect. If we lose the habitat, we lose the species and its future. The world would be a poorer place without wild Venus flytraps.”

## Conserving indigenous plant knowledge and resources

Alex McAlvay, a Ph.D. candidate working in the Emshwiller lab, has interests spanning from the biological to the cultural. His research investigates the evolutionary origins of one of the world’s most widespread weeds, field mustard (*Brassica rapa* L.), and the possible ongoing (re)domestication of this plant by Indigenous farmers in Mexico. This work integrates evidence from population genetics, growth experiments, species distribution modeling, and ethnographic interviews with the goal of better understanding how weeds evolve, how domestication happens, and how people incorporate newly-encountered plants into their cultures.

Outside of academia Alex works as the international project coordinator for the Herbal Anthropology Project (HAP), an organization that focuses on the continuation of traditional plant knowledge and Indigenous resource sovereignty. Most recently, Alex has been working with UW-Botany alumna Jane Bradbury to raise funds and facilitate the establishment of the first Indigenous-owned/run herbarium and seedbank in Mexico. The facility, located at the Huichol Center for Cultural Survival and Traditional Arts in Jalisco, will be a repository of culturally important plants and information on

their traditional use as food and medicine. They hope that this resource will help address the following issues:

Many western-Mexican Indigenous peoples face threats to land and resource sovereignty from extractive projects like pipelines, dams, and mining. The herbarium will provide legally-protected documentation of plant locations and cultural importance—evidence that has been used in northern Mexico to halt the construction of an airport on a mountain sacred to the Rarámuri people.

Dozens of new patents have been registered by foreign bioprospectors seeking to profit from products developed based on Indigenous plant knowledge from western Mexico. The herbarium specimens and documents can be used to establish the prior use of a given plant by the Huichol people in court.

Traditional crop varieties are disappearing in many parts of the world due to changing livelihoods and access to hybrid seed, but having diverse, locally adapted heirloom crops provides a form of insurance against pests and extreme weather. The seedbanking facilities in the structure will provide an ex situ repository for maize, beans, squash, peppers, tomatillos, and other crops that are central to traditional foodways and cosmology.



A Rarámuri collaborator in western Mexico collecting *sokowekeri* (*Russula brevipes* mushrooms parasitized by *Hypomyces lactifluorum* fungus) to eat

Finally, many of the Indigenous students in the town where the herbarium will be established are unable to regularly return to ancestral territories. As a result, traditional knowledge about plants is likely waning in the area. The Indigenous teachers at the school will be able to use the herbarium as a tool to show the plants first hand and connect the students with their ancestors’ knowledge.

For more information about the Huichol Herbarium project see <http://herbalanthropology.org/projects/current-project/huichol-herbarium/>

## STUDENT PROFILES

### Field Notes: Kyle Watter

*Kyle is a Conservation Biology, Cartography & Geographic Information Systems, and History Major graduating in May 2018.*



A wise naturalist, no one really knows who, once said: “Anyone can love a mountain, but it takes a soul to love a prairie”. I would amend this chestnut slightly, adding “and it takes a high fever or a mild form of insanity to love a sedge meadow.” But that is exactly what I came to do by the end of this last summer.

Over the past summer, I had the privilege to work as a biological technician at Necedah National Wildlife Refuge in Necedah, Wisconsin. I assisted with habitat management and wildlife management programs while there, and learned a great deal about central Wisconsin and conservation biology. However, the most important thing I learned on the job was the importance of research.

Before taking the job at the Refuge, I clung to a rather cynical view of research. I thought it focused on impractical issues that did not pertain to the issues facing species and ecosystems. I described myself as someone who preferred

working in the trenches of conservation. That view changed by working with Brad Strobel, the wildlife biologist, and Jess Jaworski, a graduate student, on two important projects. Jess studied whooping crane nest abandonment. Her work changed management approaches on the refuge and hopefully will lead to more successful hatches. Brad tasked me with implementing a vegetation monitoring procedure. I then conducted an extensive population study of endangered Karner blue butterflies. This data was then used to make management decisions. Being able to work with both these research projects showed me the importance of research. What research reveals can be directly applied to conservation. I came back to Madison intent on getting involved with research on campus and contribute to conservation in a way I had not before. All thanks to an outstanding summer job experience.

### Field Notes: Alexis Rivera

*Alexis is a Conservation Biology, Environmental Studies, and Zoology major graduating in December 2016.*

I am incredibly privileged to have spent a month abroad in Tanzania studying wildlife management and conservation. With the School for Field Studies I gained an incredible amount of field experience. I learned methods of conserving wildlife both inside and outside protected areas amid a rapidly changing socioeconomic and political environment and I also examined constraints to the conservation of wildlife among resource-poor rural populations.

Of the hands-on fieldwork, one I enjoyed the most occurred in the world-renowned Serengeti National Park. We conducted many behavior assessments including predator-prey interactions. During one game drive we were able to witness a vigilant Grant’s gazelle defend its fawn against a ravenous bird of prey. In addition to bird scans we also created activity budgets for primates and observed disease infection of baboons

and their association with other species in Lake Manyara National Park.

To supplement the behavioral techniques, I gained a lot of useful conservation knowledge and skills while identifying key aspects of human-wildlife conflicts. I performed transect lines near Simba River and analyzed the effectiveness of community-based natural resource conservation by the Kambi ya Simba Village. This management planning, community based natural resource conservation, and integration of wildlife conservation and human development will help me stand out as I seek a career in environmental and conservation fields.

As I learned more about how animals and humans interact with each other and with their environment, I realized I can’t help animals and the environment without helping people. I now know my passion is not just for the conservation of animals, but for conservation of all life on



Alexis Rivera with her host family in Karatu, Tanzania

earth. I was forced to step out of my comfort zone and was exposed to all sorts of challenges, but it was a great opportunity for adventure and growth. I am forever grateful for my experience in Tanzania and I will continue to broaden my mind and challenge myself to contribute to the environment in new and exciting ways; helping to create a world where both people and nature thrive.



## ALUMNI NEWS

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

**Ethel Niedergang Kamien (1952, MS Botany & 1955, PhD Botany)** left Madison to join Carl Leopold's research group at Purdue. While there she married and had two sons. In 1960 she was recruited to join the Biological Sciences Department at Lowell State College (later UMASS/Lowell) in Massachusetts, becoming Chairperson in 1963. After 33 years of service there, Ethel began her well-deserved retirement.

**Wayne Rosing (1969, BS Botany)** is continuing to keep his post retirement hands in slime (slime molds) by collaborating with a colleague at the U. of Arkansas. *First Records Of Myxomycetes From Cambodia* appeared in the last (2015) issue of the *Austrian Journal of Mycology*. Currently isolating/identifying slime molds on substrates (tree bark/litter) from the Seychelles. A manuscript on a new species of *Licea* from Laos is in preparation.

**Charles Umbanhowar (PhD 1989, Botany)** is currently a professor of biology and environmental studies at St. Olaf College. He is enjoying not being director or chair of anything. He continues with projects on the fire history of the northern Great Plains and lake-landscape connections at the tundra-forest border. When not playing with mud, he keeps busy with rebuilding barb-wire fence on 50 acres of pasture/remnant prairie that he manages using fire and grazing.

**Dr. Alexander Felson (1994, BS Botany)** is an Associate Professor, an urban ecologist and a registered landscape architect at Yale University. He directs the joint degree program between the School of Architecture and the School of Forestry and Environmental Studies and is the founder of Urban Ecology and Design Lab (UEDLAB). His work focuses on ecological urban



Alexander Felson

designs that incorporate aspects of green infrastructure (especially water management), coastal adaptation and constructed plant communities. He was part of Yale's core team on a federal HUD Hurricane Sandy initiative, Rebuild by Design and is currently serving as an advisor to the State of Connecticut through an Executive Order from the Governor on the "State Agencies for Resilience" (SAFR). He served as the lead designer for the State of Connecticut's HUD National Resilience Disaster Competition with a proposal that awarded the state 54 million. Pioneering coastal green infrastructure, Felson built bioretention gardens in Bridgeport, CT and developed the first Coastal Resilience Plan in Connecticut for the town of Guilford. Through the UEDLAB Felson also worked with the Nature Conservancy on the Regional Framework for Coastal Resilience in Southern Connecticut, a USDA funded project. Alexander lives in New Haven, CT and has three children.

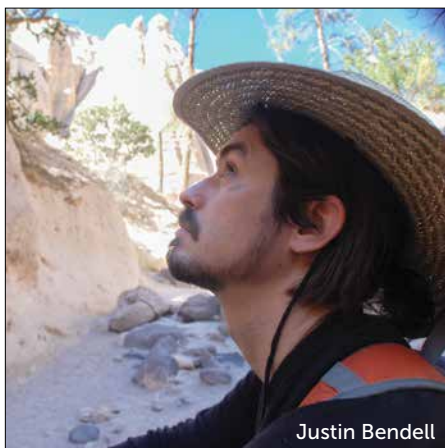
**Lance Powell (1994, BS Conservation Biology)** had intended to go into environmental law, but changed courses pretty quickly. After a handful of wildlife survey type jobs with the US Forest Service, he landed in San Francisco and promptly fell into teaching, something he had never considered. Now he's on year number 20 as a high school educator. He's currently teaching AP

Environmental Science at Menlo-Atherton High School and also serves as an instructional science coach. He's had a varied career teaching science that has included teaching a variety of courses, designing lots of curriculum and new courses, founding a new school, and working with architects designing new lab classrooms. He has received some notable awards in the process including Educator of the Year for the Bay Area and most recently in 2015, the Presidential Innovation Award in Environmental Education. For anyone majoring in Conservation Biology that is wondering about possible career pathways, Lance says teaching has been tremendously rewarding. He has taken students into the field all over the place, helped them do tons of hands-on inquiry labs, has been continually challenged to be creative and innovative, and partnered with UC Berkeley and Stanford professors. He has taken great pride in knowing he's helped to inspire quite a few students to continue on in the sciences, and in the environmental sciences, in particular. He even has a student from class last year studying at UW Madison at this very moment!



Lance Powell

**Eric Singsaas (Ph.D. 1997 Botany)** accepted a position as Initiative Director for Bioeconomy and Wood Products development at the University of Minnesota Natural Resources Research Institute (NRRI). NRRI is an applied research institute at the University of Minnesota set up to deliver integrated solutions to drive economic prosperity and environmental sustainability. Eric oversees laboratory and facilities related to forest products, materials testing, biofuels, bio-based chemicals, and chemical extractives. As Initiative Director, he is responsible for strategic planning, personnel, facilities, and developing collaborative research programs across academia and industry.



Justin Bendell

**Justin Bendell (2000, BS Conservation Biology)** has turned away from the sciences and toward a career in writing and literature. One of his short stories won the *Washington Square Review*

2015 Fiction Prize and, in 2016, he was made Assistant Professor of English at the University of New Mexico - Valencia.

**Chris Pires (2000, PhD Botany)** was recently promoted to Full Professor at the University of Missouri. Research in his lab broadly encompasses plant evolutionary biology—from phylogenetic studies in plant diversity to genome-wide analyses of gene expression. Current investigations are directed at molecular systematics and comparative genomics, with a particular focus on the evolution and ecology of polyploid plants.

**Michael Stevens (Botany PhD 2005, MS 1998)** is an Associate Professor at Utah Valley University and the Director of Capitol Reef Field Station, located inside Capitol Reef National Park in the redrock country of south-central Utah. His field station was recently featured on the cover of *BioScience* in a volume that included an article that he and a co-author wrote about the opportunities and challenges of field-station partnerships between universities and national parks. In addition to directing the field station, Michael teaches plant ecology and does research on aspen, birch, hackberry, and science faculty with education specialties.

**Kelly Montenero (2008, BS Conservation Biology)** and her husband live in Miami, FL where she works as the Florida Coral Management Fellow for the NOAA Coral Reef Conservation Program. Her conservation biology

major prepared her well for aquatic ecology work, though she's switched from freshwater to marine ecosystems. She loves getting back to Madison when possible for football games, a stroll through the farmer's market and time on the Terrace.

**Deidre Jaeger (2012, BS BAC, and Environmental Studies)** began a PhD program in Ecology and Evolutionary Biology at the University of Colorado-Boulder



as a National Science Foundation Graduate Research Fellow this fall. Her graduate advisor is Carol Wessman, (who did her PhD at the University of Wisconsin-Madison!), and they are analyzing satellite data for urban phenology patterns in the Colorado Front Range. She plans to research plant community response to climate change using simulated drought with the City of Boulder Open Space and Mountain Parks. Deidre says, "It feels really good to be a student again and in such an intellectually stimulating environment!"

**Ray Brunner (2015, MS Botany)** is currently working as a Vegetation Ecologist Research Assistant for the Institute for Natural Resources (Oregon's Natural Heritage Program) and is living in Portland, OR.

## 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/botany-funds.htm>

### Conservation Biology Major Fund (fund # 12168143)

Please join us in our efforts to provide support for important Conservation Biology program priorities. Gifts to the Conservation Biology Major are used to recognize outstanding Conservation Biology 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>

Online donations at the links provided are easy and secure. Check donations can be made out to the University of Wisconsin Foundation. Please include the fund number on the check.

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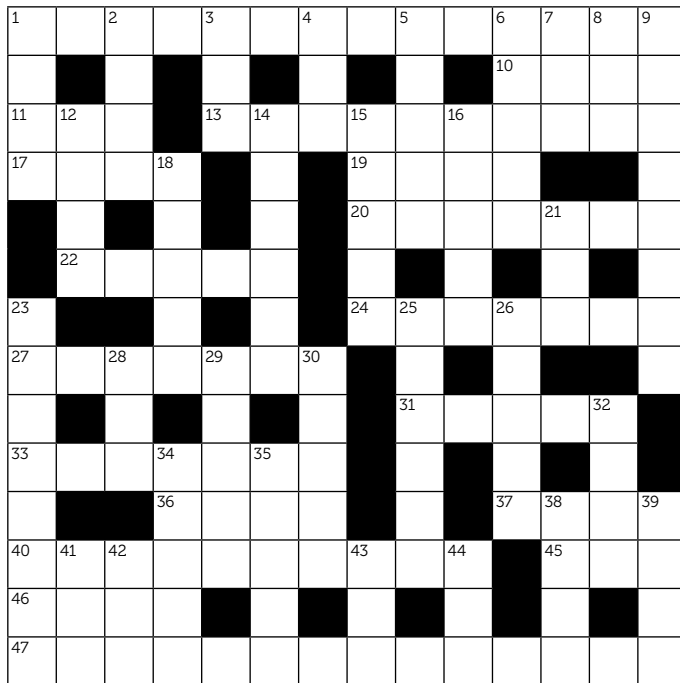
## Connect with Badger Bridge!

Badger Bridge is a new way to network with alumni and can be easily joined through an existing LinkedIn or Facebook account. Use Badger Bridge to:

- Introduce, employ and offer to act as a mentor to our graduating students.
- Leverage your professional network to get introduced to people you should know.
- Advance your career through inside connections working in top companies.
- Find and reminisce with fellow graduates, see what they have been up to and stay in touch.



## All Botany Crossword contributed by David Baum (answers at [botany.wisc.edu/alumni-newsletter.htm](http://botany.wisc.edu/alumni-newsletter.htm))



### Across

1. Florally perfect
10. Commercial product for those who don't have the patience to rub turmeric paste on their legs
11. Goal of genetic linkage analysis
13. Structure formed by the fusion of organs in a milkweed flower
17. Citrus epicarp and mesocarp
19. Of land replete with sphagnum, typically
20. Extant lycophyte genus
22. The authority associated with a basionym

24. A common name for *Valeriana officinalis*
27. Carpentry tool for tangential sections (effectively)
31. Perennial, leguminous, climber with bright red and black seeds
33. Part of the name of the CAS herbarium

36. Lychee flesh, anatomically
37. A standing, dead or dying tree
40. Some wild-flowers in the genus *Heuchera*
45. Female animal that sounds like a common conifer
46. Thus, in a Latin diagnosis
47. Scientific name of pineapple mayweed?

### Down

1. Plant yielding trendy health-food seeds
2. An item that may be made from another product of 1 down
3. A longer version of R
4. Biter of *Lamium amplexicaule*?
5. Archetypic *Phoenix* locale
6. Graft by the insertion of a bud
7. Like 21, but Amber
8. Tri-isoleucine

9. Jade plant, for example
12. Archaean, for example (at least in the UK)
14. Weedy composite whose finely-divided leaves were once used to make compresses for treating hemorrhoids.
15. Technologies used to explore the various types of molecules in cells
16. Kind of lily that should (but does not) live in streams
18. Sailors' hesperidia
21. Opal (see 7 & 42)
23. South American Solanaceae genus in tribe Solandreae
25. Persian violet
26. Sweet infusion of ground malt prior to fermentation
28. A rosary \_\_\_\_\_ (see 31)

29. Not a tree or a shrub (at least in England)
30. A tropical legume shrub widely grown for forage
32. Shredded *Brassica oleracea*
34. He who recently bragged, "I'm the greatest botanist on this planet"
35. Drought-resistant sorghum varieties
38. Mahogany yielding an insecticidal oil
39. Agarose and others
41. Lateral root number locus name
42. Like 21, but in RNA
43. A plant or tree grown for its attractive appearance (abbrev.)
44. A cryptographic network protocol used for remote login to a computer system



DEPARTMENT OF  
**Botany**  
UNIVERSITY OF WISCONSIN-MADISON

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## Plant Specimens to Art Specimens

Linda Neusen, Assistant Dean, L&S Pre-Award Services, is celebrating 15 years of work with the Botany Department with a fiber art project that translates herbarium specimens into quilted masterpieces. She is working on over a dozen species nominated by Botany faculty and staff. Linda incorporates some context into each work. For example, the Karner blue butterfly flutters in the background of her portrait of the wild blue lupine, its sole larval food source. Once the project is complete, the pieces will be displayed in Birge Hall.

At right: detail of  
Buttonbush (*Cephalanthus  
occidentalis*) with full  
composition in inset.

