

# Botany & Conservation

A newsletter for alumni and friends of Botany and Conservation Biology

Fall/Winter 2017

Unraveling the secret to  
the unique pigment of  
beets - page 5

The many colors of the common beet

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**Letters & Science**  
UNIVERSITY OF WISCONSIN-MADISON

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Chair's Letter



Dear Alumni and Friends,

Who knows where the time goes? It seems just yesterday that the students returned to Madison, and here we are already at the mid-term. I am sitting in the Botany Chair's Office, which I took over in July, and see the oaks and elms on Bascom Hill starting to transform color - there is a palpable

sense of inevitable change in the air. At the same time, autumn in Wisconsin always evokes a feeling of comfort in the familiar – botany students are once again out trying to ID asters and goldenrods. It's that enigmatic sense of the familiar coupled with a sense of change that makes it such a pleasure to be part of our exceptional university. We continue to embrace our traditions, while at the same time fulfilling our state motto – Forward! The feature story in this issue of the newsletter epitomizes this concept perfectly.

In 1849, the newly established UW Board of Regents proclaimed that “efforts should be made at once to begin the formation of a cabinet of natural history.” Without delay they commissioned geological, zoological, and botanical samples to be collected from around Wisconsin. Mr. Increase Lapham donated 1,500 plant specimens to establish the cabinet's herbarium; others followed.

Those seminal collections, intended to encourage interest in the natural resources of Wisconsin, grew quickly and would ultimately serve as the cradle of origin for most of the natural science disciplines that have propelled UW-Madison into an international research powerhouse (UW-Madison currently ranks 28th in the world). Today, more than 150 years later, a generous grant from the Wisconsin Alumni Research Foundation is breathing new life into that 19th Century Cabinet using 21st Century digital technology to re-unite them. The Department of Botany has a rich history steeped in tradition, but continues to collaborate, innovate, and advance – everything old is new again. On Wisconsin!

Ken Cameron  
Chair

Hugh Iltis Inducted into the Wisconsin Conservation Hall of Fame

Adapted from the Wisconsin Conservation Hall of Fame: wchf.org

The world lost a passionate conservationist and we lost a Botany Department legend when Hugh Iltis died in December 2016. This past Earth Day, April 22, 2017, Hugh was posthumously recognized for his efforts with a place in the Wisconsin Conservation Hall of Fame.

In 1960 he co-founded The Nature Conservancy in Wisconsin and championed its efforts to protect natural areas by serving on its Board, providing technical and scientific advice on acquisitions, and working with landowners to protect some of Wisconsin's most unique ecosystems, including the Baraboo Hills and Chippewa Prairie.

In the 1960s he joined fellow citizen activists to launch efforts to ban the use of DDT in Wisconsin and the nation. He also worked with many other national

conservation organizations to protect natural areas and promote environmental quality. His technical bulletin Atlas of the Wisconsin Prairie and Savanna Flora co-authored by Theodore Cochran and published in 2000 is still being used today.

Nationally and globally, Iltis is best known for his work as Wisconsin Herbarium Director, his efforts to protect biosphere reserves in Mexico and South America, and his plant studies, including the discovery in Mexico of *Zea diploperennis*, a perennial wild relative of corn, now being used for plant breeding.

Iltis received numerous awards for his contributions to conservation including TNC's highest honor – the Golden Oak Leaf Award, and a Presidential Award from the Republic of Mexico for his role in establishing the Sierra de Manantlan Biosphere Reserve.

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

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Longtime botany greenhouse director Mo Fayyaz retires

Adapted from a story by Eric Hamilton

When the Iranian government offered Mo Fayyaz a full scholarship to study horticulture abroad, a simple oversight meant the University of Wisconsin-Madison was not his top choice.

“I didn’t even know there was a state called Wisconsin,” laughs Fayyaz, who retired in August after 33 years as the distinguished director of the botany department greenhouse and botanical gardens.

“I even knew Kentucky!”

Fortunately for the university and Fayyaz’s future students and colleagues, UW-Madison was the first school to admit him. After earning his master’s degree in horticulture, Fayyaz went on to graduate with a Ph.D. in botany. A friend introduced him to his now-wife, a nurse from Wausau, Wisconsin.

While paying off his scholarship by teaching at the University of Tehran, Fayyaz lived through the Iranian Revolution and Iran-Iraq war. He was nearly bombed by Iraqi forces while traveling between university campuses. When Fayyaz returned to the safety of his wife’s home state, and to Madison, university hiring freezes and temporary work provided new challenges for his young family.

When a position for director of the greenhouse opened up, Fayyaz saw an opportunity to stay as busy as he enjoyed being.

“This job is just like juggling five, six balls at the same time,” says Fayyaz. “You cannot look to the side and let one go.”

Fayyaz juggled the demands of growing plant material for classes and research, managing the botanical garden, and reaching outside of the university to share his love of the plant world as widely as possible.

Among Fayyaz’s many stories of his adventures at the university is the time he masterminded an ambitious raising of the greenhouse roof — it had to be bent into place to fit after extensions were added — to accommodate larger

plants. Fayyaz and his greenhouse staff have grown a dizzying array of plants used by 14 lecture and laboratory courses as well as botanical research labs. The greenhouse climates range from humid, tropical jungles nurturing orchids to arid deserts brimming with cactuses.

In 2001, Fayyaz coaxed the notorious ‘corpse flower’, *Amorphophallus titanum*, to bloom. He had rescued the plant from the compost during greenhouse renova-



Photo by Bryce Richter / UW-Madison

tions and had to brush off skepticism that it was worth pampering a mercurial plant that only rarely blooms. As the flower opened, Fayyaz welcomed 30,000 visitors to the greenhouse night and day to get a whiff of its pungent stench. His idea to livestream the blooming from a webcam set records for website hits and crashed university servers.

Fayyaz distributed the seeds he collected to other greenhouses to grow, display and study. The offspring of the UW-Madison corpse flower have now bloomed around the world.

Donation money from visitors to the rare bloom was pooled with other grants to undertake a massive renovation of the botany department garden at Mills Street and University Avenue. UW-Madison landscape architecture students submitted designs and Fayyaz stretched the funds by paying student workers and

overseeing the work himself. The garden organizes plants by their family relationships and features several unique specimens, such as a direct descendent of Isaac Newton’s apple tree, said to have inspired the physicist’s theory of gravity.

University members, area residents and schoolchildren visit the garden for informal and organized tours — or to simply smell the flowers.

Fayyaz always extended his mission outside of the university walls. He co-founded the Association of Education and Research Greenhouse Curators, which connects greenhouse staff at universities and colleges to share knowledge and experience. Working with artists, he has designed engrossing, educational posters about plants and fungi, using the proceeds to advance the greenhouse mission.

Fayyaz received the 2017 Chancellor’s Award for Excellence in Service to the University for his contributions to the botany department and the university.

Although Fayyaz prides himself on the renovations he has overseen for the garden and greenhouse,

and the outreach he has championed with partners such as Edgewood College and Madison College, he is most proud of his record of safety. His efforts over the decades to move from chemical pest control to a program of integrated pest management, which uses natural methods like releasing beneficial insects, has helped protect the health of his greenhouse staff.

Fayyaz has many offers from different horticultural and botanical societies to consult in retirement. He also plans to spend time volunteering for Habitat for Humanity. But his first task? Cleaning out the basement at home.

“The botany department is my second family,” says Fayyaz, who, despite disliking the climate, has found a home in a chilly state he once didn’t know existed.

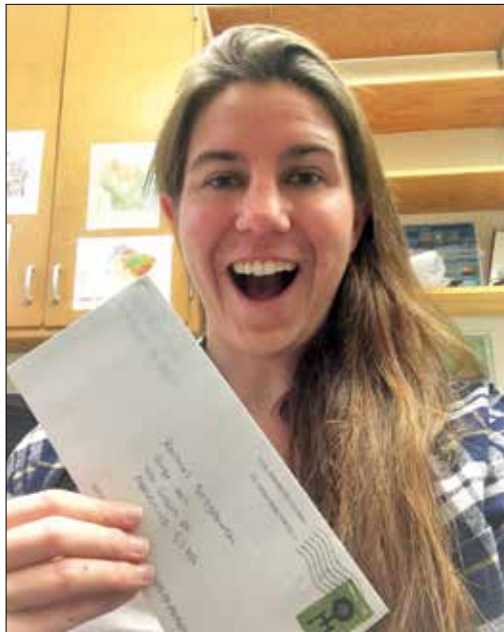
“I hate cold — these people kept me warm.”



## Giving back, one letter at a time by Rachel Toczydlowski

Who doesn't love getting a hand-written letter in the mail? Rachel Toczydlowski received four last year in her Birge mailbox, complete with drawings and stickers, from a 6th grader in L.A. who is interested in dinosaurs, space, and drawing. How? She participates in the Letters to a Pre-Scientist program (LPS). LPS is a program that pairs elementary and middle school students from under-resourced communities with scientists world-wide. They write letters back and forth for a school year as pen pals. Students ask scientists what it is like to be a scientist, and talk about what they're learning, and scientists have the opportunity to offer encouragement, talk about life as a scientist, and show genuine interest in a student that often lacks a large educational support system. The program's main mission is to empower and inspire young students to pursue careers in science and technology.

Here's what Rachel has to say after her first year. "I love participating in this program. It sounds cliché, but I really do feel like I am giving back to the broader community in a meaningful way. I grew up around scientists, so I learned early on that they were just people, and these interactions gave me the confidence to pursue a scientific career. I also knew about the cool things I could get paid to do as a scientist. Most of these



"You can just feel the energy when you walk into the classroom on a letter opening day." "I would have my students wait until everyone had a letter in their hand and do a countdown (3...2...1... open!). The students would be so incredibly excited and then all of a sudden complete silence would fall over the classroom as they browsed through their letters, photos, and other items scientists sent. This silence was quickly followed by chatter and questions of who each other's pen pal was, what they did for fun, where they lived, etc. The whole day is just fascinating to observe children absolutely engaged in science and beginning to form a connection with a real person in the field."

Rachel is currently a Botany PhD Candidate in Dr. Don Waller's lab studying inbreeding and landscape genetics in *Impatiens capensis* in Wisconsin floodplain forests.

LPS started in 2010 in North Carolina and has since grown to include over 20 classrooms and 450 scientists from 13 countries. Scientists can participate by signing up to be a pen pal and/or donating letter-writing supplies to classrooms. For more information: <http://www.prescientist.org/>.

Quote from Macon excerpted with permission from the LPS Blog at <http://www.prescientist.org/blog/>

students have never met a scientist, so imagine how powerful it is to have one take a genuine interest in them all school year. I love that I can portray scientists in a positive light, especially in our current climate. In addition to the warm fuzzy feeling of inspiring young scientists, writing these letters gives me great practice at making my research accessible. It also allows me to reflect on my own journey in science, and to remind me of why I love what I do."

The founding teacher, Macon Lowman, captures the power LPS has.

## 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: <https://botany.wisc.edu/giving/botany-directed-funds/>

### 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>

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## UW researchers discover an evolutionary stepping stone to beet-red beets

By Eric Hamilton

The color red is splashed across gardens, forests and farms, attracting pollinators with bright hues, signaling ripe fruit and delighting vegetable and flower gardeners alike.

But if you put a ruby raspberry up against a crimson beet and look closely, you might just notice: they are different reds.

Millions of years ago, one family of plants — the beets and their near and distant cousins — hit upon a brand new red pigment and discarded the red used by the rest of the plant world. How this new red evolved, and why a plant that makes both kinds of red pigment has never been found, are questions that have long attracted researchers puzzling over plant evolution.

In the journal *New Phytologist*, University of Wisconsin–Madison Professor of Botany Hiroshi Maeda and his colleagues describe an ancient loosening up of a key biochemical pathway that set the stage for the ancestors of beets to develop their characteristic red pigment. By evolving an efficient way to make the amino acid tyrosine, the raw material for the new red, this plant family freed up extra tyrosine for more uses. Later innovations turned the newly abundant tyrosine scarlet.

The new findings can aid beet breeding programs and provide tools and information for scientists studying how to turn tyrosine into its many useful derivatives, which include morphine and vitamin E.

"The core question we have been interested in is how metabolic pathways have evolved in different plants, and why plants can make so many different compounds," says Maeda. "Beets were the perfect start for addressing the question."

The vast majority of plants rely on a class of pigments called anthocyanins to turn their leaves and fruits purple and red. But the ancestors

of beets developed the red and yellow betalains, and then turned off the redundant anthocyanins. Besides beets, the color is found in Swiss chard, rhubarb, quinoa and cactuses, among thousands of species. Betalains are common food dyes and are bred for by beet breeders.

When Maeda lab graduate student and lead author of the new paper Samuel Lopez-Nieves isolated the enzymes in beets that produce tyrosine, he found two versions. One was inhibited by tyrosine — a natural way to regulate the amount of the amino acid, by shutting off production when there is a lot of it. But the second enzyme was much less sensitive to regulation by tyrosine, meaning it could keep making the amino acid without being slowed down. The upshot was that beets produced much more tyrosine than other plants, enough to play around with and turn into betalains.

Figuring that humans had bred this highly active tyrosine pathway while selecting for bright-red beets, Lopez-Nieves isolated the enzymes from wild beets.

"Even the wild ancestor of beets, sea beet, had this deregulated enzyme already. That was unexpected. So, our initial hypothesis was wrong," says Lopez-Nieves.

So he turned to spinach, a more distant cousin that diverged from beets longer ago. Spinach also had two copies, one that was not inhibited by tyrosine, meaning the new tyrosine pathway must be older than the spinach-beet ancestor. The researchers needed to go back much further in evolutionary time to find when the ancestor of beets evolved a second, less inhibited enzyme.

Working with collaborators at the University of Michigan and the University of Cambridge, Maeda's team

analyzed the genomes of dozens of plant families, some that made betalains and others that diverged before the new pigments had evolved. They discovered that the tyrosine pathway innovation — with one enzyme free to make more of the amino acid — evolved long before betalains. Only later did other enzymes evolve that could turn the abundant tyrosine into the red betalains.

"Our initial hypothesis was the betalain pigment pathway evolved and then, during the breeding process, people tweaked the tyrosine pathway in order to further increase the pigment. But that was not the case," says Maeda. "It actually happened way back before. And it provided an evolutionary stepping stone toward the evolution of this novel pigment pathway."

The takeaway of this study, says Maeda, is that altering the production of raw materials like tyrosine opens up new avenues for producing the varied and useful compounds that make plants nature's premier chemists.

For some unknown ancestor of beets and cactuses, this flexibility in raw materials allowed it to discover a new kind of red that the world had not seen before, one that is still splashed across the plant world today.



# A VIRTUAL MUSEUM REUNION

## Campus museums recreate 'cabinet of natural history' digitally

Adapted from an article by Eric Hamilton

In 1849, the Board of Regents of the new University of Wisconsin directed the curation of the state's plants, animals and minerals in a "cabinet of natural history."

Now, that founding piece of scientific inquiry is re-forming — digitally.

A new UW2020 initiative will centralize the databases of the university's five natural history museums, which have separated over the decades to specialize and accommodate growing collections. The 1.3-million-specimen Wisconsin State Herbarium will coordinate with the zoology, geology, entomology and anthropology museums to merge records in a way that allows researchers to study the full scope of natural artifacts in one central location. This digital cabinet of natural history will link the museums' combined 9 million-plus specimens that span all seven continents, the moon and Mars.

"We're coming back together, not in a physical way, in a common building, but through a virtual platform," says Ken Cameron, the director of the herbarium and the lead scientist of the project. The curators hope the project will be up and running and available online in about a year. "One hundred sixty-some years later, the cabinet, the museum of natural history,

is re-forming, but in this new 21st century online way."

The new database would allow a researcher to query specimens from each collection at once. For example, they could look up a time and place in Wisconsin and uncover the plants and animals that resided there and then, which minerals or fossils have been found there, and whether any human-made artifacts have been recovered at the site. With some specimens intact back to the founding of the cabinet, the century and a half of records provides a boon to scientists trying to track how populations have shifted over time.

Each contributing museum curates and digitizes its collections in unique ways, while facing its own challenges.



The herbarium as it appeared in the 1890's.



The herbarium today.

Nearly microscopic insect larvae from entomology are just as hard — only in different ways — to document and catalog as massive rock or fossil samples from geology. Jars of fish and boxes of bones are difficult for zoology to image, while anthropology struggles without a universal system of terms for different items.

Many of the museums capture images of as many specimens as possible to give even remote researchers a chance to inspect the samples up close. These pictures can help scientists verify that the specimen is labeled correctly while documenting variation across a species. In the eastern wing of Birge Hall, herbarium curators fit pressed plant sheets into a dedicated lightbox chamber, capture an image and copy details of the specimen to the digital entry. A similar lightbox, only much larger, allows Carrie Eaton, the curator of the Geology Museum, to photograph rock samples, with their shimmering colors true-to-life to aid identification. Eaton relies on a mobile

photography studio for the many specimens far too heavy to move.

The boxes of pinned insects lining the drawers of the Wisconsin Insect Research Collection call for a different approach. In the back room of the entomology collection on the third floor of Russell Laboratories, director Dan Young and curator Craig Brabant manage a robotic camera that can image an entire drawer of hundreds, if not thousands, of individual insects in just five minutes. Tiny labels full of

vital information still require a lot of time and labor to digitize. Some samples, like larvae preserved in jars, must be imaged in more labor intensive ways.

But curation is not all about pictures. The most important information is typically the date and location where a specimen was collected.

"If we don't know where an item came

from, we lose much of its research potential," explains Elizabeth Leith, the curator of the anthropology collection. The same could be said for all of the natural history museums.

Leith is the only one overseeing the million-or-so anthropological specimens in the Sewell Social Sciences Building. The collection had no permanent staff until 2007. Unlike the curators of the biological collections, Leith cannot rely on species names to organize the anthropology specimens. Instead, artifacts are typically grouped by the site where they originated.

Whether it is boxes of bones or a fully articulated skeleton, the Zoological Museum in Noland Hall has trouble imaging most of its specimens in a way that would be useful to researchers, says curator of collections Laura Monahan. But if they can document when and where each species was collected, researchers can match that with information about other animals or specimens from other museums.

Coordinating the different collections gives scientists a sense of "what that place was like at that time" in a way that a single museum cannot, says Monahan.

Because each museum is always collecting, paring down backlogs and keeping up with new specimens is a constant struggle. And just as a collection begins to familiarize itself with the latest database systems — which are rarely built to accommodate the demands of large and varied collections such as these — the technology changes. The institutional knowledge of the directors, curators and staff about their respective collections keeps the museums humming along as they steadily catalog and database their specimens.

The UW2020 initiative will fund database managers and additional student and staff support to develop links between the collections.

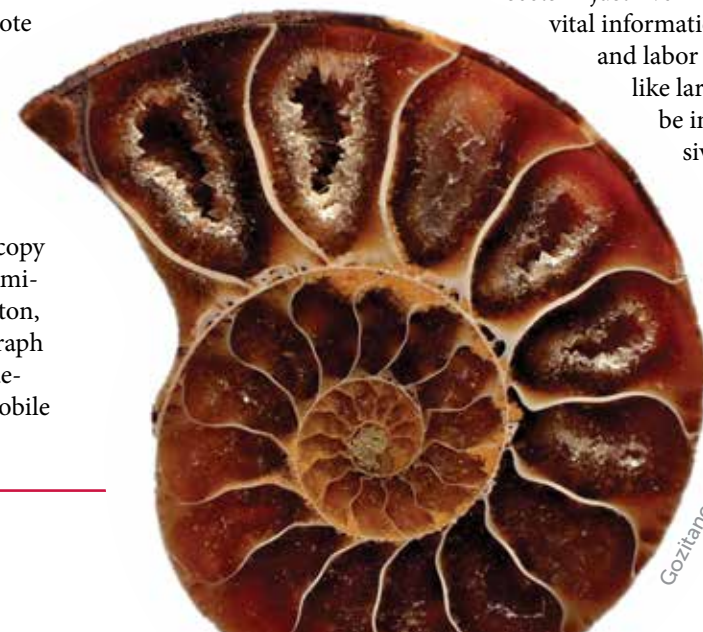
"This central database isn't a complete answer for natural history research," says Cameron. "But it gives scientists the opportunity to know to ask for further information."



Julia Suits & Alex Wild



Bynce Richter



Gozitano



Didier Descouens



**Field Notes: Claire Viellieux**

*Claire is a Conservation Biology major graduating in May 2018.*

Two summers ago, I spent a month in Gabon with nineteen other American and Gabonese students. I had been accepted into a program run by the Central African Biodiversity Alliance that encouraged international cooperation between undergraduate researchers. We were lucky enough to visit multiple forests around Loango National Park where professors from the local university taught us how to set up line transects, keep a field notebook, use camera traps, and many other important skills.

I had chosen to be in the group that was studying the types of fruit which large mammals eat. Every morning at 6am we would enter the forest, and we wouldn't arrive back to our campsite until 6pm. We would all have dinner together and listen to other groups' stories

from that day. I was surprised to find that a major part of learning how to do field research is also learning how to work in a group and get along with your team members. Conditions in the thick forests of Loango Park can make even the most patient person irritable. I discovered that, if you're willing and have a positive outlook, these challenges can serve as a



Claire (far right) and other members of the large mammal group develop a hypothesis for their study.

bonding experience rather than a dividing one. Some of my favorite memories are of the amazing wildlife I saw up close when deep in the forest with my team members. I saw more species of spiders than I ever cared to see, but I also saw forest elephants, duikers, buffalo, monkeys, butterflies, and reptiles. We even heard a group of gorillas calling out from the distance. Knowing that many of these species were exceedingly rare and may soon disappear in my lifetime made the experience all the more valuable.

As I boarded my plane home, I felt as if I were leaving a piece of myself behind. I plan on returning to Gabon someday, and I am grateful to the CAB Alliance for providing undergraduates with such an amazing program. I now plan on pursuing field research as a career, but I also hope to incorporate my findings into conservation education and management programs whenever possible.

**Field Notes: Corrigan Shea**

*Corrigan will graduate with a Conservation Biology major and Integrated Studies in Science, Engineering and Society certificate.*

This past summer, I had the privilege of working with Dr. Christ Lenhart at the University of Minnesota-Twin Cities in the Biosystems Engineering Department. Through this experience I worked with soil scientists, engineers with various specializations, and other conservationists. Despite varying credentials and backgrounds, we all have a strong passion to maintain the environment. I helped Dr. Lenhart with research that focused on wetland restoration. One of the projects that we worked on was a wetland in northern Minnesota. The goal of the project was to restore the area that had been destroyed and stripped of its natural form. As a result of land-use negligence; native species could not inhabit the

area, invasive species were taking over, the Sauk River shore was eroding, and extreme amounts of nutrients were flowing in the river. Dr. Lenhart and I worked alongside a Minnesota Department of Natural Resources representative, a soil scientist, and a graduate student to assess and implement a plan to restore this land.

In addition, I worked on building and implementing mesocosms to test the retention of nutrients in wetlands, specifically phosphorous. Agriculture, stormwater, wastewater, fertilizers and other human activity have a large influence on the levels of phosphorous in water. Surplus amounts of phosphorous lead to eutrophication. A common consequence of eutrophication is blue-green algal blooms which produce toxins that can be harmful to both humans and animals. Blue-green algal blooms are seen here in Madison in Lake Mendota.

This experience expanded my knowledge of environmental toxins



and allowed for me to explore different areas and perspectives of conservation. Particularly, I learned about how interconnected the environment and human activity are, and how crucial it is for humans to be informed and educated on the actions they are taking when it comes to natural resources and land usage.

## ALUMNI NEWS

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

**Robert McIntosh (1950 PhD Botany)** passed away on July 7th, 2017.

**Martha Christensen (1956 MS Botany, 1960 PhD. Botany)** passed away March 19, 2017

**Leon Standifer (1959 PhD Botany)** passed away on November 8th, 2016.

**Jack M. Bostrack (1959 MS Botany 1962 PH.D. Botany)** passed away on November 30, 2016.

**Fred Swan (1961 MS Botany)** and his wife Pat traveled to Wyoming on June 20 and enjoyed visiting Dennis (Ph.D. Plant Ecology) and Judy Knight in Laramie. Dennis was the best man at their wedding in November 1962. They then went on to Grand Teton National Park to attend the 60th anniversary of the start of the Student Conservation Program. From July 3 to the 15th, they enjoyed a two-week tour of Iceland.

After a short hitch with the Coast Guard, **Joseph F. Stegner (1963 BS Conservation Biology)** started working for the US Food and Drug Administration in Cincinnati, Ohio, then transferred to Indianapolis, IN, then to Boise, ID and finally to Seattle, WA. He also traveled to Japan, England, Germany, Finland, Denmark, Scotland, Canada, as well as Eastern Europe (before the collapse of the Soviet Union) and France. Joseph now resides in Issaquah, WA and attends the Rain City Badger meeting.

**David K. Wright (1966, BA Botany)** enjoyed a brief stint as an Entomologist/Botanist largely killing as many designated noxious insects and weeds as possible, that is until that same occupation was found to be a value in Vietnam. It was then that he turned to teaching school in the Trinity Alps of California and in the foothills of the Adirondacks



David Wright

of New York. Starting in 1970, David spent his time creating sculpture in the hills of Colorado with his wife Ann Herzog Wright, a painter and also a past student of the UW. Their art can be viewed at <https://www.artsbywrights.com/>. David and Ann have two children, now grown. Twelve years ago they returned to Wisconsin and this past year they published "Journal from the Heartland" (<https://journalfromtheheartland.com/>), a collection of their work, both written and visual, and of other writers and painters living in Central Wisconsin. David intends to produce two issues a year and is working on a couple more books.

**Darryl Sullivan (1975 BS Conservation Biology)** is back in Southern WI after working in several locations around the U.S.. He travels all over the world with his job as Director of Industry and Regulatory Affairs with Covance Food Solutions – but always enjoys returning to Wisconsin.



**Duane Kolterman (1978 MS Botany, 1982 PhD Botany)** retired in 2015. He just went through Hurricane Maria and can say that the vegetation has been coming back, because it's been mostly cloudy and often rainy since the hurricane.

**Bruce McCune (1982 PhD Botany)**, who has been with the Dept of Botany and Plant Pathology at Oregon State University since 1987, received the Acharius Medal at the 2016 meeting of the International Association of Lichenologists in Helsinki, Finland. This is the highest international award for lichenologists, granted for a lifetime of achievement in lichenology, and Bruce is only the 4th American to receive it since it was first awarded in 1992.



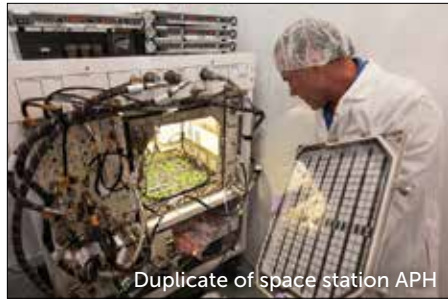
Bruce McCune

**Robert Morrow (1987 PhD Botany)** works for the Madison-based ORBITEC, which has been bought by Sierra Nevada Corporation (SNC), a large aerospace company. The SNC team worked closely with NASA Kennedy Space Center in the development of the Advanced Plant Habitat, which was just installed on the International Space Station. They developed the two "Veggie" plant growth systems on the space station which continue to be used for a broad variety of plant related studies. In addition to supporting plant research by NASA and University researchers, Veggie systems have been and will continue to be used for experiments by UW Botany faculty member, Dr. Simon Gilroy and UW Genetics faculty member Dr. Patrick Masson.

**Jay Campbell, (1997 BS Conservation Biology)** just completed his MS in biotechnology from UW-Madison in May 2017 and is currently working as a researcher in the Dept. of Neurology, SMPH UW-Madison studying binocular hearing pathways in rodent models.

**David T Hanson (1999 PhD Botany)** is a Professor of Biology at the University of New Mexico. This has been a good year at UNM with new funding from NSF IOS on the errors cuticles cause for measuring photosynthesis in leaves, returning





Duplicate of space station APH

to David's roots (or lack thereof) with new NSF Dimensions of Biodiversity funding for Sphagnum moss adaptive evolution (growing from his grad work on Jyme bog at Kemp Station), and new crazy-cool micro-needle and micro-gas chromatograph work for new ways to study plants in the field with ARPae ROOTS funding. However, this year David thinks about UW-Madison Botany more while looking to the sky. As a grad student, Linda and Jim Graham often got him thinking about putting plants on Mars and Judy Croxdale would talk to him about actually doing botany in space. David always thought that was cool but never thought he would get the chance to do it. Without the dreams they inspired, David would not have joined his colleagues on his current NASA project. He is lucky to be part of the first team who will get to use NASA's new Advanced Plant Habitat on the International Space Station this year. With a bit more luck, he'll be able to use this work to pass on some dreams to the next generation. Anything seems to be possible for UW Botany grads.



Ben Crain

**Ben Crain (2000 BS Conservation Biology)** lives in Washington D.C. where he took a position as an Ecologist with the Smithsonian Institute. He works at the Smithsonian Environmental Research Center for the North American

Center for Orchid Conservation and spends part of each week working with the orchid collections at the National Herbarium in the Museum of Natural History in DC. He is currently working on the Palau Orchid Conservation Initiative where he conducts research on the diversity and distribution of orchids on several islands in Palau and monitors them on a new permanent forest plot in the Ngardok Nature Reserve in Melekeok Palau. They study the ecology of these orchids by looking at their relationships with symbiotic mycorrhizal fungi.

**Katie Greene (2003 BS Botany and Conservation Biology)** lives and works in Duluth, MN with her husband, whom she met on a CALS study abroad program in Trinidad and Tobago, and their two children. She went on to earn her M.Ed in Environmental Education at the University of MN Duluth, as well as a teaching certificate from the College of St. Scholastica. She shares her passion for the natural world and all things botanical with her elementary students at Duluth Edison Charter Schools.

After completing her postdoc at the Max Planck Institute for Biochemistry, **Maria Spletter (2003 BS Botany)** started as an Independent Group Leader in the Department of Physiological Chemistry at the Ludwig-Maximilians-University in Munich, Germany in January 2017. Her group uses *Drosophila* as a model to study alternative splicing in muscle development, a process misregulated in muscle diseases in humans. She was excited to host a UW-Madison student over the summer through the UW International Internship Program. She still uses the analytical and dissecting skills she learned working with stomatal development in *Arabidopsis* cotyledons daily in the lab, and thoroughly enjoys the European flora on hiking trips to the Alps and Black Forest.

**Justin Zweck (2006 BS Botany)** recently obtained his PhD in Biology from Saint Louis University (May 2017), where he studied generalized vs. specialized pollination systems in legumes based on floral form. He's currently in Quito,



Justin Zweck in the Paramo of Ecuador

Ecuador, doing a temporary postdoc with the Technological University of Indoamerica, where he studies intergeneric plant hybridization in the crater of an old volcano!



Pippa Kohn

**Philippa "Pippa" Kohn (2008 BS Conservation Biology)** completed a Master's in Marine Science at the University of Auckland in New Zealand. Following that she moved back to the US and worked on fisheries research in the Gulf of Mexico following the Deepwater Horizon Oil Spill. She has since relocated to the Pacific Northwest and lives outside of Seattle where she has a position as a Fisheries Assessment Manager with the Marine Stewardship Council - a global non-profit that sets a standard from which to certify and encourage sustainable fishing. Pippa has travelled and worked in various places since graduating, but says, "...there are several things I fondly miss about Madison, most of all running on the lakeshore path!"

**Rachel Schmidt-Jabaily (2009 PhD Botany)** is now an Assistant Professor in the Department of Organismal Biology & Ecology at Colorado College (Colorado Springs).

**Meg Phillips (2009 BA Conservation Biology, certificate in Environmental Studies)** graduated with her M.S. degree in Water Resources Management in 2013 while concurrently serving as the Executive Director of the Upper Sugar River Watershed Association. In 2014 Megan and her partner moved to Albany, NY, where she began pursuing a career in state government. She currently is employed at the NY Department of State as a coastal resources specialist in the Office of Planning, Development and Community Infrastructure. In this role she works with communities across New York State to develop waterfront revitalization strategies and implement priority projects that connect waterfront areas to vibrant downtowns. In her spare time she volunteers as the Treasurer for a newly formed non-profit organization called CapSci, which aims to increase science literacy and engagement in the capital region of New York. She returns to Madison for a visit and a beer on the terrace at least once a year and never misses a chance to connect with a fellow badger in the Empire State!

**Rollin Reinart (2010 BS Botany)** returned from Peace Corps - The Gambia in January and moved to Sacramento, CA. He returned to UC Davis, earning a M.S. in International Agricultural Development. Since then, Rollin has participated in higher education workshops in preparation of becoming an instructor.

**Andy Sleger (2010 BS Conservation Biology)** traveled to the Eastern Mediterranean after graduation (Jordan, Egypt, Greece, and Turkey). It was a great experience to see the region prior to the tumult of Arab Spring. When he returned in August of 2010 he was immediately hired by Cardno, a firm specializing in ecological restoration and consulting. His time with Cardno provided the experience and tools he

needed to start his own restoration and consulting firm (Forward Land Management LLC). For the past two years Andy has been working full time for The Prairie Enthusiasts (a not-for-profit land trust) while maintaining his small business on the side.



Sam Wegleitner

**Sam Wegleitner (2011 BA Botany and Conservation Biology)** went on to study law at the University of Wisconsin. After graduating, he worked for the Legal Aid Society of Northeastern New York focusing on subsidized housing denials and eviction defense. Shortly thereafter, he moved to Atlanta, GA, where he worked as an organizer for the Democratic Party of Georgia before accepting a job back in Madison with the Elder Rights Project of Legal Action of Wisconsin, representing victimized elders with civil legal needs. Sam recently stepped away from that position to follow his significant other to Atlanta, GA. Sam now works for Georgia Legal Services Program within their the Eviction Prevention Project. Pending admission to the bar, he will be providing free legal services to indigent persons faced with housing instability.

**Sean Johnson-Bice (2013 BS Conservation Biology)** is a second year Master's student in the Integrated Biosciences Graduate Program at the University of Minnesota. He is conducting research on a couple different projects; 1) Evaluating the influence that extrinsic ecological variables (weather, habitat change, predation, and human



Sean Johnson-Bice

exploitation) have on inter-annual fluctuations in beaver (*Castor canadensis*) populations; and 2) Evaluating the spatial and temporal dynamics of beavers in the Minnesota Lake Superior north shore watersheds, as part of a larger project investigating the historical influence that beaver activity has had on brook trout (*Salvelinus fontinalis*) habitat characteristics in cold-water streams.

A month after graduating in 2016, **Clay Bess (2016 BA Conservation Biology)** was hired as the first Conservation Specialist for the agriculture program, Precision Conservation Management (PCM). He works directly with around one hundred corn-soybean farmers in East-Central Illinois across 5 counties. He combines agronomic data with economic data to show the financial benefit of practices like less tillage (e.g. no-till and strip-till), planting cover crops during the winter, and applying fertilizer at more opportune times (such as in the spring when the crops need nitrogen instead of in the fall after harvest). In return, soil health improves, less soil erodes, and fewer contaminants enter the water supply, so it's a win-win.



Clay Bess





DEPARTMENT OF  
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## Know your lichens

Penned by James Bennett and published by the Wisconsin State Herbarium, "Common Lichens of Wisconsin" is a booklet that any lichen-curious citizen should have in their library. The 18 page color booklet features the 30 most common lichens among the approximately 800 species known from Wisconsin. Color photos and brief descriptions are organized into crustose, foliose, and fruticose forms. To request a free booklet or download the PDF visit:  
<https://herbarium.wisc.edu/research/publications/>

At right: *Cladonia cristatella*  
photo by James Bennett

