

# Botany alumni newsletter

SUMMER 2013

## Letter from the Chair – The Long Wait for Spring



It may have seemed that Wisconsin would not thaw this year. The French exchange students I see weekly kept asking, “When is Spring coming?” Winter lingered on through a blustery April with snowstorms, rains, and a great grey owl haunting Middleton.

Yet there were signs. Tom Givnish led a scouting party to the Great Smokies, where excited graduate students sighted hundreds of plant species. And speaking of renewal, 100-year-old Birge Hall began undergoing a facelift, with crumbling sandstone being replaced by handsome limestone.

Patience is also rewarded inside Birge Hall, where new projects are taking shape. Botany’s old growth chambers will be replaced with efficient walk-in chambers, and parts of the greenhouses will be renovated. And many labs are being energized by Department awards to graduate

*(Continued on page 2)*



Students of Plant Path 875 in the tropical montane forest of Guatemala

## Testing New Waters of Teaching

Can we address Big Questions? How can we ensure food security in a poor country seeking to develop while conserving tropical forests? Can we introduce students to new habitats and cultures while challenging them to absorb diverse new ideas? Can Botany and Plant Pathology team up to teach a course for students with different interests and background? Can we merge a UW course of 14 with a dozen Guatemalan students? What will the UW students make of spending the night in pairs with local Guatemalan families?

We had many questions – and some concerns – in teaching Bot 575 / Plant Path 875 – *Midwest and Tropical Agriculture and Conservation* this past

Fall and January. With encouragement from Botany’s Spring 2012 Tinker Visiting Professor Pablo Prado and funding from the College of Agricultural and Life Sciences, we took the plunge. Judging from the students’ visible engagement with the diverse people and places we visited, the bilingual chatter we heard running into the night, and continuing activity on our Facebook page, we succeeded in meeting our goals.

Field courses are often ranked as a transformative “high impact” teaching practice. All who have participated in these can confirm this. Botany continues its commitment to these – to the benefit of our students.

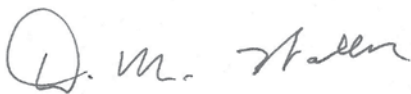


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students for work this summer and in 2013-14. We are fortunate that the concern and foresight of generous donors make these things possible. Talking of which, I encourage others to join me in building the Hugh Iltis Fund. We recently celebrated Hugh's 88th birthday and I'm eager to make him smile.

Spring also brings transitions, one that is affecting the future of this newsletter. Since the Botany department is in the process of absorbing the Biological Aspects of Conservation major, this is our last purely Botany Newsletter. We welcome this broader audience and plan to include news of interest to both Botany and BAC alumni in our next issue. To all, we wish renewal and success in all your projects.

Don Waller, Chair



This newsletter is published by the Department of Botany at the University of Wisconsin-Madison for alumni, colleagues and friends. Editorial team: David Baum, Andrea Herr-Turoff, Joy Zedler, Sarah Friedrich.

Submissions are welcome. Please send comments, ideas and photos to:

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L to R: Brian Sidoti, Alfonso Doucette, Giovanny Giraldo, James McDaniel, Ken Cameron, Matthew Pace

### A Blooming Success at Orchid Quest

At the annual Madison Orchid Grower's Guild, which drew about 1500 professional and amateur enthusiasts to the Alliant Energy Exhibition Center this February, UW Botany earned 4 top ribbons: 3rd place for best *Maxillaria* species/hybrid, 2nd place for *Epidendrum* species/hybrid, best amateur display, and 1st place for an educational display, "Orchid evolution." The latter was a 50 sq ft exhibit that featured dozens of flowering orchids and foliage plants

from the Botany Greenhouses, a 6' tree covered in epiphytes, a poster designed by Kandis Elliot, and a UW football helmet! Although inexperienced in the highly competitive orchid world, the students also received the prestigious Orchid Digest Trophy, reserved for an exceptional exhibit of "outstanding high quality, exhibiting the highest levels of artistry, taste and innovation in design and presentation." Congratulations to the Cameron Lab and Botany Greenhouses!

### SER Roots Run Deep in Madison

The Society for Ecological Restoration will convene its 5th World Conference *Reflections on the Past, Directions for the Future* at the Monona Terrace in Madison, WI, October 6-11, 2013. Talks, posters and field trips aim to attract ~1,200 delegates from around the world to present new ideas in restoration science and practice. The Arboretum will host visits to Curtis Prairie, where grassland restoration began and where research continues to improve restoration science and practice. Please join us! Questions? See: [ser.org](http://ser.org).

### Alumni Gather at Botany Conference

About 30 alumni and current students gathered for breakfast at *Botany2012* – the annual meeting of the Botanical Society of America in Columbus, Ohio. One attendee managed to add a dish of cheese curds to the buffet! Alumni from at least four decades shared stories of their fondest memories of Madison and Birge Hall, sharing current interests and professional activities. As you plan to attend *Botany2013* in New Orleans this summer, be sure to register for the Wisconsin alumni breakfast and connect with old and new friends!

## Next Generation Growth – Alyssa Studer

Helping out on her grandparents' dairy farm outside of Monroe in Green County helped Alyssa Studer develop a strong work ethic and passion for nature. Although Botany was not her major when she enrolled in 2010, General Botany (Dr. Baum) and Plant Morphology (Dr. Cameron) captured her attention. Alyssa then packed her schedule with plant-related courses, enrolling in Ethnobotany, Flora of Wisconsin, Ecology, and Plant Biogeography, as well as Chemistry, Math, and Physics. As a Sophomore, Alyssa declared a double Botany-Environmental Studies major: "...I learned that I could enjoy nature from a biological and educational point of view, rather than solely an aesthetic one, as I had tended to do before. Furthermore, I realized that the importance of plants can be related to almost anything!"

To gain hands-on research experience, Alyssa first helped Dr. Cameron sample leaf tissue from specimens within the Wisconsin State Herbarium for DNA extraction – data that helped Cameron, Sytsma, Givnish, and Waller obtain funding from NSF's program on Dimensions

of Biodiversity. It also provided summer funding for Alyssa to assist with gene sequencing and voucher specimen preparation. Next, Alyssa expanded her research skills beyond the laboratory, digitizing specimens and entering data on a second NSF grant to the herbarium to construct an online virtual flora of Arctic lichens.

As a senior in fall 2013, her independent research will take her to a wet prairie along the Sugar River, where she will conduct a floristic inventory and add field skills to her experience in the lab and herbarium. Although she is not certain which direction her career will take, or whether she will pursue a graduate degree, Alyssa knows that she wants to combine her botanical training with environmental conservation.

One of the department's star students. Alyssa also found time to co-found the UW Women's Club Soccer Team. She



says, "Through the diverse set of experiences here at UW, many of which were made possible by the Botany department, I feel not only very prepared for my future endeavors (what I hope will involve conservation and environmental education), but also extremely excited to use all of the tools I have been taught."

## Botany Club Recognized Nationally

For decades our Botany Club has served undergraduates, graduate students, and others who share a passion for plants and education. The Club currently has 25 members whose activities have included workshops on fermentation, plant propagation, botanical illustration and research lab tours. The Club is now formally recognized as one of the Botanical Society of America's 14 student chapters ([http://www.botany.org/students\\_corner/chapters/UofWisc\\_Madison/](http://www.botany.org/students_corner/chapters/UofWisc_Madison/)). The club's newly adopted mission statement is "...to bring together undergraduate and graduate students who enjoy spending

time with all forms of life, especially plants. We will participate in outreach activities throughout the community and in UW-Madison's own arboretum and greenhouse, and we will participate in activities such as prairie burnings, facilities tours, outdoor gatherings, and lectures..." Supervised by Dr. Ken Cameron, the club officers obtained a \$300 grant from the Associated Students of Madison (ASM). Donations are welcome. Notes on activities of previous Botany Clubs would also be appreciated. Visit the facebook page at: <https://www.facebook.com/groups/103891016340573>.

## Remembering Ralph Dix

Dr. Ralph L. Dix, noted plant ecologist, died at the age of 89 on 28 February 2013. An emeritus Professor of Botany at Colorado State U., he obtained his Ph.D. in Botany with John Curtis at UW-Madison in 1955. His dissertation, "Phytosociological changes on the thin-soil prairies of Wisconsin under the influence of grazing" led him to a 40-year career concerning grassland and wetland vegetation, including co-editing a 1969 synthesis of the grassland biome as part of the International Biological Program. His contributions to ecology were as a faculty member at Marquette U., then U. Saskatchewan, and then CSU; he also served the Ecological Society of America by editing the journal *Ecology*.

Answers to plant ID quiz on back cover (clockwise from top left): *Calliandra haematomma* (Red Powderpuff); *Opuntia* sp. (Prickly pear); *Daucus carota* (Queen Anne's Lace); *Paeonia* sp. (Peony)

## Gilroy Lab Shoots for the Stars

Article by Sarah Swanson and University Communications

“Gravity is the most pervasive thing on the planet, and it’s always been there,” says Botany Professor Simon Gilroy. “Terrestrial biology has evolved with this constant force in the background, and when you remove it, things start to happen that you wouldn’t necessarily think of.”

What things happen to plants that are grown outside of the Earth’s gravitational pull? It is possible to make some predictions, but to really test these ideas requires a lab with microgravity conditions. The International Space Station, circling the Earth about once every 90 minutes in Low Earth Orbit, provides just such a microgravity environment for life science research. The Gilroy Lab received funding from the National Aeronautics and Space Administration (NASA) to test the idea that low oxygen is an issue for space-grown plants.

So why would low oxygen be a problem inside a spacecraft? In space, there is no buoyancy-driven convection. Gravity is what makes hot air and liquids rise and

cooler ones sink, the process of convection. No gravity means no convection and so no mixing of gases and liquids by this process; for example, a lava lamp will not function on the space station in microgravity. For living organisms in microgravity, it is likely that local build-up of wastes and depletion of nutrients occurs due to this lack of convection that would normally mix them with the environment. Without convection, respiration will use up the local oxygen but convection will not replace it leading to local depletion of oxygen.

For plant roots, this low oxygen is akin to what happens when a river bursts its banks and floods the neighboring farmland. Corn in these flooded fields can survive a few days, but the water replaces the air pockets in the soil, and so the roots run out of oxygen. “Just like humans, plants suffocate and die,” Gilroy says. “Plants can grow in space, but ... they don’t grow very well. And one of the reasons is trying to cope with this lack of convection and oxygen depletion.”



Simon Gilroy, Sarah Swanson, and Won-Gyu Choi getting ready to load the BRICs at 3am



The SpaceX Dragon capsule containing the Gilroy Lab experiment

The Gilroy Lab studies the way plants deal with stress, including the signals plant cells pass to one another in times of trouble, like during a flood. “If I flood a plant, within seconds, cells in that plant will be sending signals to other cells, saying, ‘We need to act together to deal with this,’” Gilroy says.

In order to study low oxygen stress due to microgravity, the Gilroy Lab sent *Arabidopsis* seeds to the International Space Station aboard the SpaceX Dragon capsule which launched March 1. The seeds chosen for flight included the normal version of *Arabidopsis* (wild type) and a mutant lacking a calcium transporter that is implicated in low oxygen signaling based on other Gilroy Lab research. The seeds were germinated in space in two small containers called



The BRIC canister upon return

# IS IN SPACE



Experiment docks with the ISS

Biological Research in a Canister (BRIC). After eight days of growth in a micro-gravity environment, astronauts stopped the plants' development with a dose of a chemical fixative and placed the two BRICs in a deep freeze.

Two additional BRICs were prepared with identical samples and grown in a growth chamber at Kennedy Space Center (KSC) in Florida. This growth chamber maintained conditions identi-

cal to the space station, providing the best possible control plants for comparison to the space-grown plants.

The Gilroy Lab space-flown BRICs returned to Earth inside the Dragon capsule, splashing down in the Pacific off the California coast on March 26, and arrived at the KSC on March 30. The following week, Sarah Swanson from the



Returned from orbit

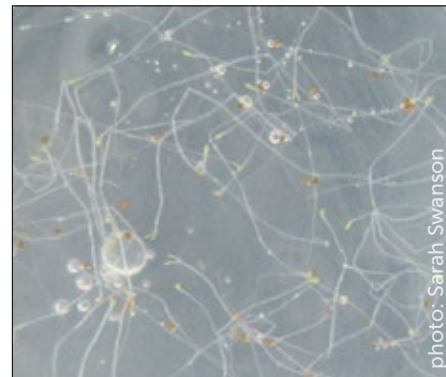
Gilroy Lab traveled to KSC to unpack and ship the samples from the space station and control plants back to UW-Madison. Gilroy Lab postdoc Won-Gyu Choi is now in the process of measuring the plants and isolating RNA for analysis of gene expression, with a focus on investigating genes that are known to be affected by low oxygen stress.

"We should be able to say this is the fingerprint of what low-oxygen looks like," Gilroy says. "We'll be able to say these plants in space look like the plants that were grown on the ground in this particular low oxygen concentration." That will contribute to the understanding of long-term plant growth in space, and give future space travelers an advantage when growing plants for food and waste recycling. "This is that bit of the science where we're beginning to tease apart the system, beginning to understand the components" Gilroy says.

## Plants in Space Research – Amanda Miller

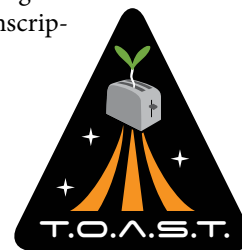
A successful space-flight experiment requires extensive parallel research on Earth, both to prepare for the flight opportunity and to be able to understand what has happened in space. The Gilroy Lab has been very fortunate to have an extremely talented undergraduate, Amanda Miller, deeply involved in these "ground-based" experiments. Amanda started working in the lab as a sophomore in 2010 and won a Frits Went summer fellowship in 2012 allowing her to pursue an uninterrupted year of research. This opportunity proved critical for the preparations for the 2013 launch.

Amanda has become a highly skilled, integral member of the Gilroy Lab's research team. Her work has centered on characterizing how the *Arabidopsis* mutants that were sent in to space behave on Earth. She has looked at how they grow and especially how their patterns of gene expression are different relative



Arabidopsis grown aboard the ISS

to wild-type plants. Indeed, her observations on these mutants were part of the reason they were chosen for space flight in the first place. As the results emerge about how spaceflight has altered growth and gene transcription, you can bet Amanda will be in the thick of the analysis and in the planning of what the next step in the research program will be.



## ALUMNI NEWS

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

**George Kuhlman (BS 1956)** George obtained his PhD from Oregon State University in Plant Pathology and spent his career in Asheville, NC, Research Triangle Park, NC and Athens, GA. working on several tree diseases: *Fomes an-nosus*, *Phytophthora cinnamomi*, Pitch Canker, Chestnut Blight, and Fusiform rust of southern pines. Eighteen years ago, George retired from the research branch of the US Forest Service.

**Jonathan Gressel (MS 1959, PhD 1963)** An emeritus at the Weizmann Institute of Science in Rehovot, Israel, Jonathan finished his book: Genetic Glass Ceilings - Transgenics for Crop Biodiversity ([http://www.press.jhu.edu/books/title\\_pages/9174.html](http://www.press.jhu.edu/books/title_pages/9174.html)), co-founded a start-up TransAlgae Ltd, and spent three years as chief-scientist. In retirement, he serves as editor/associate editor of three journals; member of various governmental and intergovernmental panels; consultant; writer; and guest speaker at scientific meetings and public outreach events. His 11 grandchildren and a garden keep him busy in between engagements.

**Wayne C Rosing (BS 1969)** A Professor of Biology, Dr. Rosing plans to retire in June 2013 after 33 years at Middle Tennessee State University in Murfreesboro, TN. His previous posts were at George Peabody College in Nashville, TN (4 yr) and the University of Texas, Austin (1 yr). Recent writings concern the Myxomycetes (plasmodial slime molds) of Southeast Asia.

**William P. Wergin (PhD 1971)** Ever wonder who took the first electron microscopic photos of snowflakes? William modified a field emission scanning electron microscope for use with frozen biological tissue, but when the prototype equipment arrived on a snowy January day, he tested it using snowflakes. Finding amazing results with magnifications more than 50,000 X, his observations led to cooperative studies with a Hydrology Laboratory and NASA. By observing the eight subclasses of snow crystals he could observe changes in crystal structure during aging in the snow pack. The structure of snow crystals and their metamorphosis provided NASA with information that could be applied to algorithms that are used along with satellite data to predict the water equivalent in the winter snow pack. The information also aids forecasting of water that will be available for

agriculture during the following growing season, in predicting flooding conditions, and assisting in dam control. And it all started with a botanist! Dr. Wergin has published >300 papers on biology and >30 on snow and ice. He retired from the Agricultural Research Service, USA in 2000, but continued the snow research in cooperation with NASA and the USDA.

**Steve Bartell (MS 1973; PhD 1978 Limnology)** After working in the Environmental Sciences Division at Oak Ridge National Laboratory (1980-1992), Steve ventured into the world of private consulting. As a Vice President of Cardno ENTRIX, he is building a Center for Ecological Modeling to expand corporate capabilities in this arena. In addition, he provides technical assistance to a variety of modeling projects concerning ecological risk assessment, ecosystem management and restoration, sustainable development, and biophysical economics. He has been affiliated with the University of Tennessee since 1984.

**Frank Ewers (BS 1976)** After serving as Chair of the Biological Sciences Department at Cal Poly Pomona for 4.5 years, Dr. Ewers was promoted to Associate Vice President for Research in July 2011.

**Julie Denslow (PhD 1978)** In 2007, Julie retired as the USDA Forest Service team leader for a research unit working on impacts and controls of invasive plants in Hawaii and the Pacific. Most of her career focused on the dynamics of tropical rain forests of Costa Rica and Panama. Now, she lives in New Orleans where she retains her affiliation with Tulane and the Forest Service, volunteers with the Organization for Tropical Studies, and paints (landscapes naturally).

**Wendy McKeown (BS 1978)** Wendy teaches 7th Grade Life Science at Atascadero Junior High School in Atascadero, California.

This lithograph depicting an ecology class in Observatory Woods is one of four by Elsa Stiles that were found in the process of cleaning out the Ecology Records Room. The print is most likely from 1960, when Elsa was a student at the UW.



**R. Chris Jones (Ph.D. 1980)** A professor at George Mason University since 1980, Chris moved from the Biology Department to become the founding Chair of the Department of Environmental Science and Policy from 2000–2008. Since 2005, he has served as Director of the Potomac Environmental Research and Education Center at Mason. Their proposed aquatic education and research facility, just downstream from Washington, DC, will be the first major university research and education facility on the tidal Potomac River.

**Janice Coons (PhD 1983)** A Professor in the Biological Sciences Department at Eastern Illinois University, Janice teaches Plant Physiology, Horticulture, and Environmental Issues. Her research on reproductive biology emphasizes state and federally listed plants and restoration strategies. Beyond EIU, she encourages use of native species in landscaping. Dr. Coons is an elected Fellow of the Illinois State Academy of Science.

**Robert C Morrow (PhD 1987)** As a Senior Scientist at ORBITEC, an aerospace research company on Madison's west side, Robert works on controlled environment plant growth technologies for space research applications and for commercial protected plant culture applications, such as production of greenhouse vegetables and ornamental plants.

**Tim Montague (MS 1993)** Tim is President of Montague Brands Marketing and Fundraising. He is a trained ecologist and green business advocate with a passion for entrepreneurship and creating a more sustainable society. He uses his >15 yrs of experience in technology, recruitment, professional services, and education to help nonprofit organizations grow their funding and revenue streams. He lives in Urbana with his two sons, where he is a running and outdoor enthusiast, and where he co-leads the Champaign County Sustainability Network.

**Megan Kennelly (BS 1999)** After receiving her PhD (2005 Cornell), Megan joined the Department of Plant Pathology at Kansas State University, where she was recently promoted to Associate Professor. She is particularly excited about a new agricultural development project with colleagues in Tajikistan, in Central Asia.

**Tina Heil (BS 2001)** After earning an MS in Biotechnology at UW in 2006, Tina joined BloodCenter of Wisconsin, where she is now the Grants & Contracts Program Coordinator.

**Raffica La Rosa (BS 2003)** A PhD candidate in Plant Biology at Michigan State University, Raffica spends most of her time at Kellogg Biological Station, where she studies adaptive floral traits and their evolutionary history in the milkweed genus *Asclepias*.

**Janet Steven (PhD 2003)** After her sabbatical with Laura Galloway at the University of Virginia on deer herbivory as a selective pressure on phenological traits in American bellflower, Janet returned to Sweet Briar College in Virginia, where she is an Associate Professor of Biology. This year, she is also chairing the department and teaching Economic Botany to nonmajors.

**Daniel Larkin (PhD 2006)** Dan conducts research in restoration, wetland, and community ecology as a Conservation Scientist at Chicago Botanic Garden and teaches ecology and mentors M.S. and Ph.D. students as a faculty member in the joint CBG-Northwestern University Graduate Program in Plant Biology and Conservation.

**Brianna Laube (BS 2010)** As an MS student in the Nelson Institute for Environmental Studies, Environment and Resources Program, Brianna is studying relationships between plant species diversity and nitrous oxide emissions in perennial grassland bioenergy crops.

**Shelley Crausbay (PhD 2011)** Shelley is a Postdoc with Dr. Patrick Martin in Horticulture at Colorado State University; her paleoecological research focuses on tropical montane forests

at 2400 m elevation in the Cordillera Central, Dominican Republic.

**Beth Lawrence (PhD 2011)** After her postdoc at Loyola University, Beth became an Assistant Professor in the Environmental Science Department at DePaul University (Chicago).

**Brent Berger (PhD 2012)** As a postdoc with Dianella Howarth at St. John's University (NYC), Brent is examining the role of specific genes involved in floral symmetry shifts across the flowering plant order Dipsacales (teasels, viburnums and honeysuckles).

**Katie Frerker (MS 2012)** Now in Puerto Rico, Katie is a Presidential Management Fellow with the US Forest Service.

**Emily Sessa (PhD 2012)** Emily is completing her postdoc with Michael Barker at the University of Arizona. In August she will become an Assistant Professor at the University of Florida.

**Shahrizim Zulkifly (PhD 2012)** "Reese" is a Senior Lecturer in the Department of Biology at University Putra Malaysia. He co-taught Limnology and Oceanography last fall and is now teaching Biodiversity of Microorganisms and Plants and Phycology/Algae. He helps his mentor conduct research on *Spirulina*.

## Make a Gift

For a full listing of giving opportunities and online donations, please see: <http://www.botany.wisc.edu/giftgiving/>

To mail a donation, please make checks out to the University of Wisconsin Foundation and include the fund number on the check. Please send to:

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**Ready for my close-up!** Can you identify these plants from the Botany Garden and Greenhouses? Answers on p.3

