It's the start of another academic year! We welcome seven new PBS students, all with some previous research experience, and six new faculty members - Kathryn Bushley, Changbin Chen, Sue Galatowitsch, Candice Hirsch, Peter Kennedy and Korby Kistler. Thanks to the efforts of Associate Director of Graduate Studies Sue Gibson, who organized the Itasca orientation, Dave Biesboer, Director of the Itasca Biological Station, and Phytograds Eli Krumholz, Allison Haaning, Derek Nedveck, and Diana Trujillo, the new students had a pleasant introduction to the PBS program. We also welcome back Carolyn Silflow and Pete Lefebvre, who are returning from sabbaticals. Thanks to outgoing Director of Graduate Studies George Weiblen, the PBS handbook has been streamlined, is easier to use, and packed with all the information a PBS student needs to successfully complete her or his degree. I hope that advisors and students refer to it whenever there are questions about program requirements. George richly deserves a sabbatical after all of his hard work! Other faculty members going on sabbatical or semester leave this year are Rebecca Montgomery, Jennifer Powers, and Peter Tiffin. I wish them all productive and refreshing breaks. Sarah Dittrich has already sent out the list of upcoming Tuesday afternoon seminars, which the Colloquium Committee, under the guidance of Fumi Katagiri, started organizing months ago. I hope you make time in your busy schedules to hear about the research work of the many diverse speakers. The Colloquium Committee and other "PBSers" who nominated and contacted speakers have tried to find presenters who can speak across disciplines. Gail Kalli is hard at work thinking about what needs to be done to forward program goals, and has started a list of tasks that need to be attended to by the Steering Committee. I thank all of you who have already agreed to serve on PBS committees, mentor students, help teach this fall's PBS courses, and given me input on the program. It is only with your contributions that the program continues to excel. I look forward to working with all PBSers to continue to enhance an admirable program. You can reach me via c-tong@umn.edu.

Cindy Tong is an Associate Professor in the Department of Horticultural Science. Her work at the University of Minnesota focuses on determining how genotypic variation affects apple fruit crispness and potato tuber physiology. Her teaching and outreach work is with farmers, helping them bring safe and high quality fruits and vegetables to market.
I’d like to welcome all our new PBS program members, especially the new graduate students. I really enjoyed getting to meet the new grad students at Itasca, and am looking forward to getting to know all of the PBS grad students, faculty and staff better over the next few years. I’d like to thank the new graduate students for some great suggestions regarding how to improve the Itasca orientation next year. In addition, thanks to all the returning graduate students, faculty, staff and post-docs who made Itasca a success this year. I’m excited to be the new ADGS for PBS. My goal is to help each PBS student get as much as possible, both professionally and personally, out of their graduate school experience. I had a really wonderful time as a graduate student, and hope that each of you can have at least as rewarding an experience as I did. My job has been made far easier by the efforts of a number of people, including (but certainly not limited to) George Weiblen, Cindy Tong and Gail Kalli, who have helped make the PBS program very well organized. I look forward to working with Cindy and Gail in trying to make further improvements to the PBS program.

I am a faculty member in the Plant Biology Department. My lab is taking a molecular genetic approach to understanding how plants regulate carbon partitioning. An improved understanding of this process should allow us to manipulate plants to increase the yields of desirable compounds, including food products, pharmaceuticals and biofuels. On a personal level, I’m originally from Huntington Beach, CA, which Sports Illustrated once called “The Heart of Surfin’ USA.” However, I enjoy life in the frozen north, and have even taken up ice hockey.

Assoc. Dir. of Graduate Studies

Dr. David McLaughlin retired after 44 years of service to the Department of Plant Biology and the Herbarium of the Bell Museum of Natural History. Professor McLaughlin began his career at the University in 1969 as a faculty member in the Botany Department and later became the Bell Museum of Natural History’s Curator of Fungi. His area of research is the evolution and systematics of fungi and fungal biodiversity, especially macrofungi (fleshy fungi) of Minnesota. Over the years, Professor McLaughlin has touched the lives and research of students and faculty alike all while making significant contributions to the field of mycology.
TRANSITIONS

New PBS Faculty

**Yaniv Brandvain**  
Assistant Professor  
Department of Plant Biology

**Kathryn Bushley**  
Assistant Professor  
Department of Plant Biology

**Changbin Chen**  
Assistant Professor  
Department of Horticultural Science

**Susan Galatowitsch**  
Restoration Ecology  
Professor, Department Head of Fisheries, Wildlife, and Conservation Biology Department of Horticultural Science

**Candice Hirsch**  
Assistant Professor  
Department of Agronomy/Plant Genetics

**Peter Kennedy**  
Associate Professor  
Department of Plant Biology (started August 2013)

**H. Corby Kistler**  
Adjunct Professor  
Department of Plant Pathology

**Kevin Silverstein**  
Research Informatics Support System (RISS)  
Minnesota Supercomputing Institute
John Benning, advisor David Moeller

I grew up in Louisburg, NC, a tiny town known primarily for its hosting of the International Whistlers Convention. In 2010, I received my BA in Anthropology from University of North Carolina-Chapel Hill, and for the last three years I've traveled around the country employed in various field biology gigs that have taken me from the middle of the Chihuahuan Desert to the greenhouses of Dartmouth. Though my organismal fidelity hasn't been perfectly true, plants are where my passions lie, and I'm excited to join Dave Moeller's lab in PBS. I'm broadly interested in gene flow and range limits, the impact of symbioses on those limits and adaptive potential at range edges. Current projects include exploring nocturnal pollination of a common ericad in Florida and modeling household sustainability in West Africa. Outside of school I enjoy biking, percussion, tree climbing, woodcraft and gardening.

Joseph Guhlin, advisor Nevin Young

I grew up in Houston, TX and moved to Dallas after high school to attend university. I lived and worked there for ten years until I decided to experience snow. After a few years I took an interest in plant breeding and came to the University of Minnesota to obtain an Applied Plant Sciences degree. I learned about plant genomics and the bioinformatics world and felt that my skills would suit me well by pursuing an advanced degree in a research oriented field. I have lived in Minnesota for five years prior to starting graduate school. In my spare time I enjoy playing softball and tennis.
Erin Jewett, advisor Adrian Hegeman

I am a born and bred Minnesotan. I did my undergraduate at the University of Minnesota and graduated with a double major in Genetics, Cell Biology, and Development and Ecology, Evolution, and Behavior in 2010. During my time at the U, as well as after graduation, I have been able to have many varied research experiences that have allowed me to look at biology from many different perspectives. All of those experiences and interests have now begun a sort of coalescence in my interest in systems biology, specifically an aspect of it called metabolic flux analysis. I am very excited to be doing my doctoral research in the lab of Dr. Adrian Hegeman. Outside of science and research I love volunteering at my church’s nursery, playing tennis, reading fantasy, and baking cheesecake, lots of cheesecake.

Praphapan Lasin, advisor not yet identified

Sa-wad-dee-ka!(“hello” in Thai). I am “Beera”; my full name is Praphapan Lasin. I am from Nakhon Phanom (the happiest province), Thailand, South East Asia. I earned my BS for Biotechnology and Biochemistry from Worcester Polytechnic Institute (WPI), MA, where I started to have an interest in plant research. During my undergraduate, I worked on Artemisia annua’s elicitation project by applying elicitors: chitosan and salicylic acid (SA). I also developed a whole plant digestion study for Artemisia annua, which explains how the plant will be extracted via human body. This gives an idea of how the whole plant, Artemisia annua, can be considered for malaria treatment. I enjoy learning plant secondary metabolite production and pathways. Now, I am working on calmodulin like binding proteins that are likely to regulate plant immunity on SA downstream response with Professor Jane Glazebrook. I hope that all lab techniques, scientist’s skills, and experiences during my Ph.D. will contribute to my success on my career goal. In my free time, I like to read dhamma or dharma books and listen to music. Also, I enjoy cooking Thai food (spicy!) and eating them along with watching my favorite TV shows, dramas, and sports: Thai boxing, volleyball, and soccer.

Katherine Muller, advisor not yet identified

I grew up in Northern California, but have spent most of my adult life in the Midwest. I began my scientific endeavors at Oberlin College, where I double-majored in Biology and Music. During my senior thesis project, I found evidence of hybridization between a native and invasive crayfish species. After that, I spent a few months catching guppies for an evolutionary study in Trinidad. I spent the past two years in a joint Master's program between Northwestern University and the Chicago Botanic Garden, where I studied interactions between a native prairie plant and a specialist herbivore. I am excited to be at the University of Minnesota and am completing my lab rotations with Ruth Shaw and Ford Denison. In my free time, I like to play the flute, sing, take aimless walks, and experiment with bizarre culinary ingredients.
Christina Smith, advisor Jennifer Powers

My parents were originally from the US, but moved to Costa Rica, so I was born and raised there and this will be my first time living in the United States. I grew up in the northwestern part of Costa Rica and then moved to San Jose, the capital, to attend the University of Costa Rica. I had originally studied to teach English as a second language, but later decided to return to college and study biology. Throughout this time I also worked as a research assistant for the Lankester Botanical Garden, which belongs to the University of Costa Rica and later accepted a job as research professor at this botanical garden. During this period I worked mainly on orchid taxonomy. Last year I started working with Dr. Jennifer Powers on a shade house experiment with tropical dry forest trees and I am now very pleased to be joining her lab with the hope of continuing to do work in the tropical dry forests of Costa Rica. Regarding my move from the tropics to the far north (or at least from my point of view), so far I have been pleasantly surprised with Minnesota; let’s hope my feelings continue along this path during the upcoming winter. In my free time I love to be outdoors or playing around with my newfound hobby of botanical painting and illustration (not that I’m very good at it, though).

Nu Wang, advisor Paul Boswell

Nu is from China where she earned her Master’s degree from the Chinese Academy of Agricultural Science with a major in Molecular Plant Pathology. She earned Bachelor’s degrees in Plant Science & Technology and Business English from Henan Agricultural University. Her Master’s thesis research examined bacterial-plant interactions under environment stresses to elucidate the gene function.
**CONGRATULATIONS!**

**Student Achievements**

**Congratulations** to the students who have recently passed their Preliminary Written Examination: Stephanie Erlandson, Beth Fallon, Xin Li, Vai Lor, Nagendra Palani, Erin Treiber and Mandy Waters.

**Congratulations** also to the students who have passed their Preliminary Oral Examination: Kevin Dorn, Johnathon Fankhauser, Rachel Hillmer, Xin Li, John Vincent and Mandy Waters.

**Margaret Taylor**, advised by John Ward, conducted an interview with plant biologist Bob Goldberg from UCLA. The interview was published in the "Luminaries" series in the American Society of Plant Biologists (ASPB) newsletter in Nov/Dec, 2012. Here is a link to Luminaries series: [http://newsletter.aspb.org/luminaries.cfm](http://newsletter.aspb.org/luminaries.cfm)

**CONGRATULATIONS!**

**Graduates Ph.D. Degrees**

**Amy Dykstra** – advisor Ruth Shaw (Feb 2013) “Seedling recruitment in fragmented populations of Echinacea angustifolia.” Amy is teaching at Augsburg College.

**Steve Eichten**, advisor Nathan Springer, (May 2013) “Identification and Characterization of DNA Methylation Variation within Maize.” Steve is currently doing a post doc in the Springer lab but will be leaving for Australia in October to start a post doc at the University of Canberra.

**Rosanne Healy**, advisors David McLaughlin and Imke Schmitt, (May 2013) “Molecular systematics and morphological congruence in the Pezizales and Neolectales (Ascomycota): three case studies.” She has received a postdoctoral appointment at Harvard to continue her studies of truffles and related fungi. She won an award for best poster from the Mycological Society of America at the APS-MSA meeting in Austin, Texas in August for her thesis work.

**Upcoming Events/Important Dates:**

- **PBS Itasca Orientation:** held August 13-18, 2013
- **Fall Semester Starts:** Tuesday, September 3, 2013
- **PBS Welcome Reception:** held Tuesday, September 3, 2013
- **Thanksgiving Holiday:** November 28 & 29, 2013 (University closed)
- **End of Fall Semester:** December 19, 2013
- **Holiday:** December 23, 24 and 25, 2013 (University closed)
- **Spring Semester Starts:** January 21, 2014
- **Spring Break:** March 17-21, 2014
- **PBS Retreat:** May 14, 2014
Joining in the tradition shared by generations of University of Minnesota Plant Biological Sciences Ph.D. students, a fresh group of graduate students traveleď north to the Lake Itasca State Park for orientation to the PBS Graduate Program. At Itasca, students received a broad sampling of scientific experiences ranging from traditional bog walks to navigating super-computer command line interfaces. At times the pace of orientation could be daunting, with each day packed full of activities and lectures. But the hours of work were balanced by the beautiful scenery, excellent companionship and perhaps above all, real home cooked meals from the wonderful dining staff.

As the neighbors, family members, and adoring undergrads of new Ph.D. students will soon find out, pursuing an advanced degree in plant biological sciences does not automatically mean that you can solve the mystery of why vegetable gardens are not producing or know every latin name of campus foliage. But to that end, Allison Hanning and Diana Trujillo gave the students a helping hand in identifying and naming the wild Itasca plant life. Students were given plant bingo cards and pitted head to head in a race to find and identify plant species. Katherine Muller emerged victorious with her prodigious knowledge of the features and lineages of plants, winning both respect and candy for her feats. The following day Dr. George Weiblen led a day-long crash course on plant surveying and identification in two different Itasca biomes, one deciduous and the other coniferous. The mini-course gave students a chance to dirty their hands and experience some down-to-earth field biology that highlighted the unique diversity of Itasca State Park.

Moving on to the bogs, both floating and dry, Erin Jewett and Nu Wang were the lucky adventurers to find the elusive “open spots” on the floating bog. Thankfully no waders were filled with water as we went for a spongy hike amid the tamarack trees. Earlier that week Eli found that dry bogs can actually be quite wet when he discovered holes in both of his boots. The water that found its way into Eli’s socks was apparently a bit of a mystery itself, and Dr. David Biesboer was determined to find answers.

The waters produced an iridescent reflection when seen from an angle, similar to an oil slick floating on water, but preliminary analysis (read: possibly Biesboer’s fearless sense of taste) confirmed that it definitely was not composed of hydrocarbons. Students aided Biesboer in one of their first research projects at the university by skimming the shimmering water with advanced water collection instruments (read: plastic spoons). Many hands made light work of the task, and all participating students are now looking forward to their co-authorship on the accompanying publication rumored to be targeted at Nature, or if worse comes to worst, Science.

Typical of late Minnesotan summers, the weather was both mild, comfortable and filled with plenty of sunshine. You could say that during the sunsets Lake Itasca was yelling “Look at me!”, and we were happy to oblige. However, in contrast to the vast majority of Minnesota, Itasca had an almost uncanny lack of mosquitoes. Certainly this was not a cause of homesickness during the trip as students used every bit of free time to enjoy the northern paradise.
Phytograd President

COGS and You

Phytograds have an exciting year of activities and parties planned for the upcoming academic year. I attended part of the orientation at the Itasca station where I was able to meet the incoming first year PBS students. I would like to formally welcome you to the program and to Phytograds. We will have at least one meeting a semester to sign up for various committees and discuss upcoming events. This year we will host the annual greenhouse party, soup lunch, winter Itasca trip, plant sale, and the PBS retreat. Additionally, student representatives from Phytograds will serve on some grant panels, CBS Educational Policy Committee, and the Colloquium Committee. So put your thinking hats on and think about the committees with which you would like to get involved. Phytograds is a great way to get involved in the program and talk or collaborate with other grad students and faculty.

During the spring semester as the council of graduate students (COGS) representative I helped coordinate the student appreciation week ice cream social, Ales and Apps, and an orientation for incoming CBS and medical school graduate students. Some of the most recent platforms presented at meetings are new university wide outstanding teaching assistant awards, transparency of fees for incoming students, and COGS funding for travel grants. As the college delegation lead (CDL), I met with the dean once a month to discuss graduate student issues. Dean Elde and Associate Dean Lehman are very open to discussing grad student concerns. As your representative, please feel free to come to me with any issues you deem necessary and I can bring the concerns to the attention of the deans. My term as COGS representative will be up at the end of September, so if you are interested in representing our department and college in COGS or would like more information please let me know. Please also remember that COGS and GAPSA offer opportunities for travel awards to attend conferences and workshops (http://www.cogs.umn.edu/awards.html, https://sites.google.com/a/umn.edu/gapsa/home/grants).

**PHYTOGRAD OFFICERS:**

President: Mandy Waters; Vice President: Margaret Taylor; Treasurer: Elias Krumholz

Officers: Derek Nedveck and Diana Trujillo
Stephanie Erlandson, advised by David Moeller

Hi everyone! For those of you who don’t know me, I am a third year graduate student working in Dave Moeller’s lab. I work on the biogeography and range limits of a woodland herb called *Phacelia fimbriata*. The current working hypothesis is that this herb had its distribution pushed south during the last glacial maximum 20,000 years ago, and that the plant became stranded in the cool, high elevations of the Southern Appalachian mountains after the glaciers receded due to limited dispersal ability. Other plants (some Trilliums, European trees) have been shown to be able to naturalize in areas much further north of their native range, and it’s thought that many of the herbs endemic to the Southern Appalachians are similarly dispersal limited.

I’m testing this idea (with *Phacelia fimbriata*) using common gardens located in areas north of the plant’s northern range edge, to see if the plants grown in these northern areas will have similar germination, survivorship, and fitness as plants grown within the native range. Four transplant sites (in Virginia, Maryland, Pennsylvania, and New York) were chosen using species distribution modeling software. This software enables one to predict the probability that a species would survive in a certain unoccupied area based on current location data and climate variables such as mean annual precipitation and temperature. The species probability maps that I generated serve as a hypothesis that will be directly tested using the actual transplant experiment (Figure 2), and help me make sure that the best possible habitat is chosen for the experiment. At the end of the experiment, if the fitness of the northern transplants is similar to the fitness of the control plants, then I can conclude that the plants probably are dispersal limited! However, if there is a strong fitness decline at or near the range edge, I can conclude that some other factor is restricting the range to its current boundaries.

In addition to the above, I’m also using transplanted seeds to determine if certain factors influence the ability of a founding population to survive and expand after dispersal. I’m planting small populations that are intended to mimic natural dispersal events; by “small”, I mean populations of only 8-32 seeds. I’m manipulating both founding population size and starting genetic diversity. If some treatments have more individual plants that cover a larger area of land at the end of the experiment, I can conclude that one or both of these factors (population size and starting genetic diversity) influences the ability of a founding population to persist and/or expand over time.

Results of these experiments can be used to help predict species responses to climate change and to inform conservation activities for rare and endemic species.

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**Figure 1.** *Phacelia fimbriata*

**Figure 2.** Species distribution map showing the probability of *P. fimbriata* occurrence. White boxes = known locations of *P. fimbriata*; blue = unsuitable habitat; red = highly suitable habitat.
Allison Haaning, advised by Gary Muehlbauer

Genetics of Barley Tillering

Barley is a globally important crop for malt production (beer!), animal feed, and, to a much lesser extent, human food. As of 2007, it was the fourth most produced cereal crop in the world (faostat.fao.org). Most of a barley plant’s architecture, as with many other grass family members, is composed of tillers. Tillers are lateral (axillary) branches that originate from proliferative axillary meristems that form around the base of the plant. Barley tillers are each topped with grain-containing spikes that directly contribute to the bulk of grain yield.

To better understand the genetic basis of tillering in barley, I will conduct genome-wide association studies (GWAS) using a representative sample from a large, diverse collection of barley from all over the world (National Small Grains Collection) to find new genes that are involved in tillering. I will also compare gene expression in axillary meristem, which produces tillers, to shoot apical meristem, which produces the main shoot of the plant, to find new genes that are specifically required for the development of axillary meristem and tillers.

Through these studies I hope to not only find new genes involved in the production of tillers and axillary meristems but also to further our knowledge about the entire developmental program of axillary growth in barley.

Ryoko Oono will be starting a faculty position at the University of California-Santa Barbara in January 2014.

-Yiping Qi, a Research Associate at the University of Minnesota, was featured in the "Membership Corner" series in the May/June, 2013 American Society of Plant Biologists (ASPB) newsletter. Here is a link to the Membership corner articles: [http://newsletter.aspb.org/membercorner.cfm](http://newsletter.aspb.org/membercorner.cfm)

-Tim Whitfeld is now a Research Assistant Professor in the Department of Ecology and Evolutionary Biology and Herbarium Collections Manager at Brown University.

Lin Wang (graduated in Jan. of 2009) has recently started a new job at Monsanto. His title is "Scientist", and he is part of the Emerging Leaders in Science program within Monsanto. This highly competitive three-year program is designed to train scientists for leadership positions within the company.
Center, AE Cavender-Bares, J., Etterson, J. Seed production timing determines fate of young tropical live oak (*Quercus oleoides*) seedlings in dry forests of Costa Rica, a test of the aster model to estimate seedling fitness. *(In prep)*


**Wilson, MB**; Spivak, M; Hegeman, AD; Rendahl, A; Cohen, JD (2013) Metabolomics reveals the origins of antimicrobial plant resins collected by honey bees. PLoS One, in press


Alumni – we would love to hear about your research or updates on your career. Please send articles to Gail Kalli at desha001@umn.edu for the next newsletter. Pictures are always welcome!

To update your University of Minnesota (alumni) contact information go to:  http://www.update.umn.edu/update_U_contact_info.html

Editors:  Gail Kalli, Sally Schretenthaler, and Margaret Taylor
Questions or comments contact Gail Kalli at desha001@umn.edu