

Plant Science Says



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Jacobsen Receives APS Award

The American Phytopathological Society recently awarded Barry Jacobsen The Lifetime Achievement Award at the annual meeting of the Pacific Division of APS on July 8-11. In 1992, Don Mathre, Emeritus Professor, was the recipient of this Award.

Barry's service to APS includes chairing the following committees: Chemical Control, Extension Professional Registration, Public Relations, Membership, Committee on Committees, and Biological Control. He also served on the following committees: Nominating, Financial Advisory, Program, Executive, Postharvest, IPM, Phyllosphere Microbiology and Industry.

In addition, Barry has served as Councilor-at-Large, Associate Editor of *Plant Disease*, Acquisitions Editor for APS Press, Vice Chair and member of the APS Foundation Board and President of the Pacific Division. He also served as APS representative to the ISPP

Executive Committee, Intersociety Consortium for Plant Protection Executive Committee, National Plant Pathology Board Steering Committee, CAST Board of Directors, and the ARCPACs Sub Board for Registry of Certified Plant Pathologists.

Congratulations Barry and thank you for your many years of service to APS!

APS Pacific Division Meeting

The American Phytopathological Society (APS) held its 2014 Pacific Division meeting in Bozeman July 8th-11th. Symposia on wheat and barley cereal crops, plant virus-vector complexes in the Western US and food safety were highlights during the conference and researchers that spanned from Montana to Mexico and California to Georgia gave presentations highlighting research in their areas. There were tours of the Post Farm, Wheat Montana, the Montana Seed Potato Certification and the Schutter Seed Potato Farm (see pictures on last page).

American Society for Virology June 21-25, 2014

By Michelle Flenniken

Michelle Flenniken, and members of the Flenniken Lab including two undergraduate students (Madison Martin - McNair and Hughes Fellow, and Emma Garcia - USP and Presidential Emerging Scholar), and one graduate student (Laura Brutscher - Project Apis m. PhD Fellow); and Mark Young and four graduate students in the Young lab (Pilar Manrique - Kopriva Fellow 2014 and ASV Travel Grant Recipient; Becky Hochstein, Jacob Munsonmcgee - ASV Travel Grant Recipient; and Ross Hartman presented their data at the 33rd Annual American Society for Virology (ASV) meeting in Fort Collins, Colorado. The students did a great job presenting their work on topics ranging from honey bee health, including virus-infection and agrochemical exposure, and virus discovery.



Dr. Barry Jacobsen receives Lifetime Achievement Award at annual APS Meeting

Each morning session of ASV featured presentations by leading virologists from across the globe. This year the Keynote lecture was given by one of the "father's of virology" David Baltimore (California Institute of Technology) known for his discovery of reverse transcriptase, NF- κ B, and HIV research and vaccine development. Highlights of the morning sessions also included talks by Carla Saleh (Institut Pasteur) on insect viruses and RNAi, Clodagh O'Shea (The Salk Institute) on using viruses to understand and treat cancer, and Ron Fouchier (Erasmus MC) on influenza transmission.

The past few ASV meetings have been greatly influenced by Vincent Racaniello, Columbia University. Vincent Racaniello did his post-doc in the Baltimore lab where he made the first infectious clone of the polio virus, and continued to investigate polio and other human infecting RNA viruses (i.e., enteroviruses, rhinoviruses, and coxsackie virus) during his career. He is now most famous for hosting a podcast called "This Week in Virology" (or TWIV, check it out at <http://www.twiv.tv/>) and co-authoring the Principles of Virology textbook that will be used in the Virology course (MB530) that will be team-taught by Mark Young, Michelle Flenniken, Blake Wiedenheft, Matthew Taylor, and Joshua Obar during the Fall 2014 semester.

Bozeman-based author and journalist David Quammen, who wrote a book entitled, "Spillover: Animal Infections and the Next Human Pandemic" also attended the 2014 ASV meeting. The meeting was a great chance to learn about cutting edge science, meet new collaborators, and re-connect with friends/colleagues - sometimes while enjoying a draft beer brewed for ASV 2014 - Hopatitis Ale (really).

After ASV, I had the opportunity to visit the Chihuly Exhibit at the Denver Botanic Gardens. This is the Rocky Mountain Region's first outdoor exhibition of artwork by celebrated American artist, Dale Chihuly. The exhibit is amazing and it is clear as you stroll around the gardens, that everyone who sees/experiences it, is in awe of the glass work.

The Chihuly Exhibit will be on display at the Botanic Gardens until November 30, 2014, so if you are in Denver consider scheduling extra time to visit. <http://www.botanicgardens.org/>



Glass sculptures by Dale Chihuly

The 21st International Lipid Symposium By Jinling Kang

Chaofu Lu and I went to the 21st international Lipid Symposium on Plant Lipids in Guelph, Canada, from July 7-11. Talks included all of aspects of lipid and wax research: lipid pathways, lipid transfer and lipid enzyme action domains. It was an educational experience; I especially enjoyed visiting with the people from the Eastern Cereal and Oil Research Center in Ontario, Canada. They have obtained diploid and tetraploid camelinas (all the varieties we have) and they are also working on hexaploids. Chaofu has been looking for diploid camelina since we started to work on camelina. Diploid has one set of chromosomes and a simple genetic background, making it very useful for camelina research. But hexaploid camelina has a high oil content so if we need to increase oil content, hexaploid is still our best choice.



University of Guelph campus

The lipid research community is very friendly so it was a great opportunity to renew relationships and make the acquaintance of new researchers. As a side note, it was a wonderful surprise to see a friend from England that worked in the lab next to mine 14 years ago!

Guelph University is larger than MSU and both the campus and the town of Guelph are very clean and neat. Most impressive is the Speedy River running through the town. Along the river there are parks with trails that hundreds of geese call home. The river is the center of the city which makes the city even more attractive. We also saw a splendid fireworks display at Niagara Falls on the 4th of July and a very large, beautiful Botanical Garden in the city of Niagara Falls.



Chaofu Lu and Jinling Kang on the Rainbow Bridge that connects the United States and Canada.



The large, beautiful botanical garden near Niagara Falls.



We saw this beautiful view from the CN Tower in Toronto, a height of 1,122 feet.

We went to Toronto to meet with Dr. Tammy Saga, a professor at Toronto University. Dr. Saga and Chaofu just initiated the collaboration on heat stress.

All in all, it was a most enjoyable trip professionally and personally.

Take your Pulse by Jamin Smitchger

From July 7-11, Norm Weeden and I attended the 6th International Food Legumes Research Conference and the 7th International Conference on Legume Genetics and Genomics which were hosted together in Saskatoon, Saskatchewan, Canada. The conferences were well attended by over 400 people from 44 different countries. Dr. Weeden and I stayed at the Delta Bessborough Hotel, which looks like a castle from the outside. It was constructed in the 1930's and it is considered to be one of the major landmarks of Saskatoon. In the evenings when we were not at the conference, we visited Wanuskewin Heritage Park, which is a living museum of Native American culture, attended a banquet in the Bessborough Gardens along the South Saskatchewan River, and went to the Western Development Museum, which looks like a town from the Wild West.



Jamin Schmitger in front of the Delta Bessborough Hotel

We also participated in a 3k fun run. I came in 6th, preceded by three Canadians and two Aussies. Canada was chosen as the location of the conference because it is the largest exporter of pulse crops in the world. Fueled by demand from the vegetarian population of India, an estimated 3 and 4 million acres of lentils and peas, respectively, were planted in Canada in 2014. For the past century, pulses have been an orphan crop grown on a small acreage. However, in 2014, for the first time in history, the number of planted pea acres in Montana increased to 520,000, which means that Montana growers are growing 25 times as many peas as they were growing in the year 2000 and that pulses have essentially lost minor crop status, mirroring a similar trend in Canada. This also means that

more funding is dedicated for legume research. In 2013, Canadian growers invested 2 million dollars into the pea and lentil sequencing projects. As a graduate student studying legume genetics, it is encouraging to be directly involved in a growing field (pun intended). We definitely still have lots of work to do in legume genetics.

I presented a poster at the poster session regarding my work mapping the *am2* mutation in pea. The mutation causes a white flower in pea due to a change in vacuolar pH.



The variety of pulses grown in Canada

It was a pleasure talking with people from all over the world who do various work with legumes. I didn't always understand everything that they were talking about, but I am definitely getting my feet wet. I found it especially interesting that several researchers at the conference had worked with Genotype By Sequencing (GBS) in several legume crops. GBS is the next-generation method of doing association mapping, QTL mapping, and other complicated stuff. The fact that GBS has been done in lentil has been very encouraging, and hopefully, pulses will eventually have the same tools that have been developed for other major crops.

Varella Receives Award



Andrea Varella, one of Luther Talbert's graduate students, recently received the Robert F. Eslick Memorial Scholarship by the College of Agriculture Scholarship Committee. Professor Eslick had a long, productive career as a plant breeder and agronomist at MSU. The scholarship is given

annually to a graduate student(s) in Crop Science who shows academic and professional promise.

Congratulations Andrea!

New Employees

Michelle Flenniken - Tenure Track Faculty



As reported in the July issue of "Plant Science Says", Dr. Michelle Flenniken is joining our faculty as an Assistant Professor in August.

Michelle received a B.S. in Biology from the University of Iowa, then was a Peace Corps volunteer in Ghana,

before obtaining her PhD in Microbiology from Montana State University. She did postdoctoral research at the University of California, San Francisco before becoming a faculty member in the Plant Sciences Department.

Research in the Flenniken Lab is aimed at elucidating the molecular mechanisms underlying host-pathogen interactions in honey bees. Projects in the lab focus on five principal aspects of honey bee biology: (1) determining the mechanisms and contributions of RNA-triggered pathways in honey bee antiviral defense, (2) honey bee pathogen monitoring, detection and discovery with an emphasis on candidate etiologic agents of Colony Collapse Disorder, (3) investigating the pathogenesis of the recently discovered Lake Sinai viruses, (4) understanding the influence of the individual bee microbiome, metabolome, and transcriptome on the immune response and outcome of infections, and (5) examining the sublethal effects of agrochemicals on honey bee health.

Michelle has several undergraduate students working in the lab (Madison Martin, Emma Garcia, Ian Cavagli, and Ellen Quist for the summer), one Microbiology PhD student (Laura Brutscher), and a new PSPP Masters student (Elisa Boyd) will join this Fall. Michelle will be involved with teaching Virology (MB530) this fall, and will teach General Genetics (BIOB 375) during the 2015 summer session.

She is looking forward to continuing to work with David Baumbauer.

Ryan Thum - Tenure Track Faculty



Getting a job at Montana State University is literally a dream come true.

My wife, Laura, is from Kalispell, Montana, and has always dreamed of moving back to Montana where she grew up doing all of the mountain-outdoor things we love doing, and with many wonderful Montanans to boot. When I decided to

pursue an academic career, we assumed we would be forever relegated to mere visits to Montana (which we have done an awful lot of over the past 15 years). Every visit was bitter sweet – flying in and seeing the majestic mountains, and the family and friends we love and miss so dearly, but knowing we were here for only such a short while. My wife, Laura, always had in her back pocket that we could pick up and move to Montana in a moment's notice, but we always envisioned any Montana-bound move to occur with a mandatory career change for me. So, getting to move to Montana and continue my professional passions in research and teaching is truly beyond our wildest dreams. In short, we are stoked.

We come to Bozeman from Muskegon, which is located on the eastern shores of beautiful Lake Michigan. We enjoyed seven wonderful years in that community, and we are truly sad to leave the many wonderful friends we made behind. However, I am fortunate to bring two graduate students from Michigan – Danielle Grimm and Jeffrey Pashnick. I am excited to introduce them to western Montana, and to a vibrant academic culture that provides them opportunities to succeed in their academic pursuits.

I am eager to achieve a work-hard/play-hard life balance. I am excited for the opportunity to further develop a research program that contributes meaningful conceptual knowledge to practical and philosophical questions regarding the pressing environmental problem of invasive species. I am equally excited to play in the mountains and rivers with our children, family, and friends.

Judit Barroso – Post Doctoral Researcher



Judit Barroso

I am very excited to join the PSPP Department as the new Postdoctoral Researcher in charge of managing Mary Burrows' lab. I came to MSU in September, 2010, with a Fulbright scholarship to work in the LRES Dept., but as most people living in this area will agree, it

is difficult to resist the charms of Bozeman and its people, so I decided to stay longer in this nice environment, this time among all of you in the PSPP Department.

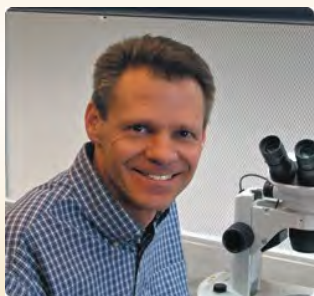
I am an Agricultural Engineer with a PhD in Weed Science in Precision Agriculture. I came to Montana to work on the Grain Plains because I needed large size fields, and.... I

found them, no doubt. I worked on spatial weed ecology and sustainability of agro-ecosystems, but now I am looking forward to working on plant pathology and management, which will allow me to see the agro-ecosystem from a different perspective.

I came here with my husband, who is doing a master's degree in the College of Engineering, and our two daughters (9 and 5 years old) who hardly speak any Spanish after almost four years in the United States. In my free time, going out to the mountains with my family and friends is something I enjoy immensely. When a branch breaks, I am always thinking it is a bear so I have to work on getting used to the sounds of nature! However, I definitely feel I am in the right place.

I hope to meet each of you soon!

Course Focus **Bill Hoch - HORT 447 – Advanced Plant Propagation**



Advanced Plant Propagation (HORT 447) focuses on the micropropagation, or tissue culture, of plants. The course is structured around a master chart of the different types of plant growth strategies and the methods that

can be used to propagate each of these types of plants. Students use an experimental approach to learn each of these techniques, including shoot, callus and bulblet culture, in vitro germination, organogenesis, embryo rescue and embryogenesis. Students leave the course with a thorough understanding of the physiology and biology underlying these specialized plant propagation techniques.

As there are no text books or manuals that adequately address the material of this course, the lectures and handouts provide all of the information necessary to understand the concepts employed in lab. Students write lab reports following completion of each exercise, take a midterm exam following conclusion of the lecture material, and give a presentation either on a topic of their choice or a review of a significant research paper. This course also makes extensive use of the spaced-education method, which involves testing students multiple times each week with randomly chosen questions that stress the application of concepts. This retrieval practice over the course of the semester

increases the students' level of knowledge and long-term retention, which is then further reinforced by observations in the lab portion of the course.

I enjoy this course because of the amount of interaction I have with students in the labs, and the challenges of developing effective lab exercises and keeping it up-to-date with the advancing methods and technologies. I experiment with many new things each year in the hopes that one will become a new lab or improve an existing lab exercise. Student feedback has been very positive and has been vital to the improvement of the course.

Grants

Mike Ivie, MDA, "Storage Equipment and Housing of Mollusk Collection."

Mike Ivie, MDA, " Stone Fruit Survey"

Chaofu Lu, University of Washington, "Biochemical Genomics: Deciphering the Chemical Factories of Oilseeds."

Nina Zidack, MDA, "Increasing Planting of Montana Certified Seed Potatoes in Home Gardens in Montana"

Publications

Yu, E.T., Tran-Gyamfi, M., Strobel, G.A., Taatjes, C., Hadi, M.Z., VOC profile of endophytic fungi is altered by nature of lignocellulosic biomass feedstock. NASA report, 2014, USA- National Aeronautics and Space Administration. Washington, D.C.

Mallette, N. D., Pankrantz, E.M., Busse, S., Strobel, G.A., Carlson, R.P., and Peyton, B., (2014). Evaluation of cellulose as a substrate for hydrocarbon fuel production by *Ascochyta sarcooides* (NRRL 50072). J. of Sustainable Bioenergy Systems 4: 33-49.

Strobel, G.A. (2014) Methods of discovery and techniques to study endophytic fungi producing fuel -related hydrocarbons. Natural Product Reports 39: 259-272.

Nigg, J., Strobel, G.A., Knighton, B., Hilmer, J., Geary, B., Hassan, S.R., Harper, J., Valenti, D., and Wang, Y. (2014) Functionalize para- substituted. Benzene as 1,8 cineole production modulators (CPMs) in an endophytic *Nodulisporium* sp. Microbiology (in press).

Strobel, G.A. (2014) The Story of Mycodiesel. Current Opinion in Microbiology 19: 52-58.

Strobel, G.A., (2014) Bioprospecting. Natural History p. 25-30.

Patents

Gary Strobel, US patent. "Antimicrobial compositions and related methods of use". Issued 5/20/2014. USPTO 8728462.

Gary Strobel, An endophytic fungus making 1, 8 cineole and related hydrocarbons - potential fuels- provisional filed May 18, 2010. US Patent No 8,425,946. 4/23/2013.

New Species Named after Strobel

Investigators in India have named a new species of *Muscodora* as *Muscodora strobeli* in honor of Gary Strobel as the original describer of this fungal genus. The fungus has many uses since it makes volatile compounds that are bioactive and uses for it are being investigated by government, university and private labs across the world.

Tricks to Get Tomatoes to Ripen in Montana Starts in August

By Toby Day

Extension Horticulturist

The cool temperatures that we experienced in the month of June didn't help the tender vegetables in our garden, particularly tomatoes. Many tomatoes in Montana are like mine and are not too far along. My plants have vigorous green growth now that the day and nighttime temperatures have risen, but there isn't much fruit. The fruit that have formed are small and green. And, the clock is ticking! Ugh.

Our traditional first hard frost in the Gallatin valley is September 16. That may seem like a long time from now (heck, the summer is *only* half over right?). However, it is only just over 6 weeks away! So, what is the trick to getting tomatoes ripe before we get a hard frost? You really should start thinking about what to do beginning in early August.

Around the 10th of August, cut off any remaining flowers and very small fruit. I know, it is a hard thing to do (they *might* become something, right?), but the energy that is expended for those remaining flowers and fruit would best be used to ripen the ones that are have a *chance* to ripen. In fact, if you have an abundance of green fruit on the vine, remove some of the green ones to allow the remaining to ripen faster. Again, this is a hard thing to do, but you have to ask yourself, "Is it better to have a few ripe tomatoes at the end of the season or a whole bunch of green

ones? I personally would rather have a few ripe ones.

Another trick is to withhold water once or twice to the point that the plant is wilting. As plant lovers (hey, aren't we all in Plant Sciences?) it may be difficult to withhold water from a perfectly healthy plant, but I assure you that if you withhold water to your tomato plant to the point that they are wilting and then water again, it will hasten the ripening process. Sometimes you have to think like the plant - if there is an event or two that stresses the plant, the ultimate thing the plant wants to do is produce mature seed. And, to have mature seed, there must be mature fruit. Most of its energy will be spent on ripening the remaining fruit. I tried this last year and the stressed tomatoes ripened three weeks earlier than the ones that were not stressed. Now, I'm sold.

Another way to stress the plant is to root prune. This historically was a well-kept secret of the gardening world, with tomato gardeners flaunting their crimson-ripe beauties as the masses on Montanans are choking down another serving of fried green tomatoes. To root prune, use a spade to cut the roots of the plant in several places. Again, the stress to the plant will cause it to go into "full ripening



Honestly, there is a limit to the amount of fried green tomatoes one can eat! (heyhungrypeople.com)



Doesn't this look so much better?
Photo Credit: USDA via Flickr Revised by Joey Williamson, HGIC

mode." You don't want to sever all the roots, but cut about one-third to one-half of the roots approximately 4 to 5 inches from the stem (or even shorter in a pot).

Finally, if the nights get cooler, you may want to cover the plants - if possible. Many of us will cover a tomato plant for eminent frost, but even if the temperatures at night creep toward 40°F you may want to cover them.

Tomato plants can experience cold damage at even 50°F and will take time to recover. That means less sugars going to the fruit. A cover will often trap the nighttime heat increasing the chance for ripe fruit.

I will have more next month on what to do when frost is eminent and you have a ton of green tomatoes on the vine...all is not lost.

August Birthdays

Barry Jacobsen	6
Nancy Cooke	12
Nar Ranabat	12
Mike Ivie	16
Jean Allen	23
Karen Maroney	23
Ruth O'Neill	26
David Sands	30



Recipe of the Month

Quinoa and Black Beans

- 1 t vegetable oil
- 1 onion, chopped
- 3 cloves garlic, chopped
- 3/4 c quinoa
- 1 1/2 c vegetable broth
- 1 t ground cumin
- 1/4 t pepper
- Salt and ground black pepper to taste
- 1 c frozen corn kernels
- 2 (15 oz) cans black beans, rinsed and drained
- 1/2 c chopped fresh cilantro



Heat oil in a saucepan over medium heat; cook and stir onion and garlic until lightly browned, about 10 minutes.

Mix quinoa into onion mixture and cover with vegetable broth; season with cumin, cayenne pepper, salt, and pepper. Bring the mixture to a boil. Cover, reduce heat, and simmer until quinoa is tender and broth is absorbed, about 20 minutes.

Stir frozen corn into the saucepan, and continue to simmer until heated through, about 5 minutes; mix in the black beans and cilantro.

Mina Marries Ian

On Saturday, July 26, Mina Talajoor and Ian Johnson were married at Springhill Pavilion. They've been together for over eight years and were excited to exchange their vows amongst their friends and family who traveled to Bozeman from all over the country.

Congratulations Ian and Mina!





1. Speakers Niisa Bosque-Perez, University of Idaho; Barry Jacobsen, Montana State University; Mary Burrows, Montana State University; and Judith Brown, University of Arizona
2. Barry Jacobsen and Judith Brown
3. Jackie Fletcher, Oklahoma State University and Jan Leach, Colorado State University
4. Gary Chastagner, Washington State University and Mike Matheron, University of Arizona
5. The Montana State University Crowd – Alan Dyer, Mary Burrows, Nar Rhanabat, David May, and Carmen Pol
6. Nick Schutter giving a tour of the Schutter Seed Potato Farm
7. Judith Brown and Rick Bennett, APS President Elect
8. Barry Jacobsen spearheaded the local arrangements with the assistance of Alan Dyer.
9. Jackie Fletcher and Bill Chessin, Emeritus Professor of Botany at the University of Montana and Jackie's major professor
10. Danilo Vera, graduate student, Washington State University
11. Attendees
12. Hamburger Buns – Wheat Montana Tour
13. Jan Leach and Judith Brown
14. Marcia McMullen, North Dakota State University; and Juliet Marshall, University of Idaho
15. Jay Pscheidt, Oregon State University and Tim Murray, Washington State University and APS President Elect
16. David Sands, Montana State University; Cheri Turner, Eastern Ag Research Center and Alice Pilgeram, Montana State University
17. Dean Folkvord, Wheat Montana Tour - explaining how hamburger buns are made
18. Tour of Wheat Montana
19. Carmen Pol, graduate student at Montana State University
20. Rufina Hernandez Martinez and Habib Batche of INIFAP_CICESE and Mojtaba Mohammadei and Akif Eskalen of the University of California-Riverside.
21. Jack Rasmussen, North Dakota State University and John Sherwood, Montana State University
22. Bags of wheat flour, Wheat Montana Bakery
23. Tissue culture mother stock of potato varieties during tour of the Montana Seed Potato Certification Program
24. Alan Dyer, Juliet Marshall, Rick Bennett, Marcia McMullen, Jan Leach, and Judith Brown
25. Participants of the 2014 Graduate Student Oral Competition
26. Alan Dyer talking to attendees at the Post Farm about wheat root rot studies
27. Barry Jacobsen explaining the process for ELISA testing at the Montana Seed Potato Certification Program

Note: The dates on the pics are incorrect.

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