



Department Head Retires By John Sherwood



As all of you know by now, I will be retiring at the end of June. It has, in many ways, been an incredible ride. Linda and I moved to Bozeman in November, 1988. I moved through the ranks running a moderately successful

research program studying the mating genetics of smut fungi, primarily *Ustilago hordei* and taught and advised undergrad students in the Biotechnology program. The start of my slide into more administrative responsibilities occurred when I was elected Chair of the Faculty Council (now Senate). I guess I caught the eye of then Dean Quissenberry, and her last act before leaving MSU was to ask me to be PSPP Head. I agreed assuming it would be a short term thing. Fourteen years later, and still Head, I have come to the end of my career at MSU.

I will say that I could not have survived as Head as long as I did if I hadn't had great Deans to work under (Jeff Jacobsen and now Charles Boyer) who gave me relatively free rein and at least tolerated my somewhat off beat sense of humor, which I have always been willing to share. I obviously also could never have remained in this position for this long, nor would I have wanted to, if this

wasn't a great department, with outstanding faculty and staff. To be honest, you all made my job pretty easy (at least most of the time). It was simple for me to brag about your work, both in teaching (including Extension) and research. So as I hand the job off for the immediate future to Mike Giroux, I know you will continue to be successful simply because the people that make up this department will not stand for anything less. I wish you all the best.

Note: A retirement barbecue/potluck for John will take place on Friday, June 30 at 4:00 p.m. in 108 PBB/Mathre Courtyard.

Lachowiec Joins Faculty



Beginning November 1, 2017, Dr. Jennifer Lachowiec will be taking the place of Dr. Jack Martin as the PSPP Professor of Quantitative Genetics/statistical Genomics. Jennifer is currently a Post-doctoral Fellow at the University of Michigan in Ann Arbor, Michigan.

Along with her research responsibilities, it is expected that Jennifer will teach Biometry and Experimental Design and Analysis.

Gallatin Valley Farm Fair 2017

The Potato Station

By Nina Zidack

How do we educate our increasingly urban



Ron Larson, Phil Bruckner, Larry Holzworth, and Jim Berg teaching students about Montana crops.

communities about where their food comes from when only 2% of the US population lives on a farm? In Gallatin County, Montana, we start early through a program for 4th graders called Farm Fair that is sponsored by the Gallatin Valley Agriculture Committee which is a sub-committee between the Belgrade and Bozeman Chambers of Commerce. The program originated twelve years ago and was an instant success with 450 students. Fast forward to May, 2017, and the attendance is up to 1100 including nearly all city and rural schools in the county. This program requires over 200 volunteers, including members of the Plant Science and Plant Pathology Department, and spans three school days. Since its inception, the Brainard Farm in Manhattan, Montana has provided a genuine farm location surrounded by mountains in the heart of the Gallatin Valley. The program is

organized into 16 stations including major types of livestock, crops, weeds, farm safety, 4-H, water, forestry, bees, and potatoes. Many of the stations are actually located in barn stalls. The potato station was led by members of the Potato Lab and Extension where students are taught the differences between seed potatoes and the potatoes they buy in the store, and how nutritious and versatile potatoes are. The highlight of the potato station is the "harvest" of a potato plant where students get to tear apart a potted potato plant and learn to identify all the important parts. Students generally find the seed piece or "mother potato" endearing, if not a little shriveled and wrinkled, and the baby potatoes cute and "cool"! The kids show genuine enthusiasm and it can be a challenge to keep them from eating their harvest on the spot, dirt and all. Following the potato station, the students then go to the crops station, which is also taught by several members of the department. After the students finish showing us their potato, we show the students plants and seeds of several different crops grown in Montana. We also show and discuss the end-use products that come from our crops such as cereal, bread, lentil soup, and the always popular Whoppers. Some students are surprised to learn sugar comes from sugar beets, and they conclude that if sugar comes from a plant then it must be healthy. Everyone is treated to locally produced barbecued hamburgers for lunch and during the horse-drawn wagon tour around the farm, students learn about different cropping systems. One of the most rewarding aspects of the program is the response from the teachers and chaperones such as, "I had no idea what went into growing potatoes, much less seed potatoes!" This opportunity to educate the younger generation about agriculture is vital to enhancing future dialog and respect between the agricultural and urban communities. The agricultural and urban communities are intertwined with shared resources,

especially water and open space. Demonstrating how maintaining agricultural production can actually enhance the quality of life for all residents, as well as produce food and preserve open space is paramount for ensuring communities that support agriculture.

The Bee Booth

By Michelle Flenniken

The bee booth at the Gallatin Valley Farm Fair was a huge hit once again this year. Last month, Michelle Flenniken and several volunteers from the PSPP Department (including Ruth O'Neil, Kevin Wannier, Laurie Kerzicnik, Alyssa Piccolomini (Peterson Lab) and Flenniken lab graduate students (Laura Brutscher, Alex McMenamin, and Brian Ross) hosted over 1,100 4th graders at the bee booth. Students attended in groups of ~20 for 15 minute intervals, in which they learned about honey bee biology and their important role as pollinators of numerous agricultural crops through demonstrations, interactive Q&A session, and by viewing an observation colony.

Some of the interesting facts we shared with the students were (1) that honey bees pollinate over 180 crops, which are valued at \$17-18 billion dollars annually in North America, and (2) that Montana is a big beekeeping state that typically ranks in the top 5 for honey production (e.g., in 2013, Montana ranked 2nd and produced ~15 million pounds of honey, valued at ~\$30 million, and provided over 150,000 colonies for pollination services).

The students were able to observe the interior of a bee colony and see the queen bee lay eggs (which she does between 1,000 – 2,000 times per day). A fun interactive question we asked is, "How many visits to a flower it would take to make one pound of honey?" They loved guessing and were shocked to find out that it was two million visits. A hive of bees will fly 90,000 miles, the equivalent of three orbits around the earth, to collect two pounds of honey, hence the phrase "busy as a bee".

Most rewarding was all the thoughtful questions from the kids and their adult chaperones! Often they hung around the table after the horn blew trying to ask more questions before the next class came through. Common questions included how long the female queen lives (up to five years), how long the female workers live (four to six weeks in the summer) and how many bees are in a hive (around 40,000 - 70,000). Many of the boys repeatedly asked "Is there a king bee?"! This was an interesting point for future education. When I asked, "Are there more boys or girls in the colony?" several groups answered correctly that most of the colony is composed of female bees. Time will tell if we have managed to inspire a future generation of beekeepers!

Trident-Peregrine Trail Grand Opening By Rebekah VanWieren

Phase 1 of a new birding trail at Missouri Headwaters State Park will officially open July 8th. The Park is designated as an Important

Grand Opening
Trident-Peregrine Trail

Sat, July 8
9:00 AM-12:30 PM
Missouri Headwaters State Park

*~ A designated Important Bird Area
by National Audubon Society ~*

*enjoy free birding,
cement plant tours,
art activities,
& food!*

9:00 Ribbon Cutting Ceremony at
Trident-Peregrine Trailhead

9:30 CRH Plant Tour 1 (Bus @ boat launch)
Cliff bird viewing* (Trail viewing area)

10:00 Bird Kite Making*
Gold Panning Starts*
Guided Bird Walk
Bird Clay Sculpture Making 1

10:30 CRH Plant Tour 2
Bird Clay Sculpture Making 2

11:30 Lunch

Unless indicated, all activities at Park's picnic area
*Ongoing activities from 9:30-11:30

*Come
celebrate
with us!*

MONTANA DEPARTMENT OF REVENUE AND TREASURY
SAGAJAWEA AUDUBON
MONTANA STATE UNIVERSITY
MONTANA RIVER FUND

Bird Area by the National Audubon Society. In 2014-2015, landscape design students in HORT 432 helped develop a three-phase master plan for the new trail amenity. In 2016, project partners received a RiverFund grant to begin Phase 1 construction. More recently, Matt Deane, a current landscape design major, and I completed a series of landscape and bird drawings for new interpretive signage along the trail. Join us on July 8 to celebrate or go check it out any time after the official opening!

Scholarships

The Montana Grain Growers Association and the Montana Grains Foundation recently awarded the following scholarships:

Tom Grubb, Sophomore in Plant Science - \$1000

Tavin Schneider, Senior in Plant Science/Crop Science Option - \$2500

Richard "Wade" Webster, Senior in Plant Science/Crop Science Option - \$2500

Kendra Hertweck, Graduate student, Plant Genetics - \$2500

Justin Vetch, Graduate Student, Plant Science - \$2500.

Congratulations to each of you!

Invited Talks

Bill Dyer, "Molecular, proteome, and biochemical characterization of multiple herbicide resistant *Avena fatua* accessions", Global Herbicide Challenge meeting, Denver, CO May 4-17, 2017.

Barbara Keith, "Multiple herbicide resistance in *Avena fatua*: transcriptome and proteome analysis burns", Global Herbicide Challenge meeting, Denver, CO May 4-17, 2017

Erin Burns, "Impacts of environmental and biological stressors on the population dynamics of multiple herbicide resistant *Avena*

fatua (L.)", Global Herbicide Challenge meeting, Denver, CO May 4-17, 2017.

Budak Named Associate Editor for Frontiers in Plant Science

Hikmet Budak has been invited to serve as an Associate Editor of *Frontiers in Plant Science*, an online open-access journal ranked #1 in citations in Plant Science and ranked #2 in Microbiology. This Journal with impact factors on average ranked in the top 15%. *Frontiers in Plant Science* publishes primary research from all areas of the plant sciences. Budak's editorial duties will be to manage the peer review process – a review by experts in the same field to ensure the scholarly work meets standards for publication and make final decisions on whether a paper should be accepted for publication in the journal. Hikmet also serves as Editor-in-Chief of *Functional and Integrative Genomics*, a journal devoted to large-scale studies of genomes and their functions and Associate Editor of *BMC Genomics*, an open-access peer-reviewed journal for the genomics field. In addition, he is a member of the editorial board for *PlosOne*, a multidisciplinary open-access scientific journal and Associated Editor of *Scientific Reports*, an online open-access journal from the publishers of Nature.

Publications

Burcu Alptekin, Peter Langridge, and Hikmet Budak, "Abiotic stress miRNomes in the Triticeae", *Function and Integrative Genomics*. (2017) 17: 145. doi:10.1007/s10142-016-0525-9

Hikmet Budak and Baohong Zhang, "MicroRNAs in model and complex organisms", *Functional and Integrative Genomics*. (2017) 17: 121. doi:10.1007/s10142-017-0544-1

Hikmet Budak, "High-throughput SNP genotyping of modern and wild emmer wheat for yield and root morphology using a combined association and linkage analysis" *Functional Integrative Genomics*. 2017. doi:10.1007/s10142-017-0563-y
Mike A. Ivie, Ian A. Foley, S. Adam Slipinski,

"Colydiine Genera (Coleoptera: ZXopheridae: Colydiinae) of the new World: A Key and Nomenclatural Acts 30 Years in the Making", Coleopterists Bulletin.

Michael A. Ivie and Charles J. Hart, "Two New Species of Xerolinus Ivie and Hart (COLEOPTERA: TENEBRIONIDAE: OPATRINI) From Jamacia and the Virgin Islands", Coleopterists Bulletin.

Heidi R. Schoen, Kristopher A. Hunt, Gary A. Strobel, Brent M. Peyton, and Ross P. Carlson. "Carbon chain length of biofuel- and flavor-relevant volatile organic compounds produced by lignocellulolytic fungal endophytes changes with culture temperature", Received 3 June 2016, Revised 23 March 2017, Accepted 26 March 2017, Available online 18 May 2017. <https://doi.org/10.1016/j.myc.2017.03.005>.

V. Doublet, Y. Poeschl, A. Gogol-Doering, C. Alaux, D. Annoscia, C. Aurori, S.M. Barribeau, O.C. Bedoya-Reina, M.J.F. Brown, J.C. Bull, M.L. Flenniken, D.A. Galbraith, E. Genersch, S. Gisder, I. Grosse, H.L. Holt, D. Hultmark, H.M.G. Lattorff, Y. Le Conte, F. Manfredini, D.P. McMahon, R.F.A. Moritz, F. Nazzi, E.L. Nino, K. Nowick, R.P. van Rij, R.J. Paxton, C.M. Grozinger, "Unity in defense: honeybee workers exhibit conserved molecular responses to diverse pathogens". *BMC Genomics*, 18. DOI : 10.1186/s12864-017-3597-6.

G. Sablok, H. Budak, P. Ralph (Eds.) *Brachypodium Genomics: Methods and Protocols Series: Methods in Molecular Biology*, Vol. 1667.

Below is additional information regarding this book:

This volume presents protocols for *Brachypodium* genomics in numerous areas ranging from marker development, trait evolution, functional genomics, metabolomics, transcriptomics, genomics, and tilling. This book also explores techniques to study the widening genetic base of *Brachypodium* that

will help researchers better understand the model plant using NGS technologies. Written in the highly successful *Methods in Molecular Biology* series format, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls.

Cutting-edge and comprehensive, *Brachypodium Genomics: Methods and Protocols* is a valuable resource for bench-oriented molecular biologists and computational biologists working towards further evolving this field.

Montana Ag Live!



Jack Riesselman, Nina Zidack, Jessica Rupp, Angie Nelson, and Mac Burgess - Montana Ag Live on June 5. Angie was the guest and her topic was "The Growth Through Agriculture Program". There is one show left this season and it will be airing on June 11 at 6:00 p.m. Michelle Flenniken will be the guest and she will be discussing "The current status of bees and what Montana can do to increase the bee population".

Use Caution When Making Herbicide Selection

By Cole Thompson, Integrated Turf Management Specialist - Lincoln, NE
New in 2017 is a lawn product name that may sound familiar, but the new *Roundup for Lawns* is a stark contrast from the traditional *Roundup* herbicide, said a Nebraska Extension integrated turfgrass management specialist.



“The two products have completely different ingredients and are not interchangeable,” said Cole Thompson, who is based at the University of Nebraska-Lincoln. Thompson said in addition to the *Roundup* name similarity are other consumer-awareness factors:

- Multiple *Roundup* products may be displayed together in stores, so consumers must know what they are purchasing.
- Pricing between the two *Roundup* products may differ – do not automatically select the least expensive, which likely is the “traditional” *Roundup*.

Consumers in-store or online must carefully read product labels to correctly determine the active ingredients are what they intend to purchase and use, Thompson said.

Roundup Weed and Grass Killer is a brand name of an herbicide that contains glyphosate. This active ingredient nonselectively kills most plants, including both broadleaf and grasses, Thompson explained. Homeowners often use this product to kill anything growing in cracks, between patio pavers, even entire lawns, for example. Agricultural producers also use glyphosate in their fields to kill unwanted plants.

“Though there are always exceptions, consumers should expect that all plants sprayed with *Roundup Weed and Grass Killer* will die,” Thompson said.

Roundup for Lawns, on the other hand, is the brand name of a new herbicide that does not contain glyphosate; rather it contains the active ingredients MCPA, quinclorac, dicamba and sulfentrazone. Each is a selective herbicide that controls various weeds without harming Kentucky bluegrass, perennial ryegrass or tall fescue lawns.

“Research trials do, however, show that some active ingredients in *Roundup for Lawns* (MPCA and dicamba) could cause short-lived injury to buffalograss lawns,” Thompson said.

In addition to reading the label for the active ingredients, consumers must follow safety directions. At a minimum, when handling and applying pesticides, consumers should wear a long-sleeved shirt, long pants, shoes, socks and chemical-resistant gloves. Other manufacturers have products that contain similar ingredients as *Roundup for Lawns* and target the same weeds, Thompson said, adding labels will list product ingredients.

Other *Roundup* products are also available for home use. *Roundup for Lawns for use on Southern Grasses* contains an active ingredient that may injure cool-season lawns. *Roundup Extended Control* and *Roundup Max Control 365* both contain imazapic, a soil residual herbicide that kills germinating cool-season grass seedlings for weeks after application. Thompson advised avoiding using these extended control products in renovations where seeding will take place soon after application.

June Birthdays

Jill Scarson	3
Li Huang	12
Jennifer Britton	12
Sezgi Biyiklioglu	12
Mac Burgess	13
Ron Ramsfield	15
Luther Talbert	18
Eileen Carpenter	22
Bill Hoch	25



Recipe of the Month

Honey Garlic Slow Cooker Chicken Thighs

5 skinless, boneless
chicken thighs

1/2 c soy sauce

1/2 c ketchup

1/3 c honey

3 cloves garlic, minced

1 t dried basil



Lay chicken thighs on the bottom of a 4-quart slow cooker. Whisk soy sauce, ketchup, honey, garlic, and basil together in a bowl; pour over the chicken. Cook on Low for 6 hours. Serve with basmati rice or quinoa and steamed or roasted vegetables.

**Please see next page for photos of
Graduation Spring 2017.**



Cathy Cripps and Marlee Jenkins



Rebekah VanWieren, John Sherwood, and Mac Burgess. Rebekah received the President's Award for Excellence in Service Learning and Mac received the MSU Certificate of Teaching Enhancement Award.



Connor Hodgskiss receiving the PSPP Outstanding Senior Award from John Sherwood.



Left to Right: Neil Strauss, Haley Craven, Erin Barker, Toni Koontz, Rory Delaney, Marlee Jenkins, Connor Hodgskiss, Hannah Lewis, Titus Hendricks.



Dean Charles Boyer addressing the graduates.



Haley Craven and Erin Barker



The graduating class of Spring 2017



Titus Harkins with wife Danae and parents.



John Sherwood and Hannah Lewis

Graduation Spring 2017