

Plant Science Says



Volume 15, No. 7

August, 2013

Mixing Minds, Mountains, and Cultures By Blake Wiedenheft (edited by Michelle Flenniken)

The familiar 'Mountain and Minds' slogan that captures the culture of our community at Montana State University also applies to the AKTRU summer school at Tomsk State University in Russia. Michelle Flenniken (Research Assistant Prof in Plant Sciences) and Blake Wiedenheft (Assistant Professor in Immunology and Infectious Diseases) recently returned from the Altai Mountains in Western Siberia where they helped teach a three-week summer school for international students. Students (and foreign lecturers) learned about the flora, fauna, microbiota, geology and climatology of Western Siberia from international experts. Nobel prize winner Terry Callaghan, explained how the AKTRU research station, nestled in the heart of the Altai Mountains has been incorporated into a network of 50 remote locations called INTERACT that are being used by scientists from around the globe to study climate change (<http://www.eu-interact.org>). The summer school, organized by world-renowned climatologist Sergey Kirpotin, incorporates classroom lectures with field trips to the surrounding glaciers and explains how researchers with diverse expertise are using this region to measure

the rates and predict the future impacts of climate change. Please visit (<http://inter.tsu.ru/en/news/457-second-actru-summer-school>) for more information on the AKTRU summer school and to find out how you can participate.

For those that are interested in our travel experience, a more detailed description of our trip follows.

We are always eager to travel, but this trip came as a surprise. We are both microbiologists, so when we were invited by world-renowned climatologists to lecture for an international summer school on climatology in Russia, we were simultaneously confused and elated. We traveled to Russia with our friend Veronika, who emigrated from Russia when she was seven years old with her siblings and parents, who are also scientists at MSU. Veronika is a smart young lady with a firm handle on Russian culture and language. Upon arrival in Moscow, we were greeted and hosted by Veronika's friends and family. This warm welcome from our Russian hosts continued throughout our trip, in spite of our very poor language skills.

Our first day in Moscow, we enjoyed local cuisine including Borsch (soup), Syrniki (fried cheese), Blintchiki (pancake) prepared by our very kind hostess (Nellie), a retired engineer, now tutor, who is a fabulous cook. That evening, Nellie gave us a spectacular walking tour of Moscow. We visited the Red Square and saw iconic Russian landmarks (i.e., the Kremlin, Lenin's tomb, the Basil Cathedral, and the Bolshoi Theatre). It was nearly midnight when we called it a day and the sun was just starting to set for the evening. The next evening we boarded the plane to Tomsk, where we met a series of equally gracious scientific colleagues. The conference began the following day. During the first session, we gave seminars in what appeared to be more like a ballroom than a



A group of the international summer student participate in a field lecture on top of Teacher peak in the Altai Mountains of Western Siberia. Photo courtesy of Blake Wiedenheft.

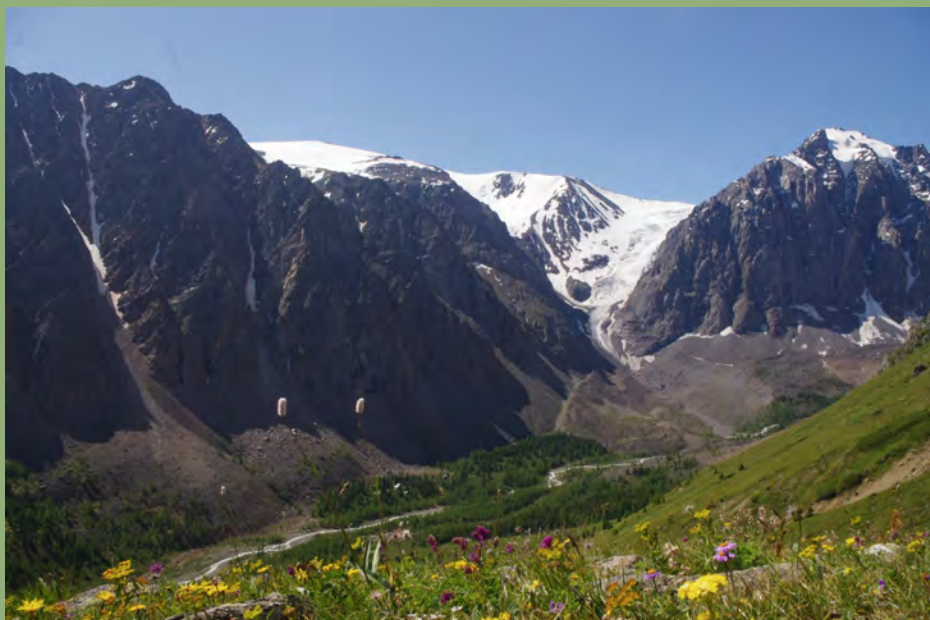
lecture hall. A large oval table filled the room and most of the participants wore headphones dialed into translators that converted English to Russian or *vice versa*. The atmosphere felt more like a summit on international policy, but aside from the occasional confusion due to the challenges of translating scientific jargon from one language to another, it was more or less like any other scientific meeting. Following a couple days of seminars, many of the participants boarded a bus to embark on the field portion of the summer school.

Russia is a vast country. A direct flight from coast-to-coast takes about 12 hours, but to get a true appreciation for the scale of this great nation, one needs to ride the bus. On the map, Tomsk is separated from the Altai region by 'less than an inch', but our journey took nearly three days. Along the way we stopped at a couple of campsites and whitewater rafted down the Katun River. On the third day the bus came to a stop at the outskirts of a small village and our group of road weary scientists stumbled off. Korri village is located at the southern tip of Western Siberia. Mongolian yurts decorate the landscape and their cultural influence is a reflection of their historical ownership of this area. Today, small villages like Korri serve as trading posts for the surrounding 'ag' community. Houses, cows, pigs, goat and dogs mingle between the shacks, in the fields and occasionally occupy the highway. For our part, Korri village was a transition zone for moving from the 'comforts' of our journey by bus to the soviet area military lorries waiting to



Blake Wiedenheft and Michelle Flenniken survey their surroundings from Anniversary Peak in the Altai Mountains of Western Siberia. Courtesy of Margareta Johansson.

shuttle us into the Altai Mountains. The next three days were spent in mountaineering nirvana. The AKTRU research station is surrounded by huge glaciers and jagged mountains. The station serves as a base for scientists from around the world working on all aspects of climatology. At the summer school, our time was divided between lectures and hikes. Michelle and I took full advantage of the hikes and our hosts were kind enough to match our enthusiasm for the mountains with a guide that was eager to go hard and show-off the surrounding mountains in his outdoor playground. The weather was perfect and on the second day we got on top of Kupal mountain, a ~12,000 foot peak with views of Mongolia to the east, China to the south and Kazakhstan to the west.



Wildflowers flourish near Karitosh Peak in the Altai Mountains of Western Siberia. Photo courtesy of Blake Wiedenheft.

Two hours after leaving the lush surroundings of the Aktru research station, we were surprised by the dramatic change in geography and climate. In contrast to the pine trees and wildflowers, we were now in a rain shadow of the Altai Mountains and the landscape was barren, the air was hot and the bugs were hungry. In place of the brilliant colors of seasonal wildflowers adorning the Aktru valley, here layers of weathered minerals created dramatic stripes of red, yellow and white across the hills. One of the scientists from Tomsk State University led us on a hike into an adjoining valley lined with large smooth stones. Most of the stones had a dark oxidized

surface and early inhabitants of this region used these surfaces to record stories about their lives in petroglyphs from ~2000BC.

With a thin layer of desert dust covering our bodies and a lot more respect for the early inhabitants of this regions that managed to survive in this far away land, we boarded the busses that promised to take us back to a place with showers, coffee, and all the conveniences of life in the 21st century. The end of our trip was in sight, but we were still thirsty for a little more Russian adventure so we convinced our colleagues that the best way to finish off our trip was to ride on the trans-Siberian railway from Novosibirsk to Moscow. The bus dropped us off near the train station, where we struggled to buy *plaskarty* class (literally hard-class) to Moscow. We took advantage of our two-day layover in Novosibirsk by exploring the city and seeing a ballet. Then, we boarded a train car with 60 bunk beds for the 48-hour journey back to Moscow. During the train ride we gazed out the window at mixed Birch and Pine forests, practiced our limited Russian vocabulary with our neighbors, and had the opportunity to reflect on our recent experiences. Overall it was a great trip and I would recommend it to anyone that is interested; the next opportunity will be in July 2015.

Plant Path Class Goes to the Flathead By Charrisa Burk

On Thursday, July 8, at 8:00 a.m., eight graduate students taking Dr. Alan Dyer's summer graduate course, Field Methods of Plant Pathology, wandered into the second floor conference room, coffee in hand, for the classes' first field trip. We were heading to Flathead Lake to examine and be a part of a discussion, the Sweet Cherry Variety Trial Research Update, among growers and researchers on cherry tree health. For some, it was our first time seeing Flathead Lake,; for others, it was their first time through Missoula. Dr. Mike Giroux graciously agreed to accompany our class and brave the five hour drive.

It was a beautiful morning as we comfortably squeezed ourselves into the two cars for the long drive. A stop at the "best store in Missoula" as quoted by Dr. Alan Dyer, provided a delicious lunch. Each sandwich was stuffed to the brim, pouring vegetables and meat and baskets full of candy provided special favorites, such as Kinder chocolate bars, which remain elusive in Bozeman. Armed with food, ready to

face the remainder of the journey, we continued on to our arrival at the field house or Yellow Bay Club House of the MSU Agriculture Extension Service at Flathead Lake. Pulling into the parking lot, we were met with a beautiful view of Flathead Lake cherry trees! The orchards stretched from the road to the edge of the lake, spreading out to take up all the available space to grow and thrive. The cherries were beautiful. Some were deep, dark and with a red-wine luster and others were bright red.

Although initially distracted by the cherries, our heads turned as growers from the immediate area, invited by the Montana State University Extension to take part in the Sweet Cherry Variety Trial Research Update, joined us as we walked to Mr. Mark St. Sauver's orchard to discuss the growing methods and latest news for Flathead Cherries along Flathead Lake. We visited a number of different orchards along Flathead Lake including Barry Hansen's Orchard, Louis Swanberg's Point Caroline Orchard, Mark St. Sauver's Orchard, Allen Rodgers Organic Orchard, and Gerald Bowman's Orchard. At each orchard we examined the sweet cherry research trials and listened as expert growers and scientists discussed many topics involving the growth and maintenance of flathead cherry trees including; pruning, commercial harvesting methods, breeding tolerant varieties, disease susceptibility and resistance, packaging, transport and finally the selling of Flathead cherries in Washington State.



Alan Dyer with Flathead cherry producers. Photo courtesy of Riyadh Al-Khafaji.

At each orchard the graduate students discovered and eagerly collected pictures or small samples of diseases on Flathead Lake

Cherry trees. Using a field guide to sweet cherry diseases in Washington, we determined we had collected Bacterial Canker, caused by the bacterium *Pseudomonas syringae*, showing symptoms of an elongated canker on the tree trunk with brown streaks in the tissue above and below the canker. We also found Cherry Leaf Curl, a fungal disease caused by *Taphrina cerasi*, diagnosed through symptoms of a white fungal growth beneath the surface of the leaf with a distorted leaf shape. Additionally, Coryneum Blight (Shot Hole), another fungal disease caused by *Wilsonomyces carpophilus*, showed symptoms such as round lesions on the leaves and sunken dark brown areas on the fruit.



Riyadh Al-Khafaji looking for disease in a cherry tree. Photo courtesy of Nar Rhanbat.

Finally, after identifying these diseases and finishing with the Cherry Orchard tours, we ended the night sleeping in cabins in the woods at the University of Montana's Research Station, on the edge of Flathead Lake. The next morning, Dr. Patricia McGlynn, the MSU Flathead County Agriculture Extension Agent took us on a tour of her grape research trials among select cherry orchards along Flathead Lake. Ms. McGlynn was experimenting with growing 12 varieties of grapes recommended by surrounding Montana growers and shared her extensive experience and knowledge in the growth and care of grapes. It was exciting to hear about her pioneering efforts

for the growth and successful production of grapes along Flathead Lake in Montana.

After learning a great deal about grapes and cherry tree diseases, we piled into the two cars to head back to enjoy the rest of the weekend in Bozeman. The drive was worth it. We met the growers of many sweet cherry orchards along Flathead Lake and were able to ask questions and learn practical field knowledge in the requirements of maintaining a healthy orchard. It was impressive to witness the time and energy invested in such a small but precious piece of fruit, carefully cultivated to optimum sweetness and then harvested from the shores of our very own Flathead Lake. Most importantly, we came away with a good base of knowledge on the challenges associated with keeping the sweet cherry orchards of Flathead Lake healthy, disease free and economically beneficial to the many small-scale growers along Flathead Lake.

Strobel and the Origins of Crude Oil

On July 30, Marsha Walton of the National Science Foundation and Bill Campbell, a videographer from Livingston, were in the Department to do a filming session with people in Gary Strobel's lab on the development of the Paleobiosphere and its implications for use in studying the origins of crude oil. Also in the session were Bozeman Daily Chronicle staff writer Ms. Gayle Schontzler and a photographer along with Adam Bell of KBZK. Strobel has also been advised that Science Magazine will do a news piece on the Paleobiosphere in the near future. The instrument mimics the ancient earth by having a damp atmosphere, a constant flow of sterile air and the presence of plant material and a hydrocarbon producing fungus all suspended over bentonite shale. After incubation, the shale is harvested, dried, and subsequently subjected to high temperatures in a specially designed oven. This causes the release of hydrocarbons that were made by the fungus and trapped by the shale. The whole process takes three weeks and representative molecules in each of the four classes of organic substances found in diesel can be recovered from the trap shale. The oven, the paleobiosphere and the stainless steel carbotrap columns were all made in Bozeman by Eric Booth in his father's garage. The work has implications to our understanding on how crude oil may have been produced and trapped in the ancient earth.

**Towne's Harvest Lunch
7th Annual President's Luncheon
By Bill Dyer**

Towne's Harvest Garden staff hosted the 7th Annual 'President's Luncheon' at the Horticulture farm on July 18. Joining President Waded Cruzado were Provost Martha Potvin, Vice President of Administration and Finance Terry Leist, Deans Matt Caires and Lynda Ransdell, Assistant to the Dean and Director of the College of Agriculture and Montana Agricultural Experiment Station Susan Frazer, PSPP Department Head John Sherwood, and Ron de Yong and Collin Watters from the Montana Department of Agriculture. Guests, faculty, and students from the Colleges of Agriculture and HHD dined on a delicious lunch prepared by students of Carmen Byker's SFBS 445R/541 Culinary Marketing: Farm to Table, with foods from Towne's Harvest Garden and other local sources. After lunch, the group toured the farm and the new Horticulture Barn.

Susan Lanning Farewell Potluck

See pictures on Page 9 of the Farewell Potluck for Susan Lanning.



Sample menu items included strawberry basil cooler, Bozeman borscht, spinach and herb frittata, and chocolate mint shortbread. Photo courtesy of Susie Beardsley.



A tour group learns about crop rotations, planting schemes, and research being conducted at Towne's Harvest Garden. Photo courtesy of Susie Beardsley.



MSU folks sample the locally-sourced lunch at the 2013 President's luncheon. Photo courtesy of Susie Beardsley.

New Employees

Pamela Burkenpas - Seed Lab



Photo courtesy of
Becky Burkenpas

I grew up in a small town in Southern Oregon, the sixth of eight kids. After I graduated from High School, I spent two years as a nanny in the Boston area. While living there, I came to Bozeman to attend my cousin's wedding. Little did I know her groom had a brother. You know what they say, "Going to a wedding is the making of another". We were married just over a year later and I have been here ever since. We began our family after my husband graduated from MSU in 1992. We have three beautiful kids, two of which will begin their college careers here at MSU in August. I spent 13 years doing childcare in my home while I raised my kids, followed by a few years of secretarial/bookkeeping work before finding my way to the Seed Lab. Having a year under my belt as a fixed-term employee, I am happy to have permanent status and to continue my journey in the field of agriculture. Currently my job entails mostly data-entry and preparing the seed samples for testing, as well as answering the phone and providing customer service. I have already learned so much and look forward to gaining even more knowledge of the seed trade industry and agriculture in Montana.

Grants

Cathy Cripps, "Mycorrhizal Inoculation",
USDA Forest Service, \$6500.

Course Focus

**BIOB 256 - Introduction to Biology:
Cells to Organisms**
By Cathy Cripps



Photo courtesy of Don
Bachman

I teach half of this introductory biology course which is offered every spring and has a home base in the Cell Biology and Neuroscience Department. It is part of a series of courses originally funded by a Howard Hughes Medical Institute grant to develop a basic biology program

intended primarily for medically oriented students ("pre-meds"). Biochemistry students also choose this option. The goals of the course are to integrate qualitative biology with quantitative methods (statistics for my part) and to provide labs developed around 'active learning'. Prerequisites for the course include chemistry and a statistics course.

We use Freeman's "Biological Science" textbook for the series. The first part of BIOB 256 covers the basic groups of plants, plant physiology, and fungi. The second part of the course covers animal physiology which could be "animal physiology", "mammal physiology" or "human physiology" depending on who is teaching it. We use D2L, online quizzes, online movies and the "iclicker" system for lectures. Laboratory exercises are designed to have students set up their own experiments, analyze their own data, complete reports in a scientific format, and present information in a PowerPoint format. Students use either Minitab or Excel to evaluate their results statistically. We have been told that the laboratory section is rather 'intense' and that the reports take a lot of time, but students who have graduated from this series thank us later on.

Over 80% of our 200 students intend on entering the medical field in some way. The course is comprised primarily of freshman, but a significant number of upper classman as well as a group of Post Bacs and Veterans returning to school take the course. This series is also intended to prepare students for the MCAT. Follow-up courses include Biology 260: Intro Biol: Cells to Molecules, and Biology 258: Intro Biol: organisms to populations. The correct order in which to take the series is: 256, 260, and 258.

Growing Flathead Cherries

By Toby Day, Extension Horticulture
Associate Specialist



Photo courtesy of Toby
Day

I recently travelled to Flathead Lake for relaxing and boating, but also to pick Flathead sweet cherries. My wife Jennifer and I each year routinely pick over 80 lbs of cherries, mostly 'Lapin' and 'Lambert' sweet

cherries and process them into jam, syrup, cordial, and my favorite, canned cherries. Flathead cherries are pretty hard to miss as they are sold the first weeks of August in the grocery stores, at the farmer's market, and by vendors out of the back of vehicles at major highway crossings. They are quite an abundant agricultural market in Montana. The Flathead Lake Cherry Growers Association produces more than three million pounds of sweet cherries each year. That number does not take into account the independent growers and the U-pick operations like the one we visited.

Flathead cherry growers face a number of concerns including: frost, which can freeze the flowers before they are fertilized; hail, which will mark the cherries; rain, which can cause the cherries to split; and Washington cherries that can flood the market at the same time the Flathead cherries are ripening – a terrible situation for Montana growers whereas it costs more to pick the cherries than they can sell on the market. New varieties are being tested through a research project by MSU/Flathead County Extension agent, Pat McGlynn, to find sweet cherries that ripen earlier than Lambert and Lapin cherries, so that there is less industry overlap. More about this research can be found at: http://flathead.mt.gov/extension/msu/documents/FlatheadCherry_Annual.Report_2.13.2011.pdf

Some interesting facts about the sweet cherries that come from the Flathead area (Many stats via www.agr.mt.gov):

The sweet cherries are Hardy to Zone 5.

The "Flathead Lake Effect," on the east side of Flathead Lake is what creates the perfect environment for growing sweet cherries. The area has long, warm days, cool nights and the low winter temperatures that rarely drop below -25°F because of the wind being warmed as it crosses the lake (the lake is large enough that it does not freeze).

Sweet cherries were introduced into Montana in 1866.

The Flathead Lake area was not discovered as an area for growing the cherries until 1893.

Many varieties of sweet cherries are not self-fruitful and require cross-pollination

Cherries grow on the fruit spurs in groups of three's. A cherry tree will start producing fruit in five years and is fully mature in 15 years.

A mature sweet cherry tree can produce over 100 pounds of cherries per year.

If you purchase (or pick) some Flathead cherries this year and are in the mood for let's say – sweet cherry coffee cake, cherry dumplings, sweet cherry pie, or even cherry pudding; there are some great recipes from the Flathead Lake Cherry Growers, the people who grow the cherries at: http://www.montanacherries.com/CherryRecipes_FLCG.asp

Gunnink –Troth Wedding



Photo courtesy of Colette Ruth

Grad student, Erin Gunnink married Austin Troth on June 30. Erin is working toward a Masters in Plant Pathology. Austin is working on an Associate's degree in Design Drafting and he works at Home Depot. Congratulations Austin and Erin!

Frank Dougher Earned Eagle Scout

On July 23, Frank T. Dougher became Mountain Valley District's newest Eagle Scout. Proud parents are Frank & Tracy Dougher. Many thanks to everyone in the Department that supported Frank through his scouting, especially those that enjoyed the popcorn. Frank is enlisting in the Marine Corps after his 18th birthday in August.



Frank, Frank Jr, and Tracy Dougher. Photo courtesy of April Bonamuci.

Recipe of the Month

Zucchini Chocolate Bread

2 (1 oz) squares
unsweetened chocolate
3 eggs
2 c white sugar
1 c vegetable oil
2 c grated zucchini
1 t vanilla
2 c flour
1 t baking soda
1 t salt
1 t cinnamon
3/4 c semi sweet chocolate chips



Preheat oven to 350. Lightly grease two 9x5 inch loaf pans. In a microwave-safe bowl, microwave chocolate until melted. Stir occasionally until chocolate is smooth

In a large bowl, combine eggs, sugar, oil, grated zucchini, vanilla, and chocolate; beat well, Stir in the flour, baking soda, salt, and cinnamon. Fold in the chocolate chips. Pour batter into prepared loaf pans.

Bake I preheated oven for 60-70 minutes, or until a toothpick inserted into the center of a loaf comes out clean.

August Birthdays

Barry Jacobsen	6
Al Scharen	9
Mike Ivie	16
Peter Suci	24
Ruth O'Neill	26
David Sands	30





Susan Lanning sharing some final thoughts at her farewell potluck



Nancy Blake, Luther Talbert, Susan Lanning, Andy Hogg, and Matt Moffet



Bernie Schaff, Bill Grey, Hwa Young Heo, Luther Talbert, Jay Kalous, Jim Berg, and Ron Ramsfield modeling the t-shirts given to them by Susan Lanning. An aerial shot of the Post farm is on each t-shirt.



Nancy Blake presenting Susan with her favorite hoe that was signed by several MSU employees, past and present.



Jim Berg giving Susan Lanning some old, good quality garden tools.



Hope Talbert and Deanna Nash



Ray and Sharon Ditterline



Nancy Blake presenting Susan Lanning with a picture taken about 100 years ago of women carrying bundles of wheat. Harvest hasn't changed much.



Becky Hattersley, Susan Lanning and Brian Hattersley



Jackie and Jerry Kennedy



Craig Cook and Andy Hogg