

# May 2015



# Table of Contents

- Scientists unravel genes searching for connective tissue disease causes ..... 1
- Animal science student, rescued racehorse took trail to greener pastures ..... 4
- Plant sciences professor boost helps Sheridan College team ..... 6
- Hess names Meador Sheridan Research and Extension Center director ..... 9
- Three receive Promoting Intellectual Engagement Awards ..... 10
- Revised Cent\$ible Nutrition Program cookbook includes food safety, nutrition tips ..... 12
- Undergrad receives award to present poster at national symposium ..... 13
- Quality work, service to public, co-workers brings honors to three in college ..... 14
- College celebrates graduation May 16 at Indoor Practice Facility ..... 16
- Changing faces and changing places happening at the college ..... 17
- Department of Molecular Biology Seminars ..... 18
- Proposals Submitted ..... 19
- Monies Awarded ..... 21

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# Scientists unravel genes searching for connective tissue disease causes

By Ann Tanaka | May 2015



*Research by Ph.D. student Melissa Kelley and Professor David Fay discovered in *C. elegans* intrinsic biomechanical forces operating in embryos no one had previously theorized.*

Molecular biologist [David Fay](#) doesn't much look like famous sleuths such as television's Columbo - no trenchcoat, at least - nor Fox Mulder of "X Files" fame; there is no doubting-what's-out-there Scully at his side.

Fay earned his Ph.D. in molecular biophysics and biochemistry from Yale University, and his laboratory logo is a worm with a boot (emphasis on singular boot) and spur, sporting a red neckerchief, and donning a hat with a "W" - "The Wyoming Worm Lab."

His [research history](#) is peppered with a \$1.4 million grant, a \$1.19 million grant, a \$799,000 grant, and those of lesser amounts. His scientific journal articles total 48 and date back to 1991.

And yet, there is no denying the look of fun that spread across his face when this director of the [Molecular and Cellular Life Sciences](#) (MCLS) Program here at UW talked about the mystery he and his lab associates pursued, tracked down, and ultimately solved.

It began with mutant worms.

"This was one of those studies where the idea of doing really basic, exploratory science shines," he says.

His lab works with *C. elegans*, a transparent (and not parasitic) nematode, usually about a millimeter long with about 3,000 cells. Probably somewhat disappointing to humans, its genome is similar to us.

Fay and others in the field often mutate wild-type (normal) worms in a random manner and look at the resulting phenotypes – the appearance of an organism resulting from its genotype and environment.

“The classic genetic strategy is to break something to figure out how it’s working,” notes Fay.

### **The Search Begins**

Fay, MCLS doctorate student Melissa Kelley, and others in his lab found themselves looking at a mutant that had an unusual phenotype, one not well described or understood at any level.

“Some of the fun of it is like sleuthing, figuring out what happened” says Fay, and flashed that look.

The fun and difficult part, he says, is figuring out just how deep and precise you can get in your understanding of the problem.

“We were able to solve the mystery of the mutant phenotype in pretty good detail,” he says. “We made a lot of new connections, and you never know where these studies are going to lead. Sometimes they lead to genes that might be nematode-specific.”

In this case, it led to genes that are conserved in humans.

“Thanks to previous studies from another group, we already knew that genes with clear human correlates were involved in what we were studying,” Fay says. “That’s partially what made us interested in the problem to begin with. We knew the study would have relevance to human biology and possibly disease.”

### **Scaffolding Support**

Their research led to a gene that encodes a worm protein related to the fibrillin proteins in humans. Fibrillins are essential for proper formation and function of elastic-like fibers in connective tissues. Fibrillin works outside the cell, providing structural support – a scaffold – for the cell.

Two of the three fibrillin proteins in humans are associated with disease, in particular, Marfan syndrome. Marfan affects connective tissues, and symptoms can be long arms, legs, and fingers, a tall and thin body type, flat feet, and harder-to-detect signs such as aorta defects. Some have speculated Abraham Lincoln had the syndrome, but many now reject that.

The lab’s mutant worm didn’t have a normal scaffolding system. This led to a range of deformities in the developing worms, says Fay. The lack of a proper tissue scaffold also led to the discovery of certain intrinsic biomechanical forces operating in embryos no one had previously theorized.

### **Results in Open Access Journal *eLife***

Results were first published on March 13 in [eLife](#), a highly regarded open access scientific journal. Publication in *eLife* is free because of backing by the Howard Hughes, Max Plank, and Wellcome Trust Institutes. The Fay lab is the first from the University of Wyoming to publish an article in this journal. Kelley is one of three lead authors.

Fay eagerly credits his collaborators, which include Nobel Laureate Martin Chalfie in the Department of Biological Sciences at Columbia University. Others are from Stanford University, Universidad Mayor, Harvard Medical School, Rockefeller University; and the David Geffen School of Medicine at UCLA.

Kelley says work on the project began 10 years ago, before she joined the lab.

“I have been very fortunate with this project, both to be able to work on well-established research, and because I have had this opportunity to be an author on a paper with such outstanding collaborators,” says Kelley, who is interested in studying developmental biology and human diseases.

The research has implications for sorting out the complicated genetic landscape of diseases.

In the case of Marfan syndrome, two siblings can have the exact same mutation in the fibrillin gene, but the symptoms can be radically different in severity. That told scientists there must be additional critical genetic modifiers that influence the severity and outcome of the disease.

“People don’t know yet what those modifiers are for Marfan syndrome,” says Fay. With the genetic machinery largely being the same in humans and *C. elegans*, “We can use worms to figure out what the genetic modifiers of diseases like Marfan syndrome are,” says Fay. “That could have an influence on diagnosis, prognosis, and although more farther out, treatment.”

# Animal science student, rescued racehorse took trail to greener pastures

By Ann Tanaka | May 2015

Buckdeer faced a career change.

He was, by all measurements, a failure.

A name change and career switch later, he's back in the saddle again. At least, his owner, University of Wyoming junior and animal science major Lindsay Zacco, is.

The thoroughbred that finished dead last in his only race gave her the courage to pursue her dreams, says Zacco, who has an equine science option.

Buck was sold at age 3 to a trainer at the same Pennsylvania horse barn Zacco used. Buck was to be trained as a hunter-jumper horse after his failed race career. Zacco said Buck wasn't working out with his new owner.



"He and I just always got along," says Zacco, who began riding at age 8. *Lindsay Zacco with Buck*

"With everyone else, he was a little crazy. When I rode him, he was always very good. The woman just decided to give him to me."

She bought him for \$1 two years later, and a few years after that, Buck was in a horse trailer bound for college in Wyoming with his owner.

Buck got a name change and would major as a hunter-jumper with a minor in western trail.

## Colorado Competition

The horse excelled in March at the [Colorado Most Wanted Thoroughbred](#) event, a competition that promotes the rescue of unwanted thoroughbred racehorses. He showed off his ranch horse and jumping skills and, with Zacco aboard, he's at home on the range herding cattle or helping guide horse tours on dude ranches.

When younger, she and her parents vacationed at a dude ranch near Jackson. Wyoming always called to Zacco.

"I loved Wyoming and decided to move out here," she says. "I told my parents if I was going to college in Wyoming, my horse was going. I think they just kind of assumed that."

She would later work at the same dude ranch with Buck.

"He never really had a problem with any of it," says Zacco. "Which is shocking. He had never seen a bear or buffalo, but he didn't care. Black bear, grizzly, bison - he's pretty laid back."

By coincidence, a Pennsylvanian posted the Colorado competition on Zacco's Facebook wall. Zacco says

Buck qualified because he had been boarded in Colorado during the year (He's now about five minutes from Laramie).

### **Unwanted Racehorses Important Topic**

The Retired Racehorse Project sponsors Colorado's Most Wanted Thoroughbred event. Today's unwanted horse topic is very relevant in the equine industry, says [Jenny Ingwerson](#), an equine lecturer in the Department of Animal Science.

"It was an honor Lindsay and Buck were chosen for this competition among many applicants," notes Ingwerson. "We are very proud to have one of our UW animal science undergraduate students participate in this event."

She said the number of unwanted horses, neglect, abuse, and welfare cases have increased with horse slaughter banned in the United States and the drop in the economy.

"Many unwanted racehorses can end up as an animal welfare case or going to slaughter, even though it isn't legal in the United States," she says. Some "ex-race" horses do find good homes and alternative futures, she notes.

### **Jumping at Opportunities**

The Colorado event showcases what the "ex-race" horses can do, Zacco says, including jumping, which Buck does naturally.

"He's an unexpected horse to do so well in competition," she says. "A year and a half ago, we thought he was going to die. He dropped about 600 pounds and was skin and bones. It's still bizarre. We still don't know what happened."

They rushed him to Colorado State University, where he stayed for two weeks.

"To go through that and be able to jump 4 feet high. It's kind of amazing," she says. "In three days, he had gone from healthy to almost dead."

The jumping comes naturally to Buck. That characteristic taught Zacco patience, she says.

"He's always been a little unpredictable. He's always really calm and then all of a sudden he'll jump into the air," she says, and laughs. "He used to do it more when he was younger. Never malicious, never bad or anything like that. He just does it when he gets really excited. It's been entertaining trying to get that out of him. But it's also what makes him such a good jumper."

Lindsay and Buck are a great example of an alternative for an "ex-race" horse, says Ingwerson.

"We are very proud to share her accomplishments and look forward to featuring more of our Animal Science Equine option undergraduates," says Ingwerson.

# Plant sciences professor boost helps Sheridan College team

By Ann Tanaka | May 2015



*From left, University of Wyoming assistant professor of plant sciences Sadanand Dhekney, Sheridan College students Hannah Shafer of Rapid City, South Dakota, Paige Jernigan, of Cheyenne, Ceirra Carlson, of Greybull, and Hannah Jernigan of Cheyenne, and Sheridan College science faculty Rob Milne near UW's research and extension center at Sheridan College. (Photo courtesy Daniel Mediate)*

Revvng up the genetic horsepower of algae to gush lipids for use as biofuel has propelled four Sheridan College students onto the national stage in Washington, D.C.

Hannah Shafer, Rapid City, S.D., Ceirra Carlson, Greybull, and sisters Hannah and Paige Jernigan of Cheyenne are one of 10 community college teams from across the nation advancing to the [Innovation Boot Camp](#) in June, the final competition of the [National Science Foundation's Innovation Challenge](#).

The students use the laboratories in the University of Wyoming Sheridan Research and Extension (R&E) Center and draw upon the research expertise of [Sadanand Dhekney](#), who holds the E.A. Whitney Professorship in Agriculture at the college.

## Turbocharge Algae



The students proposed to genetically engineer algae for enhanced lipid production. They're figuring out how to replace the original genes - yank out wimpy stock genes, insert turbo-charged replacements - and turn the algae into lipid megaproducers.

Lipids are molecules that contain hydrocarbons and make up the building blocks of the structure and function of living cells. Examples include fats, oils and waxes.

"We're excited we made it all this way with this little idea that has come so far from the beginning," says Hannah Jernigan. "We've thoroughly enjoyed learning what we have. It's totally new, and we've grown leaps and bounds from where we were a couple months ago."

Sheridan College instructor Rob Milne had mentioned the National Science Foundation's Innovation Challenge to his general chemistry class last November. The challenge thrusts research into the traditional teaching roles of community colleges.

Shafer wanted to initiate a project, and, once it seemed she and the other students wanted to pursue algae lipid production, Milne saw a good connection with Dhekney at the R&E center.

Undergraduate research is encouraged at the college, but the reality is facilities, time and equipment are limited.

"The initial motivation has to come from the students," says Milne. "The nice part is, these students are exceptionally motivated."

### **Seek Help from Dhekney**

And so the students took the five-minute walk from their science center to the [R&E center](#) to visit Dhekney. The assistant professor in the Department of Plant Sciences at UW has been nationally recognized for his grapevine research but knew nothing about algae.

The state of Wyoming matched funding from Whitney Benefits to create the E.A. Whitney Professorship in Agriculture position, designed to implement at Sheridan College an enhanced degree completion program within UW's agroecology curriculum and to teach selected courses each semester.

"The students had this idea in mind, increasing lipid production in algae, but had no clue how they were going to do it," Dhekney recalls.

Dhekney threw out ideas, and showed them research by Steve Herbert, the former head of the plant sciences department in the [College of Agriculture and Natural Resources](#).

"This is like a Ph.D. project," says Dhekney. "These kids are pretty ambitious. They did not have anyone to show them the way or have a place to do it. We don't work with algae, but we have everything in our lab to work with in the research center."

Dhekney has mentored students for more than 11 years.

"When a student comes to me, I never turn them down," he says. "If it's something not in my area of expertise, I'll give some type of guidance or mentoring that can take them to the next level. With the Sheridan College students, I knew I could give them a place to work, the necessary supplies and the chemicals to work."

## **Appreciate Assistance**

That collaboration, says Jernigan, has proven invaluable.

“I’d say that was the most important part,” she notes. “We were coming here with very little knowledge. He didn’t have to accept our project or help us, but he was super excited about it, he brought us in and even took his personal time to research and find out more about it and try and help us.”

Each student member of the first-place team at the boot camp receives \$3,000, second-place student team members receive \$2,000 each and third-place student team members receive \$1,000 each.

# Hess names Mealor Sheridan Research and Extension Center director

By Ann Tanaka | May 2015

Plant sciences Assistant Professor [Brian Mealor](#) will begin May 18 as director of the [Sheridan Research and Extension Center](#), says Bret Hess, associate dean of research and director of the Wyoming Agricultural Experiment Station.

“Brian’s professional experiences will serve him well in this position,” says Hess. The AES in the College of Agriculture and Natural Resources directs four research and extension centers in the state.

“He has proven to be innovative, has strong organizational skills and possesses exceptional communication skills coupled with an ability to work with a broad range of constituencies,” notes Hess.

Mealor received his Ph.D. and master’s degree in rangeland ecology and watershed management from the University of Wyoming. He joined the plant sciences department in 2009. Mealor replaces Valtcho Jeliakov, who has accepted the director position of the Columbia Basin Agricultural Research Center with Oregon State University.

Hess says Mealor, who is also the UW Extension weed specialist, will retain a research appointment and be an active member of the plant sciences department. He will transition from his faculty role to the director position throughout the spring and summer.

“I am very anxious to have Brian join the Wyoming Agricultural Experiment Station team,” says Hess. “He brings much-needed leadership to the position.”

The Sheridan R&E Center is housed in the Watt Agriculture Center at Sheridan College with trials on the grounds and about 400 acres of the Adams Ranch south of the college. The ranch is owned by Whitney Benefits. The center also maintains 250 acres of dry land crops and irrigated vegetables and fruit trees at its former headquarters near Wyrno.



*Brian Mealor is the new director of the Sheridan Research and Extension Center.*

# Three receive Promoting Intellectual Engagement Awards

By Ann Tanaka | May 2015



*John Willford*

Associate Professors Ed Bradley and Todd Cornish and lecturer John Willford in the College of Agriculture and Natural Resources are recipients of the Promoting Intellectual Engagement Award.

The award, by LeaRN, Ellbogen CTL, Residence Life and Dining Services, and Center for Advising and Career Services, honors instructors who inspire excitement, inquiry, and autonomy in first-year courses.

Bradley is in the Department of Agricultural and Applied Economics, Cornish in the Department of Veterinary Sciences, and Willford in the Department of Molecular Biology.

Recipients of the PIE Award are nominated online by sophomore students and then selected by a committee based on thoughtfulness and volume of student nominations.

A reception honors recipients Wednesday, May 6.



*Dr. Todd Cornish, associate professor, Wyoming State Veterinary Lab*



# Revised Cent\$ible Nutrition Program cookbook includes food safety, nutrition tips

By Ann Tanaka | May 2015

Sections on nutrition, cooking, food safety, saving money, and feeding a family in addition to recipes are in the revised [Cent\\$ible Nutrition Program](#) cookbook unveiled in February.

The [cookbook](#) is structured around the five food groups and features over 200 recipes, many of which are new, says Mary Kay Wardlaw, UW Extension associate director and former CNP director.

“It provides in-depth MyPlate recommendations and information for each food group as well as details on selecting, preparing, and cooking methods,” she says.

The goal is to help CNP participants become more informed about food choices and feel confident in cooking and trying new foods.

The new edition also emphasizes CNP mixes.

CNP mixes are similar to the packaged baking, sauce, and spice mixes sold in grocery stores but are far more cost-effective, says Mindy Meuli, CNP director.

“These mixes are simple and are used in recipes throughout the cookbook,” she notes. “The cookbook provides several create-your-own recipes for stir-fries, skillet, casseroles and more to help people utilize what they have on hand or what is on sale.”

The revised cookbook is centered on making cooking at home easier and faster.

CNP representatives say the revised CNP cookbook has been well-received across the state. CNP educators say they are thrilled to be introducing it to their classes, where the cookbook serves as the textbook for the adult program. Educators report participants love the cookbook and are discovering new favorite recipes to share with their families.

“CNP is excited to provide a new cookbook for program participants and to continue to help families eat better for less,” says Meuli.



*Mindy Meuli*

# Undergrad receives award to present poster at national symposium

By Ann Tanaka | May 2015



*Mitch Szymczak*

Mitchell Szymczak, a senior microbiology major, received the Dr. Edwin Lennette Award (\$1,200) from the American Society of Microbiology and the Clinical Virology Symposium (CVS) Program Committee to help pay travel expenses to attend the CVS conference April 26-29 in Daytona Beach, Florida.

He presented his poster detailing his research into sequencing the genome of the Rio Grande virus and the possibility of misdiagnosing the Rift Valley fever virus.

Szymczak is also a recipient of a University of Wyoming undergraduate INBRE research fellowship.

# Quality work, service to public, co-workers brings honors to three in college

By Ann Tanaka | May 2015

Three members of the College of Agriculture and Natural Resources received honors during the annual Staff Recognition Day Program April 28 on the Laramie campus.

Tracy Navarro, senior office assistant in the Laramie County office of University of Wyoming Extension, and Daniel Smith, farm manager at the Sheridan Research and Extension Center, received Off-campus Awards, and Trish Hysong, senior office assistant in the Department of Family and Consumer Sciences and a member of Staff Senate, received a Staff Incentive Award.

Dozens of employees were honored for their [years of service](#) and contributions to UW. Sponsored by the UW [Staff Senate](#) with support from the UW Office of the President, Staff Recognition Day encourages and acknowledges the work of all UW staff members.

## Tracy Navarro

Navarro was noted for her exceptional customer service skills and who volunteers for additional responsibilities when the office is short-staffed.

“When our other administrative assistant position has been open during our busiest times of the year, Tracy stepped up and helped out without being asked,” said UW Extension educator Tansey Sussex, who nominated Navarro. “Her work is very detail-oriented, and she always completes tasks prior to the deadline.”

Her graphic design skills have elevated the flyers and brochures from the office. She’s helped train two new staff members and has never complained about the additional work, says Sussex.

“I know that any time I ask her to complete a project, it will be done with great care, professionalism, and before the deadline,” she says.

## Daniel Smith

Smith has always exceeded expectations and carries out duties with dedication and efficiency, says nominator plant sciences Assistant Professor Sadanand Dhekney.

Smith frequently works late hours during the growing season and has a great attitude toward customers and co-workers.

“His good interaction with seasonal employees has resulted in people wishing to come back and work for the facility for several seasons,” says Dhekney, who is a faculty member in the Department of Plant Sciences and stationed at the Sheridan R&E Center.

Smith has a very positive attitude toward companies who contract research, and “Also has a great rapport with farmers and ranchers in the community and will go out of his way to provide required information,” he



says.

His assistance to and guidance of graduate students was also noted. "A number of graduate students have graduated on time due to his timely assistance," says Dhekney. "This is very valuable considering the fact Wyoming has such a short growing season and a graduate student losing a season can mean losing a whole year of work."

### **Trish Hysong**

Hysong was credited with her problem-solving abilities as the "go-to" person who assists anyone she can. Her nominators were Melissa Bardsley, UW Extension nutrition and food safety specialist, Mona Gupton, senior office associate, and Professor Virginia Vincenti, all in the Department of Family and Consumer Sciences.

"Her management of the classroom technology in our department is especially worthy of comment," notes one nominator. "She continually takes the initiative when problems arise and searches for answers and strives for win-win solutions."

Her nature is calm, gentle, and persuasive, which aids in her success of collecting Dining with Diabetes program data from educators, which she then enters into a database. She is described as the "ultimate glue" between the Wyoming Food Safety Coalition support person and the University of Wyoming.

Noted another nominator, "Educators contact me many times during the year to compliment her on her assistance and thankful she is there to assist them with their questions and program needs."

No slides are available in this gallery

# College celebrates graduation May 16 at Indoor Practice Facility

By Ann Tanaka | May 2015



*Kara Brighton*

There are 127 students participating in spring commencement 1:30 p.m. Saturday, May 16, at the Indoor Practice Facility (22nd and Willett).

Featured speaker is Kara Brighton, who received her bachelor's degree in small business management from the University of Wyoming and her juris doctorate from the University of Nebraska-Lincoln College of Law. She is a member of the College of Agriculture and Natural Resources Advisory Board.

Brighton was born in Wheatland where her parents worked on her grandparent's agricultural operations. She moved at a young age to Kimball, Nebraska, when her family purchased the John Deere dealership, which operated as Brighton Equipment Co. for more than 30 years.

She started her legal career in the Wyoming Attorney General's Office, Water Division, working on the Nebraska v. Wyoming litigation over the North Platte River.

She was a founding partner of Hageman & Brighton PC in August 2000, where she focused her practice exclusively on water issues.

Governor Matt Mead appointed her to the Wyoming Public Service Commission in 2013.

# Changing faces and changing places happening at the college

By Ann Tanaka | May 2015

## Welcome:

**Dawson, James:** Johnson County UW Extension, 4-H/youth development educator (5/18)

**Lavelle, Cate:** Office of Communications and Technology, resource center manager (2/25)

# Department of Molecular Biology Seminars

By Ann Tanaka | May 2015

**Fridays, 2:10-3 p.m., Animal Science/Molecular Biology building, room 103 -**

**May 1:** "Modeling Human Disease and Regenerative Medicine Using Zebrafish," Shawn Burgess, National Human Genome Research Institute

**May 8:** TBD, Galit Alter, Massachusetts General Hospital, MIT and Harvard

# Proposals Submitted

By Ann Tanaka | May 2015

**Adamovicz, Jeffrey:** \$140,550 to U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) for “Project Proposal/Work Plan and Budget for Managing Animal Health Technical Services, Cattle Health, Equine, Cervids and Small Ruminant Health for 2015.”

**Beck, Jeffrey:** \$10,000 to Linn Energy LLC for “Factors Influencing Pronghorn Survival and Reproduction in South-Central Wyoming.”

**Bledar, Bisha, Jeffrey Chandler,** and Lawrence Goodridge: \$500,000 to USDA National Institute of Food and Agriculture (NIFA) for “A Universal Approach to Integrating Sample Separation and Detection of Foodborne Pathogens.”

**Dhekney, Sadanand,** and Bhaskar Bondada: \$29,998 to USDA NIFA for “Understanding Ecophysiological and Morpho-Anatomical Adjustments of Grapevine (*Vitis vinifera* L.) to Drought Conditions Using Molecular Techniques.”

**Hess, Bret:** \$217,444 to USDA NIFA for “Animal Health and Disease Research,” and \$644,999 for “Hatch Multistate Formula Funds.”

**Islam, Anwar:** \$20,000 to Wyoming Department of Agriculture (WDA) for “Grass-Legume Mixtures Under Irrigation to Mitigate Nitrogen Fertilizer Use: Economic and Environmental Sustainability.”

**Kniss, Andrew,** Cynthia Weinig, and Brent Ewers: \$500,000 to USDA NIFA for “Systems Analysis of Shade-Avoidance Responses as a Mechanism of Crop Yield Loss Due to Weeds.”

**Latchininsky, Alexandre, and Larry Debrey:** \$111,413 to USDA APHIS for “Wyoming CAPS Infrastructure, Wyoming CAPS Bundled Small Grain Commodity Survey, Wyoming CAPS Nematode Survey.”

**Peck, Dannele, Chris Bastian, Brant Schumaker,** Amy Hageman, and Columb Rigney: \$60,000 to USDA APHIS for “Animal Disease Economics Research: Small Ruminant Feedlots, Wildlife-Livestock Interactions, and Foreign Animal Disease Outbreaks.”

**Sondgeroth, Kerry:** \$20,000 to WDA for “Comparison of *Brucella ovis* Seroprevalence in Wyoming Domestic Sheep Flocks Using Two Different Diagnostic ELISA Tests.”

**Stahl, Peter:** \$175,770 to Wyoming Community Foundation for “Vegetation Monitoring on East Antelope Road Restoration Sites.”

# Monies Awarded

By Ann Tanaka | May 2015

**Cammack, Kristi:** \$21,108 from U.S. Geological Survey for “Rumen Microbial Changes Associated with High Sulfur - Year 2/3.”

**Ehmke, Cole, Mariah Ehmke, Mae Lynn Smith, Kelly Chichester, Tamra Jensen, and Caleb Carter:** \$15,000 from Iowa State University for “Annie’s Project: Risk Management Education for Women in Agriculture in Wyoming.”

**Gomelsky, Mark:** \$174,385 from National Institutes of Health (NIH) for “Bacteriophytochrome-Based Optogenetic Tools for Mammalian Gene Regulation.”

**Gomelsky, Mark,** and X. Frank Yang: \$70,750 from Indiana University for “Cyclic di-GMP-Dependent Regulation of Metabolism and Virulence in *Borrelia burgdorferi*.”

**Hilgert, Christopher:** \$12,000 from Wyoming Department of Agriculture (WDA) for “Junior Master Gardener Program.”

**Islam, Anowar:** \$20,000 from WDA for “Evaluation of Birdsfoot Trefoil - A Non-Bloating Forage Legume - in Wyoming,” and \$24,500 for “Regional Assessment of Fenugreek for Producer’s Propagation.”

**Jabbour, Randa:** \$29,919 from University of California, Davis for “Predicting Variation of Biological Insect Control in Alfalfa Hay and Seed Crops.”

**Levy, Daniel, Jesse Gatlin,** and John Oakey: \$266,284 from NIH for “Integration of Xenopus Extract and Microfluidics to Study Organelle Size Scaling.”

**Murphy, Melanie, and Beth Fitzpatrick:** \$42,183 from Wyoming Game and Fish Department for “Identifying Habitat Restoration and Land-use Priorities for Sage-Grouse.”

**Nathanielsz, Peter, Cun Li,** Thomas Jansson, Laura Cox, and Susan Weintraub: \$1,389,986 from NIH for “Mechanisms of Placental, Fetal Brain and Renal Outcomes of IUGR.”

**Paige, Virginia:** \$9,909 from U.S. Geological Survey for “Quantifying Return Flow in the Upper Wind River Basin - Year 2/3.”

**Sbatella, Gustavo:** \$11,280 from WDA for “Technical and Economic Evaluation for On-farm Drying of Confection Sunflower and Grain Corn in the Big Horn Basin.”

**Thompson, Jennifer:** \$5,000 from Pennsylvania State University for “AMS Grant Writing Workshops and Technical Assistance.”