

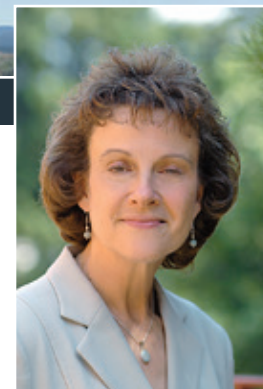
CONFLUENCE

THE COLLEGE OF LETTERS AND SCIENCE • MONTANA STATE UNIVERSITY • 2012-2013 • VOLUME 9



LETTERS AND SCIENCE

LEADING RESEARCH



Paula Lutz

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Dear friends and colleagues,

As we move L&S faculty members from their temporary spaces into the newly renovated Cooley Lab building—a truly state-of-the-art research facility—I've been thinking a lot about one of the greatest strengths of our college—cutting edge research.

The Carnegie Foundation for the Advancement of Teaching has designated Montana State University as one of 108 universities with very high research activity (108 out of 4,600!). This means that MSU is in the top two percent of institutions nationwide as measured by metrics of scholarship and discovery. We are very proud of the fact that much of this research is the work of College of Letters and Science faculty. That pride played an important role in our decision to highlight research in this year's *Confluence*.

Research expenditures from external grants and contracts (through competitions outside the boundaries of MSU) are a good barometer of research activity, and our college had a very strong showing during FY12. Two of our departments, Chemistry and Biochemistry and Physics, were among the campus leaders in this important metric. Of MSU's record \$112.3 in grant expenditures in FY12, \$10.6 million came from chemistry and \$7 million from physics, placing them in first and third place respectively on MSU-Bozeman's campus.

We also like to boast that 14 of our 15 departments are currently receiving grant funding. We are especially proud that our social science and humanities faculty are competing successfully for external funds—disciplines where opportunities are very limited. Our departments' success in obtaining grants during times of shrinking pools of federal funds and increasing competition for scarce funding resources is a strong testament to the strength of our research programs. I hope you enjoy learning more about the culture of discovery in the College of Letters and Science through this issue of *Confluence*.

On a bittersweet note, this will be my last occasion to communicate with you in *Confluence*. As many of you know, I am returning to the faculty as of January 1. I am excited about the challenges and opportunities in my future. I'm also very excited to introduce to you our new dean, Dr. Nicol Rae, senior associate dean in the College of Arts and Sciences at Florida International University, who will take the helm in the new year.

I know you will join me in welcoming Dr. Rae to MSU and Bozeman, and of course, Montana, the Last Best Place. It has been my pleasure to lead the college with such outstanding faculty, high quality students and excellent staff for the last five plus years. It has been a joy to work with them and to get to know YOU, our engaged and generous alumni and friends. Thank you for ALL of your support.

Best regards,

Paula M. Lutz, Dean



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COVER PHOTOGRAPHY

Earth Sciences graduate student Travis Corthouts and world-renowned mountaineer Conrad Anker gather GPS data to measure the movement of a boulder on the Khumbu Glacier during the Everest Education Expedition. *Photo by Travis Corthouts.*

BACK COVER PHOTOGRAPHY

Clockwise from left: 1. Photo courtesy of Michael Neeley. 2. Photo courtesy of Ada Giusti. 3. Photo by Kelly Gorham. 4. Photo by Kelly Gorham. 5. Photo courtesy of Frankie Jackson.





DEVELOPING THE NEXT GEN

This issue of *Confluence* highlights the great variety of research projects that faculty in the College of Letters and Science are involved in, ranging from the geology of Mount Everest to anthropology in South Africa, from biomedical research conducted in the newly renovated Cooley Lab to ecological statistics and the economics of risky behavior.

Research in Letters and Science cannot be discussed without also recognizing the college's commitment to training the next generation of scholars and the important contributions students are making in every department. Our students have the opportunity to work side-by-side with faculty members, many of whom are well known nationally and internationally for their scholarly work.

Archaeology students Betsy Garten and Meghan Forney helped research, write and design an exhibit featuring ancient artifacts excavated by the famous archaeologists Mary and Louis Leakey. Under the supervision of Nancy Mahoney, a non-tenure track faculty member in the Department of Sociology and Anthropology, the pair of undergraduates took on an independent study to prepare the exhibit. "It's been really exciting to be involved with this exhibition, especially as an undergrad," Forney said. "We've been able to be involved in the whole process, from researching the finds and the history of the Leakey family to following up on the published results of Dr. Friedman's dating work to writing and designing the exhibit. That's pretty good considering in a lot of archaeology programs, undergrads don't get to handle important Old World prehistoric artifacts."

Zach Dupree, a McNair Scholar and enrolled member of the Lakota Sioux-Assiniboine Tribe of Fort Peck, is working with Lisa Davis, an associate professor in the Department

Top to bottom:

Tyler Bridges, who participated in the 2011 paleontology research trip to China, holds a fossil sample that he will analyze with a high-powered microscope in the Imaging and Chemical Analysis Laboratory at MSU.

Zach Dupree is part of an MSU team researching similarities between mathematic models of traffic traveling on a single-lane road and a stream of polymerases elongating on a DNA strand, with eventual biomedical applications.

Archaeology students Betsy Garten and Meghan Forney with ancient artifacts excavated by the famous archaeologists Mary and Louis Leakey.

Ashley Poust, Jade Simon and Chinese colleague Wenjie (from left) examine dinosaur eggs after a day in the field. *Photo courtesy of Frankie Jackson.*



ERATION

of Mathematical Sciences, on a project studying the use of mathematical models related to the cellular process of DNA transcription. Davis has mentored Dupree, who is majoring in mathematical sciences and physics, as he studies a class of equations known as hyperbolic partial differential equations, trying to find similarities between traffic traveling on a single-lane highway and a stream of polymerases elongating on a DNA strand. Davis said that, “Zach’s involvement in the McNair Scholars Program has allowed him to pursue undergraduate research opportunities that will help to prepare him for success in graduate school as well as in his long-term career goals.”

Finally, several undergraduate students at MSU have participated in a summer research project in China. The project, which is funded by the National Science Foundation’s International Research Experience for Students program, includes research at the Natural History Museum in Hangzhou, southwest of Shanghai. Students focus much of their attention on a huge collection of fossil eggs, spending part of their time in the laboratory and part of the time in the field. MSU paleontologists, David Varricchio and Frankie Jackson, serve as the faculty mentors for these students, overseeing their work in China as well as working with them to prepare presentations and papers on their findings.

“A solid understanding of the processes involved in research and creative endeavors will give our students an extra advantage as they enter the job market or apply to graduate school,” said Paula Lutz, dean of the College of Letters and Science. “We also want every student to experience the thrill of discovery and pride in creative projects because this is how we develop the next generation of scholars, artists and engaged citizens.” ▀



Geology professor Dave Lageson explains the geology of Everest to Danuru Sherpa.
Photo courtesy of Travis Corthouts.



MSU graduate student Travis Corthouts uses a satellite internet connection to send reports from Everest Base Camp back to Montana. Photo courtesy of Travis Corthouts.

“The geology of Mount Everest matters because Everest is a global icon that in many ways represents all mountains on our planet. We are driven by basic human curiosity to learn all we can...”

—DAVE LAGESON, MSU Geology Professor

MOUNTAINS & MINDS

By Travis Corthouts

Travis Corthouts is studying structural geology as a graduate student at Montana State University. His pursuit of structural geology stems from his lifelong interest in mountains and how they are formed.





Danuru Sherpa and Jangbu Sherpa with the suite of rock samples from the southeast ridge, a few days after summiting. Photo courtesy of Travis Corthouts.



The entire Everest Education Expedition team, including Sherpa staff, climbers and assistants, at base camp. Photo courtesy of Travis Corthouts.

Last spring, I had the privilege of being involved in one of the largest—and most closely followed—Mount Everest expeditions in recent years. Supported by National Geographic, The North Face, Montana State University and the National Science Foundation, the expedition was dubbed the Everest Education Expedition (EEE) for its emphasis on science and education. Lead by world-class mountaineer and Bozeman native Conrad Anker, the EEE focused heavily on human physiology, glaciology, climate change and geology. David Lageson, professor of structural geology in the MSU Department of Earth Sciences, pioneered the geological research component of the expedition. I served as the MSU education outreach correspondent and satellite technician for the expedition while also assisting Dr. Lageson with his research.

The geology of Mount Everest is fascinating. One of the most intriguing aspects of Everest is that the summit is composed of seafloor sediments with marine fossils dating back 470 million years. The scope of our project was to collect a suite of rock samples extending across the southeast ridge (from the South Col to the summit), a task that has never before been completed. It's not for a lack of interest or effort that these rocks remain largely un-sampled, but the extreme difficulty involved in reaching and collecting them.

Usually collecting a rock and recording its location isn't difficult. However, when you're bundled up like an astronaut, and oxygen deprivation is crippling your ability to function, sampling becomes tough, if not impossible. Your focus quickly changes to self-preservation. This left us wondering what we could do to ensure the success of our research on Mount Everest.

From April 1st to the beginning of June, Everest turns into a spectacle due to the hordes of summit-seekers who mob the mountain on their quest for the roof of the world. Facilitating these expeditions is the Sherpa, a group of people indigenous to the Everest region who are physically evolved to tolerate high altitude. During my time on Everest, it became decidedly clear to me that the climbing industry on Everest couldn't endure without the strength and fortitude of the Sherpa people.

Likewise, Sherpas became the linchpin in our pursuit for the geologic treasure above—why not employ people who have a proven aptitude for dealing with the extreme conditions high on Everest, and by doing so, allow them to be involved with groundbreaking research on their mountain. Through this logic, the task of sampling rock high on Everest was placed in the hands of Danuru Sherpa of Phortse and Jangbu Sherpa of Makalu.

In the weeks leading up to our team's push for the summit, I had a few training sessions with Danuru and Jangbu. The largest hurdle to overcome was deciding how the location of each sample would be recorded. Normally a sample's location would be recorded on a topographic map or with a GPS unit, but given the conditions, both of those methods would be far too cumbersome. We decided the most reasonable way to solve this issue would be to place the sample in a Ziploc bag, and then record on the bag the elevation where the sample was taken. Because the southeast ridge route is so well defined, the elevation could then be used to pinpoint on a map exactly where the sample was taken along the ridge.

On May 25th, the day our team was pushing for the summit, the weather was very windy, too windy to do anything other than summit and quickly descend. I was sure the sampling wouldn't get done, and that our research was in jeopardy. But I was wrong. Despite fierce wind that took the toes and fingers of many climbers that day, Danuru Sherpa managed to gather 16 samples from eight different locations. A truly astounding feat!

Today the treasures from the top of the world are safely housed at MSU, and Dr. Lageson and I have begun the process of analyzing them. The goal of our research is to further refine the composition and geologic evolution of the world's tallest peak. For my master's thesis, I'll be looking at the lithology and structural nature of the North Col Formation, a suite of rock that comprises the bulk mass of the summit pyramid. Dr. Lageson is focused on the petrology and geochemistry of the summit limestone, known as the Qomolangma Formation. Together, we hope to use the geology of Mount Everest as a window into the tectonic processes that have created the greatest mountain belt on Earth.

Want to know more? www.montana.edu/everest/index.htm.

To read about the educational component of the Everest Education Expedition, please see pages 18 and 19.

“The new facilities make it easier for faculty to conduct their work, helped attract new researchers and better prepared students for their careers.”

—TOM MCCOY, Vice President for Research, Creativity and Technology Transfer

Cooley Lab

RENOVATION IS A BOON FOR L&S BIOMEDICAL RESEARCHERS

In September, a \$17 million renovation of MSU’s Cooley Lab was completed. This project, which transformed the 52-year-old building into a state-of-the-art research facility, will help advance one of the university’s major strengths: biomedical research. Of the \$100 million MSU wins annually in competitive grants for research, roughly \$40 million of that goes to studying everything from influenza, to heart disease, to using parts of viruses for pinpoint delivery of drugs, to preventing infectious diseases, to developing safeguards against bioterrorist attacks.

The facility, which was completely gutted and renovated over the past two years, will house research teams from two departments in the College of Letters and Science, microbiology and cell biology and neuroscience. Most of the work was paid for with a \$14.9 million grant from the National Institutes of Health (NIH).

“This state-of-the-art facility is a great asset for MSU’s biomedical research community and the university as a whole,” said Mark Jutila, head of the Department of Microbiology. “But the real excitement comes as we move forward in these labs with our research addressing infectious diseases and other public health questions.”

The renovated laboratory space will likely spur a burst of new research for students and faculty, said Tom McCoy, vice president of research. “We have ample evidence that when we provide modern, quality laboratory space, great success follows for our students and faculty,” McCoy said.

In 2007, MSU’s Department of Chemistry and Biochemistry moved out of its antiquated home in Gaines Hall and into the new Chemistry and Biochemistry Building. Its success in grant awards jumped 71 percent, from \$4.5 million in FY06 to \$7.7 million in FY07. In FY12, chemistry and biochemistry brought in nearly \$10.6 million in research grants.

Excerpted from Sepp Jannotta, MSU News Service




Mike Franklin, associate professor in the Department of Microbiology, has a multi-year grant from the NIH to study the molecular genetics of the medically and environmentally significant microbe *Pseudomonas aeruginosa*, a bacterium that causes lung infections in patients with cystic fibrosis. Bacterial infections associated with surfaces, including pulmonary tissue or artificial implant devices, are often resistant to antibiotic treatment. Resistance may occur because a dormant cell subpopulation repopulates the infection following treatment. Franklin's research examines the role of a stress response protein that allows the bacteria to survive prolonged dormancy and resuscitate into pulmonary biofilms.

Frances Lefcort, professor and department head in the Department of Cell Biology and Neuroscience, studies how pain-sensing neurons are born and mature. These neurons are essential for life as protection against noxious stimuli that could harm human health. She is applying knowledge gleaned from investigating normal neuronal development to understanding the causes of the devastating peripheral neuropathy, Familial Dysautonomia. People with the disease typically die within the first few years of life because of a failure in their autonomic nervous system. With a grant from the NIH, her lab has generated a mouse model of this human disease. Using the model, her goal is to develop treatments for the human disorder and gain insights into the degenerative mechanisms causing this and other neurological disorders.

Sandra Halonen, associate professor in the Department of Microbiology, studies the protozoan parasite *Toxoplasma gondii* (*T. gondii*), a ubiquitous parasite infecting approximately 50 percent of the population worldwide. In healthy hosts, the parasite establishes a chronic, lifelong infection in the brain that is typically asymptomatic. However, recent evidence indicates the chronic infection in some healthy individuals is associated with development of neurological disorders such as schizophrenia, cryptogenic epilepsy and Alzheimer's disease. *T. gondii* can also cause severe neurological complications for fetuses and newborns, and is a major opportunistic infection in the central nervous system in immunosuppressed patients. Halonen's research studies the interactions of *T. gondii* with their host cells (neurons, astrocytes and microglia) in the central nervous system and the immune response in the brain to these parasites.

Seth Walk, assistant professor in the Department of Microbiology, leads an NIH-funded laboratory that studies the ecology of the gastrointestinal tract (GIT). His research utilizes global analysis tools, including metagenomics and metabolomics, to identify the qualities of GIT microorganisms that influence complex diseases, such as inflammatory bowel disease and *Clostridium difficile* infection. Another focus of his laboratory is the epidemiology of pathogens that circulate in hospitals and other healthcare settings, such as *Klebsiella pneumoniae* and *Escherichia coli*. The research approach in the Walk lab is "translational," where the goal is to make discoveries that can be translated into novel treatment and prevention strategies for patients.



An architectural rendering of the renovated Cooley Laboratory on the MSU campus.

“These state-of-the-art research labs will offer our students and faculty the kind of cutting-edge opportunities that we believe will change the world. You only have to look at one of MSU’s most famous graduates, Maurice Hilleman, who saved millions of lives with his creative and original work on vaccines, to see what is possible.”

—PAULA LUTZ, Dean, College of Letters and Science



A cranium and mandible of a rock hyrax. This modern specimen is part of an extensive set of rock hyrax skulls at the University of Cape Town, South Africa, that was collected by biology researchers several decades ago. Specimens from archaeological sites can be compared to this collection to estimate the age and season of death of the archaeological specimens.

Anthropologist's research leads to new insights into the

EVOLUTION

OF THE HUMAN BRAIN AND HUMAN BEHAVIOR

*By Amy Stix
Photos courtesy of Jack Fisher*

When searching for answers to some of the biggest questions in the field of anthropology today, it helps to have a big study site. That's just one aspect that Jack Fisher, associate professor of anthropology, appreciated about his recent nine-month sabbatical in South Africa, where he collaborated with John Parkington of the University of Cape Town to investigate the evolution of nomadic hunter-gatherers, and their encampments, over millions of years.

The colleagues' research site, Dunefield Midden (DFM), which is located at Elands Bay north of Cape Town on the Atlantic Coast, is rare among research sites for its sheer size. Excavated over an eleven-year period, DFM is a huge, contiguous, rectangular area, which, according to Fisher, provides "snapshots" of Later Stone Age hunter-gatherer life, from AD 1300 to 1400.

Fisher says, "It is great to have a large contiguous area (like DFM) to get a sense of repetition."

From those repetitive snapshots, scientists can decipher what Fisher calls "patterns of living," including where hunter-gatherers slept, cooked, built fires, roasted meat and deposited trash. He and Parkington will compare their new findings from DFM with past discoveries from much older hunter-gatherer camps, which they hope will lead to new insights into the question of how human cognition and behavior have changed since the Early Stone Age began, some 2.8 million years ago.

Waves wash ashore at Elands Bay on the Atlantic coast north of Cape Town. The Dunefield Midden archaeological site is located in the center of the photo, above the small town of Elands Bay.



Fisher has been working in South Africa since 1998, and describes his research as “a very long process, but ultimately we do get new insights.”

Those glimmers into early human behavior and interactions with their environment are being gleaned through meticulous study of every single object unearthed at DFM. Fisher says more than two tons of shellfish remains have been found in the coastal camp, as well as 18,000 stone tools and in excess of 10,000 well-preserved animal bones, ranging from the rock hyrax, which resembles a marmot, to fur seal, several species of African antelope and buffalo. Many carnivore bones have also been discovered, including remnants of the striped polecat, mongoose, honey badger and genet. Fisher uses mapping software to show where and how hunter-gatherers at DFM arranged and used their campsite.

Through the mapping process, Fisher has discovered a fascinating pattern to the animal bones at DFM. Bones from herbivores were scattered everywhere throughout the campsite at various fireplaces, roasting pits and other cooking sites, leading Fisher and Parkington to surmise that both small and large herbivores were a staple in the hunter-gatherer diet. Carnivore bones, however, were buried in just a few, specific locations. The carnivores’ bones also contained exacting cuts to their skulls and legs, which were made with stone tools. From this discovery, Fisher and Parkington hypothesize that Later Stone Age people used carnivores for ritual and ceremonial purposes, rather than for food. Also found at DFM were ostrich egg shell beads, which humans used for necklaces, as well as tortoise shell remains and ceramic shards.

In addition to discovering how early humans arranged and used their encampments, Fisher is researching the season of year and length of time people remained in their camps. His answers are coming largely from the teeth of the herbivorous rock hyrax, which develop fairly rapidly. By studying the ages of rock hyrax teeth collected from both DFM and inland hunter-gatherer campsites, and comparing those findings with a modern-day collection housed at the University of Cape Town, Fisher has attained an accurate accounting for when hunter-gatherers at DFM killed the animals and his analysis of inland sites is underway. The information gleaned supports his and Parkington’s hypothesis that early humans used their camps intermittently, and moved seasonally between the coast and inland sites in their search for food.

As for the next question Fisher would like to investigate at DFM, he says, “We’d like to know more about the social divisions of the people.” He and Parkington will look for clues as to whether hunter-gatherers arranged their camps according to gender, for example.

Ultimately, Fisher hopes they can also shed light on the pace of human cognitive development, and how the brain’s development enabled Early, Middle and Later Stone Age people to make the most effective use of their surroundings.

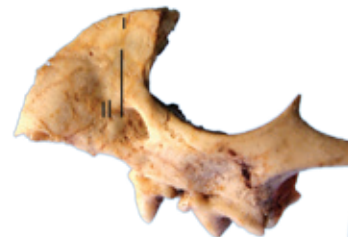
The question of abrupt versus gradual human cognitive development has long been debated among anthropologists, says Fisher. Through his and Parkington’s studies of objects found at DFM and the arrangements of those objects in the camp, “We feel we can contribute to answering the question of abrupt versus gradual evolution of cognition,” he says.

“DFM can serve as a very good example of patterning in the Later Stone Age, and with that, fully modern human cognition,” that can be compared to earlier times.

In a sense, you can view DFM as a big jigsaw puzzle. And with each puzzle piece Fisher and Parkington put together at Dunefield Midden, their work, he says, is “giving a new body of evidence” to the field of anthropology, and important clues into the behavioral evolution and lives of human beings over millions of years.

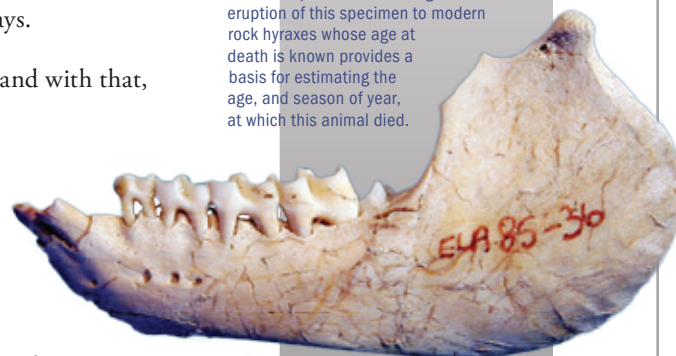


Jack Fisher at the University of Cape Town, South Africa, examining animal bones from the Dunefield Midden archaeological site.



Part of the cranium of a mongoose found at the Dunefield Midden archaeological site. The black lines indicate the location of cut marks made by stone tools when the skin from this animal was removed during the Later Stone Age.

The lower jaw of a rock hyrax found at the Dunefield Midden archaeological site. It and other rock hyraxes are food remains left by Later Stone Age people. This juvenile rock hyrax contains some teeth still in the process of erupting at the time this animal died. Comparison of the stage of tooth eruption of this specimen to modern rock hyraxes whose age at death is known provides a basis for estimating the age, and season of year, at which this animal died.



STATISTICIAN HELPS RESEARCHERS FROM

MONTANA TO ANTARCTICA

EXAMINE DIVERSE ECOLOGICAL QUESTIONS

By Amy Stix

From her office in the Department of Mathematical Sciences, Megan Higgs, assistant professor of statistics, collaborates with people across campus, and the country.

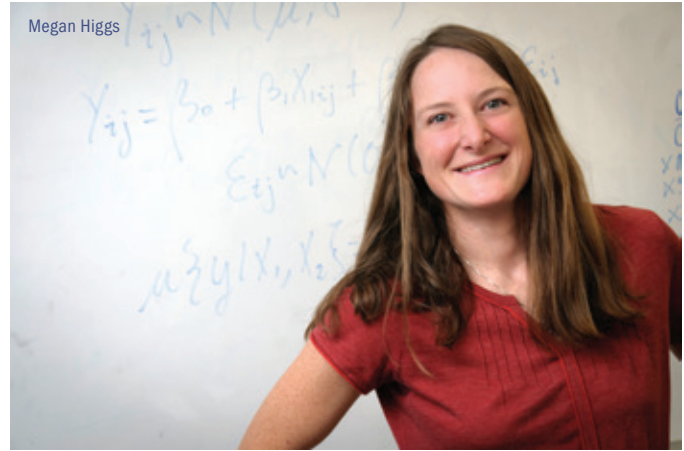
“I really try to keep my research tied to real problems. That’s the point of statistics,” says Higgs. She notes that “number crunching,” a term often associated with her field, is, in reality, a much smaller facet of a statistician’s daily work.

Rather, says Higgs, she prefers to focus on helping researchers refine their research questions and effectively design studies before data are collected. After data collection, she helps researchers appropriately analyze data and interpret results.

To that end, Higgs works with the Interagency Grizzly Bear Study Team to address questions about grizzly bears in the Greater Yellowstone Ecosystem, and has helped researchers studying blister rust in whitebark pine assess whether accurate predictions of infection can be made related to climatic and topographic variables. She also collaborates with graduate students in ecology on numerous research projects, ranging from the relationship between cow elk predation and habitat characteristics in Yellowstone, to individual variability in reproductive success of Weddell seals in Antarctica. Higgs has even helped the head biologist of Grand Teton National Park develop a model for predicting pregnancy status of bison through analysis of the fecal progesterone content in their scat. The results of this study will be published in the December 2012 *Wildlife Society Bulletin*.

Outside the region, Higgs has assisted the National Oceanic and Atmospheric Administration’s National Marine Mammal Laboratory to develop methods for analyzing dive depth data from harbor seals in Alaska. That work was published in the September 2012 issue of *Biometrics*. More recently, Higgs began collaborating with the University of Idaho’s Fish Ecology Research Lab to address questions related to the impact of Columbia River dams on the anadromous Pacific Lamprey fish.

A harbor seal with a satellite transmitter on its back in Cook Inlet, AK. The transmitter is used to collect dive depth data. Photo courtesy of Dave Withrow, Polar Ecosystems Program, National Marine Mammal Laboratory.



According to Higgs, her broad-ranging work is grounded in “developing and applying rigorous methods to quantify the uncertainty in estimates (from scientific data).”

She stresses that the use of statistics is most effective to researchers before they set off in the field, because the decision to use statistical inference shapes how researchers should approach a problem.

“The whole process starts with posing your question.”

Higgs is thrilled to help scientists formulate their questions, because, “I get to work on so many different projects at one time. It’s a great way to collaborate with other researchers.”



Social Issues & Policy Making

BY THE NUMBERS

By Michele Corriel

D. **MARK ANDERSON**, assistant professor in the Department of Agricultural Economics and Economics, takes students beyond numbers, graphs and pie charts with his myth-busting research, getting to the heart of social issues like medical marijuana laws, risky sexual behavior and how state-set high school dropout ages affect juvenile crime.

By focusing his research on current trends, and keeping up with data that could influence policy-making, Anderson is breaking new ground, if not traditional suppositions.

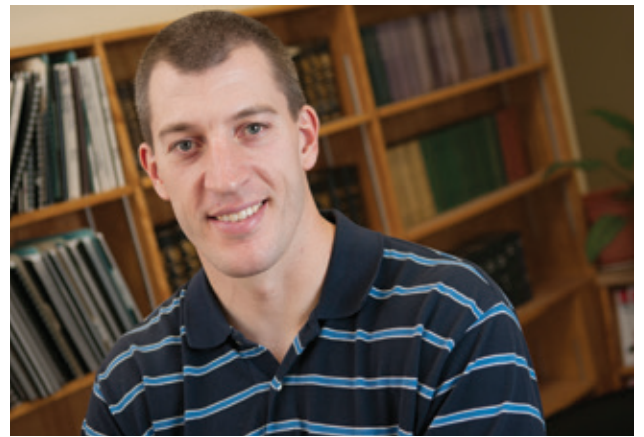
For example, common belief held that the visually disturbing “Montana Meth Project” billboards and television commercials, which showed teens succumbing to self-mutilation and other abusive behaviors, would convince teens not to try methamphetamines. However, Anderson’s research found that the ad campaign had very little or no effect on behaviors. In fact, meth use was already going down nationwide as part of larger societal trends.

Anderson’s latest research led him to look at the societal impacts of medical marijuana laws.

“I wanted to see if we could look at the economic and social effects of the laws being passed,” Anderson says. “The first thing we wanted to look at was spillover into the recreational markets.”

By looking at the problem through the lens of economics, Anderson found that the price of recreational marijuana decreased in states where laws were passed, indicating an increase in supply.

Once he had this evidence, he looked at whether marijuana might be a substitute for alcohol. Not knowing what he would find, he looked at alcohol-related traffic fatalities and found they were falling in states with medical marijuana laws. The study also found that beer sales had dropped in those states, bolstering the assumption that marijuana was replacing alcohol.



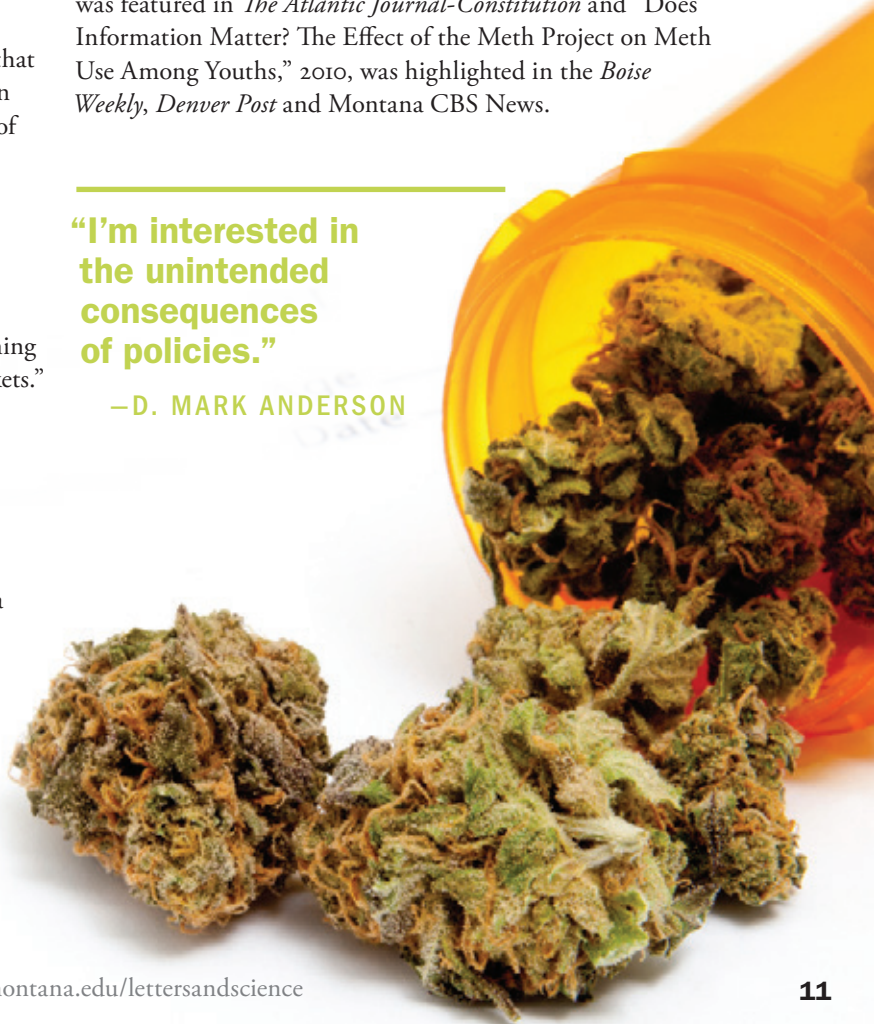
D. Mark Anderson

“I’m interested in the unintended consequences of policies,” Anderson says. “The next research project will look at workplace injuries in states where medical marijuana laws have passed.”

Popular media outlets frequently take notice of Anderson’s papers. His 2011 paper “Medical Marijuana Laws, Traffic Fatalities and Alcohol Consumption,” which was co-authored by Dan Rees at the University of Colorado, Denver, was covered by *Popular Science*, *The Wall Street Journal* and ABC News. “Medical Marijuana Laws and Teen Marijuana Use,” which is currently under review by an academic journal, received media attention from CBS News, MSNBC News, Yahoo! News and *The Wall Street Journal*. A 2012 paper, “Does Shortening the School Week Impact Student Performance?” was featured in *The Atlantic Journal-Constitution* and “Does Information Matter? The Effect of the Meth Project on Meth Use Among Youths,” 2010, was highlighted in the *Boise Weekly*, *Denver Post* and Montana CBS News.

“I’m interested in the unintended consequences of policies.”

—D. MARK ANDERSON



HISTORY MAJOR APPLIES UNIQUE SKILLSET TO MUSEUM INTERNSHIP

Senior Sabre Moore maintains an incredibly busy schedule during the school year. In addition to pursuing three minors—Native American studies, English literature and museum studies—she also serves as the managing editor of the *MSU Exponent*, volunteers with Eagle Mount and the Child Advancement Project (CAP), and works as a living history interpreter at the Museum of the Rockies. But instead of taking a well-deserved break from her busy schedule during the summer, Moore jumped at the opportunity to complete a summer internship at the Gallatin Historical Society's Pioneer Museum in Bozeman.

For her internship project, Moore was tasked with photographing all the items on display in the museum, matching them with their record, which ranged from typewritten cards to entries in a ledger book, and entering both the photo and record into the museum's digital database. The project matched up perfectly with her knowledge of history, as well as her writing and photography skills. Moore also led school and camp tours of the museum and aided visitors with research.

"While at the Gallatin Historical Society, I learned the art of giving an engaging tour that ended on time, as well as the infinite patience and commanding voice that it took to keep the kids on task," said Moore. "From my photography project, I learned the best lighting and positions for items as well as the history behind each object."

Moore worked closely with her academic advisor, history professor Mary Murphy, to complete the paperwork necessary to obtain college credit for her internship. Moore, who grew up on a ranch in Douglas, Wyo., plans to apply to graduate school and obtain a pilot's license once she graduates from MSU.

MSU senior history major Sabre Moore completed an internship through the Gallatin Historical Society at the Pioneer Museum this summer in Bozeman. Photo courtesy of Mike Greener, Bozeman Daily Chronicle.



STUDENT WHO CAUGHT THE CHEMISTRY BUG FROM HIS FATHER WINS GOLDWATER

David Halat, a junior in chemistry and mathematics, received a Goldwater Scholarship in 2012. The scholarship is the nation's premier scholarship for undergraduates studying math, natural sciences and engineering. It provides recipients up to \$7,500 a year for tuition, fees, books, and room and board.

The award was the 54th Goldwater given to an MSU student since the Goldwater Foundation was established in 1986. MSU is traditionally one of the nation's top institutions for total Goldwater recipients. Among other institutions that won 2012 Goldwaters were Yale University with three, Harvard University with two and Princeton University with two.

Four out of the past eight MSU Goldwater winners have been from the Department of Chemistry and Biochemistry. "I believe that chemistry and biochemistry majors have enjoyed so much success in the Goldwater competition because of our commitment as a department to providing world-class research opportunities to undergraduates," said Bern Kohler, professor and former head of the Department of Chemistry and Biochemistry.

Halat, whose father is a chemist, has been interested in chemistry since he was a boy. Halat said he knew when he enrolled at MSU that he planned to major in chemistry. He likes chemistry because, "Everything we touch or interact with on a daily basis involves some sort of chemical phenomenon."

Halat plans to attend graduate school in chemistry and then teach or lead a research team at a university. Already involved in research as an undergraduate, he works in professor Robert Walker's chemistry lab and studies the high-temperature surface chemistry that takes place on solid oxide fuel cells.

Excerpted from Evelyn Boswell, MSU News Service

David Halat, a MSU junior majoring in chemistry and mathematics, won the nation's premier scholarship for undergraduates studying math, natural sciences and engineering.





Matt Smith received a Boren Fellowship to study Swahili in Tanzania and do economics research in Kenya for ten months.

MSU STUDENTS WIN PRESTIGIOUS AWARDS TO ENHANCE THEIR GLOBAL EDUCATION

Gabe Lavin, an anthropology senior with a passion for using music to bridge cultural differences, and Matt Smith, an economics graduate student who wants to use his knowledge to help people in Kenya, both received prestigious Boren Awards for International Studies from the National Security Education Program. The Boren Awards are a federal initiative designed to build a broader and more qualified pool of U.S. citizens by providing award winners with foreign language and international skills. The Borens also support study and research in areas of the world that are critical to U.S. interests such as Africa, Asia, Central and Eastern Europe, Eurasia, Latin America and the Middle East.

Lavin was one of 161 American recipients of the Boren Scholarship for undergraduate students, and was provided as much as \$20,000 to attend AMIDEAST in Cairo, Egypt to study Arabic language and culture. AMIDEAST is an American non-profit organization that provides international education, training and development activities in the Middle East and North Africa.

Lavin began his academic career at MSU as a music major, but after a year-long MSU exchange to Al Akhawayn University in Morocco's Atlas Mountains, changed his major to anthropology. Lavin said he picked Morocco because he wanted to study the oud, a pear-shaped instrument that is similar to the lute. While at Al Akhawayn, he realized that music was a way to link people who had no common language other than music.

Lavin has finished three years of Arabic language classes. Two of those years were taken at MSU through its distance-based Arabic language studies program. He will continue to study the language in Cairo. "My goals are to continue to be a musician while I attend grad school, with an emphasis on Middle East studies," said Lavin, who hopes to find a career in diplomacy, possibly in the Foreign Service.

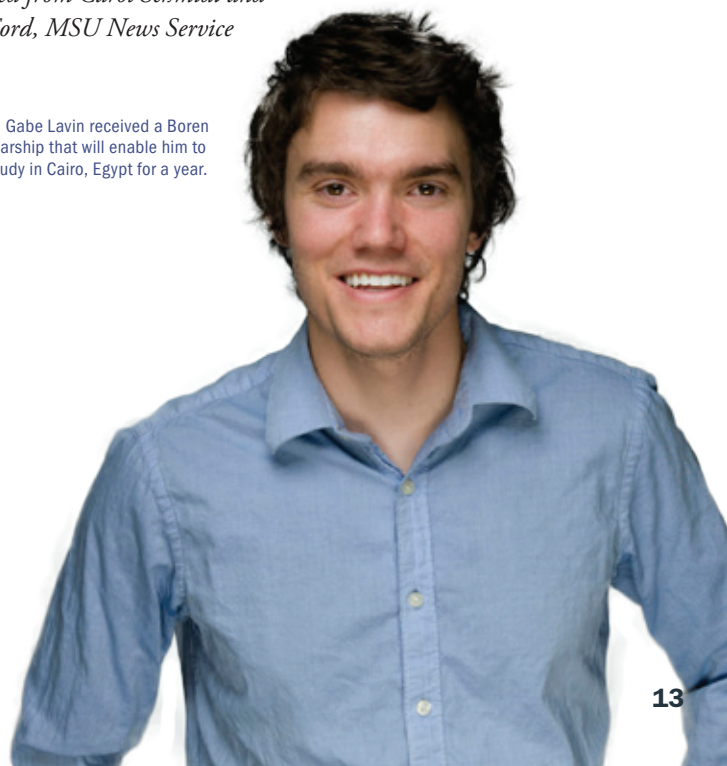
Smith was one of 119 awardees of the Boren Fellowship for graduate students. He received as much as \$30,000 to spend the summer of 2012 studying Swahili in the African Languages Initiative's Domestic Intense Summer Program at the University of Florida in Gainesville. In the fall, Smith went to the State University of Zanzibar, Tanzania to continue his language studies.

As part of his fellowship, Smith will research economics in Nairobi, Kenya, work he will apply to his graduate studies in economics. Smith has a double bachelor's degree in business management and philosophy from MSU. He credits MSU's chapter of Engineers Without Borders with inspiring him to apply for the Boren Fellowship. The student-run group has been working the past 10 years to bring clean drinking water and sanitation to thousands of school children in western Kenya. Smith has traveled to Kenya three times since 2008, most recently as a project manager.

"We have some great students here at MSU who have applied for the Boren Award," said Sally O'Neill, who coordinates the Boren Scholarship through the MSU Office of International Programs. "This is a very competitive award and we have done well."

Excerpted from Carol Schmidt and Angie Ford, MSU News Service

Gabe Lavin received a Boren Scholarship that will enable him to study in Cairo, Egypt for a year.



MSU'S WATTS VOTED VICE CHAIRMAN OF FARMER MAC

In April, Myles Watts, an economics professor in the Department of Agricultural Economics and Economics, was selected to be the vice chairman of the Farmer Mac board of directors. Watts was voted to the position by his peers on the 15-member board of directors of the Federal Agricultural Mortgage Corporation, commonly known as Farmer Mac.

President Obama appointed Watts to the board in 2010. The board generally meets at least six times per year in Washington, D.C., to address a variety of issues related to lending practices and policies, including meeting the regulating requirements of a secondary market for agricultural loans and rural utility loans. In addition to serving in the absence of chairman Lowell Junkins of Iowa, Watts serves as chairman of Farmer Mac's public policy committee and serves on the finance and credit committees, which oversee generated funds used to buy loans from banks.

He said that the work is not only fascinating and important, and it also benefits students at MSU.

"It provides me a lot of material to complement my teaching in agriculture management and finance," Watts said. "Secondary markets are an important component of financing our economy including the agricultural sector. It is unusual that a university professor has the opportunity to bring this type of experience into the classroom."

Excerpted from MSU News.



Myles Watts

CHEMISTRY PROFESSORS ELECTED FELLOWS IN WORLD'S LARGEST GENERAL SCIENTIFIC SOCIETY

Two professors in MSU's Department of Chemistry and Biochemistry have been named fellows of the American Association for the Advancement of Science (AAAS).

The election of Timothy Minton and Robert Walker was announced at the end of 2011 in the journal *Science*. Minton and Walker were each presented a certificate and gold and blue

rosette pin in February during the 2012 AAAS annual meeting in Vancouver, British Columbia. Gold represents science and blue represents engineering.

Walker was chosen as a fellow because of his distinguished contributions to understanding the molecular structure and interfacial behavior at complex liquid and solid surfaces using surface spectroscopy, according to AAAS officials. Minton was elected for his pioneering work in hyperthermal gas-surface and gas-phase reaction dynamics, and for his service as a senior editor for the *Journal of Physical Chemistry*.

The AAAS is the world's largest general scientific society and publishes the journal, *Science*, as well as *Science Translational Medicine* and *Science Signaling*. AAAS was founded in 1848, and includes 262 affiliated societies and academies of science, serving 10 million individuals. *Science* has the largest paid circulation of any peer-reviewed general science journal in the world, with an estimated total readership of 1 million.

Excerpted from Evelyn Boswell, MSU News.

Timothy Minton. Photo by Steve Winslow, Winslow Studio and Gallery.



Robert Walker



IN MEMORIAM:

Christopher Pinet

Christopher Pinet, professor emeritus of French at MSU, gold medal recipient from La Renaissance Française and longtime editor of the *French Review*, died at home on Thursday, Nov. 17, 2011.

Pinet, who was of Franco-American descent, embraced his French heritage and had a long and distinguished career as a teacher and scholar of French and Francophone literatures and cultures. He earned his B.A. with honors and distinction at the University of Kansas, and his M.A. and Ph.D. degrees at Brown University where he was an NDEA and Woodrow Wilson Dissertation Fellow.

He was active in the university and in several community organizations. In particular, he served for two years as Chair of the Montana Committee for the Humanities, and he was a dedicated member of the Gallatin Valley Human Rights Network for many years. He served on the Executive Council of the American Association of Teachers of French and the Board of Directors of the Federation of French Alliances, USA.

As editor in chief of the *French Review*, the journal of French studies with the largest circulation in the world, Pinet produced an array of editorials and special issues concerning the Francophone world. The French government recognized his contributions in 2010 when he was promoted to "Officier" in the French Order of Academic Palms during a ceremony at MSU that was attended by over a hundred family members, friends, students and colleagues. In 2011, he was awarded the Gold Medal of Francophone Merit by the French Renaissance Society in Washington, D.C. After a 29-year teaching career, Pinet retired in May of 2010.

His curious spirit and abiding interest in people extended to all aspects of his life. Those who knew him will always remember his enthusiasm, energy, humor and joie de vivre, as well as his love of basketball, tennis, cross-country skiing, jazz and movies, and a good glass of wine.

Excerpted from Evelyn Boswell, MSU News Service

Christopher Pinet (1944-2011)

2012 FACULTY AWARDS

L&S Dean's Award for Meritorious Research

David Eittle, *Sociology and Anthropology*
Thomas Hughes, *Cell Biology and Neuroscience*

L&S Outstanding Teaching Awards

Sandy Bowers, *Mathematical Sciences (Non-Tenure Track)*
Steve Eiger, *Cell Biology and Neuroscience (Tenure Track)*
Matthew Fockler, *Earth Sciences*
(Graduate Teaching Assistant)
Katie Jo LaRiviere, *English (Graduate Teaching Assistant)*

L&S Kathy E. Griffith Employee Excellence Award

Jim Burns, *Native American Studies*
Judith Van Anandel, *Ecology*

Betty Coffey Award

Sara Rushing, *Political Science*

Cox Faculty Award for Creative Scholarship and Teaching

Neil Cornish, *Physics*

James and Mary Ross Provost's Award for Excellence

Robert Rydell, *History and Philosophy*

Phi Kappa Phi Distinguished Teaching Award

Leah Schmalzbauer, *Sociology and Anthropology*

President's Excellence in Teaching Award

Michael Reidy, *History and Philosophy*
Robert Rydell, *History and Philosophy*
Leah Schmalzbauer, *Sociology and Anthropology*

Wiley Award for Meritorious Research & Creativity

Richard Block, *Psychology*
Isaac Klapper, *Mathematical Sciences*
Timothy LeCain, *History and Philosophy*

Retiring Faculty (and year they joined the MSU faculty)

Maurice Burke, *Mathematical Sciences (1988)**
Stephan Custer, *Earth Sciences (1976)**
Robert Fleck, *Agricultural Economics and Economics (1995)**
Lynda Sexson, *History and Philosophy (1986)**
Jean Starkey, *Microbiology (1984)*
Richard Swanson, *Mathematical Sciences (1982)**
Russ Walker, *Mathematical Sciences (1982)**

**Conferred with the rank of Professor Emeritus by the Montana Board of Regents.*



Michelle Meade

THE MEMORIES OF OTHERS CAN BE CONTAGIOUS

Michelle L. Meade, associate professor of psychology, examines the impact of social factors on individual memory. When remembering an event, we rely on our own internal representation of the event, and we may also turn to others for additional information about the event through sharing stories and reminiscing. However, others' memories are not always accurate and may include exaggeration or errors. When other people make errors, do we reject them or do we incorporate them into our own memories?

To study this question in the lab, participants and confederates take turns recalling items from previously studied scenes. A confederate is an actor who participates in a psychological experiment pretending to be a subject but in actuality is working for the researcher. The confederate suggests several items during this collaboration that had not been presented in the scenes. On a subsequent individual recall test, participants often incorporate the confederates' errors into their individual memory, a process termed the social contagion of memory.

"Some of our recent research findings have also revealed important age-related differences in social contagion of memory," said Meade. "Participants are more likely to incorporate erroneous items suggested by young adults and relatively unlikely to incorporate misleading suggestions from older adult confederates."

Student co-authors on this research include former MSU graduate students Sara Davis and Katya Numbers and former MSU undergraduate students Chase Ladd and Vladimir Perga. Their findings were recently presented as an invited talk at the International Conference on Memory, a prestigious conference that is held just once every 5 years.

THE SCIENCE OF POLITICAL STORYTELLING

Elizabeth A. Shanahan, associate professor of political science, conducts research under the rubric Narrative Policy Framework (NPF), which focuses on the influence of political storytelling on policy decisions. She explains that political narratives inform people about which relationships matter, whom the relevant actors are, where to assign blame, and, perhaps most importantly, what parts of reality we should pay attention to and what parts should be ignored.

"In essence, policy narratives create policy realities, which can have direct effects on political decisions, even in the face of countervailing scientific evidence," said Shanahan.

Shanahan has developed NPF while working on regional environmental issues, such as bison management, winter use in Yellowstone National Park and hydraulic fracturing, as well as other national issues such as climate change and alternative energy development. While ongoing, her research has revealed that the most powerful component to policy narratives is the use of a strong and accessible hero, not just the portrayal of a dastardly villain. For example, in the case of development of an offshore wind farm near Nantucket, Mass., the winning coalition constructed narratives that framed the corporation proposing the wind turbines in federal waters as the hero who would help 'deliver the nation from its addiction to foreign oil.' In contrast, the losing coalition constructed narratives describing a villainous wind farm developer—the 'greedy multi-national corporation out to make money off the backs of residents and ruin the viewscape.'

Shanahan is invited to present her NPF research at a 2013 public policy conference in Grenoble, France. She was also invited to submit a manuscript for a symposium on "New Theories of the Policy Processes" in the *Policy Studies Journal*. Former MSU Master of Public Administration students Molly Anderson and Ross Lane have assisted Shanahan in conducting various studies and are co-authors on two publications.



Liz Shanahan



Liz Shanahan applies her NPF research to bison management. Photo courtesy of iStock.



MSU STUDY COMPARES GROWTH AROUND YELLOWSTONE, GLACIER AND OTHER NATIONAL PARKS

Andrew Hansen, a professor in the Department of Ecology, and Cory Davis, a graduate student in ecology, have completed the country's first study into population density and land use changes in the ecosystems around U.S. national parks. Their findings were published in *Ecological Applications*, a journal published by the Ecological Society of America.

Their study, which complemented a University of Montana study on climate change, focused on 57 national parks in the lower 48 states and found that population densities around the parks rose an average of 224 percent between 1940 and 2000, while housing densities grew 329 percent. Those surprising increases are considerably higher than the national increases in population and housing densities in the United States during the same time.

Davis and Hansen conducted their study with statistics from the U.S. Census between 1940 through 2000, the latest year that Census figures were available while the study was being conducted. They updated their findings with 2007 estimates of population and housing densities. The researchers also visited several national parks and worked with park administrators and staff for their study.

Regionally, population densities rose 246 percent around Yellowstone National Park and Grand Teton National Park and 210 percent around Glacier National Park between 1940 and 2000. By comparison, population densities surged 3,092 percent around the Mojave National Preserve in California, 2,962 percent around the Colorado River parks and almost 2,473 percent around the Everglades National Park/Big Cypress National Park in Florida.



Rural homes next to public lands can constrain fire management on public lands, as illustrated by this subdivision in the Greater Yellowstone Ecosystem. Photo by Andrew Hansen.

“We are quite impressed locally with the increase in density of rural homes around Yellowstone and Glacier and with the density of people that live around the ecosystem, but when compared to 57 parks, we are quite on the lower end of that development,” said Hansen.

Want to know more?
www.montana.edu/lettersandscience/2012/parks

Excerpted from Evelyn Boswell, MSU News.



David Varricchio, Frankie Jackson and two Chinese colleagues (from left) jacket a clutch of dinosaur eggs in China. Photo courtesy of Frankie Jackson.

MSU PALEONTOLOGISTS EXCAVATE DINOSAUR CLUTCHES IN CHINA

MSU paleontologists recently excavated four clutches of dinosaur eggs in China and found at least four more clutches they may excavate in the future. Associate professor David Varricchio and assistant research professor Frankie Jackson, along with graduate students Jade Simon and Ashley Poust, traveled to the Hangzhou area of southeast China through a National Geographic grant that funded one month of fieldwork. Working with a crew from China, the paleontologists excavated two clutches along road cuts and two clutches in more remote areas near agricultural fields. One clutch held four dinosaur eggs. The others each contained at least seven eggs.

The eggs in one clutch were unusually small—a little over 1.5 inches long, Jackson said. The eggs are also three-dimensional, unlike many dinosaur eggs found in Montana, which are often crushed and flattened during fossilization. The difference between fossil preservation in Montana and China is one thing the paleontologists want to study.

Excavating the clutches was valuable in itself, because knowing how eggs are oriented in the clutches, what kind of sediment or rock surrounded them, and the geochemistry of the rock can provide the paleontologists with important context, Varricchio said. The context might offer clues as to why the dinosaur eggs in China are preserved so differently than the dinosaur eggs in Montana.

The clutches could also yield discoveries about dinosaur behavior or parental care, a topic of particular interest to Varricchio and Jackson who published, among other things, a 2008 paper in *Science* that said males representing three types of dinosaurs were the sole caregivers for their mate's eggs. The “super dads” may even have had multiple mates and watched all their eggs at once.

Want to know more?
www.montana.edu/lettersandscience/2012/eggs

Excerpted from Evelyn Boswell, MSU News.



OUTREACH



Dave Lageson visited Irving Elementary School in Bozeman. Photo courtesy of Dave Lageson.



Eighth graders Troy Harmon, Brandon Richter and Justin May (from left) try to determine the route that climbers featured in a National Geographic movie will take as they ascend Mount Everest. The movie came to the Chester-Joplin-Inverness Public Schools in a teacher's kit from Montana State University. Photo courtesy of Deb Wickum.



Brietta Boyce (left) and Jada Goettlich, both sixth grade students at Winifred School, use hand-held microscopes and eye loupes to explore the properties of granite, garnet, schist and limestone rock samples included in the Everest Education Expedition kit. Photo courtesy of Bill Lee.



Montana students learn challenges, thrills of climbing Mount Everest

More than 1,000 students across Montana followed the 2012 Mount Everest Education Expedition, which involved MSU geologist David Lageson and MSU geology graduate student Travis Corthouts as part of the expedition team.

MSU's Extended University prepared 40 teacher kits and eight lesson plans to be used in Montana as the climbers ascended the mountain, said Suzi Taylor, assistant director of outreach and communication at Extended University.

The lesson plans that Extended University prepared target fifth graders, but they could be adapted for other grade levels, Taylor said. Each lesson was designed to last about 45 minutes and together they cover meteorology, geology, climate science, the history and culture of Everest, glaciology and biodiversity. The educational outreach project was developed through a partnership with the Montana National Science Foundation EPSCoR program.

Students whose schools applied and were selected to receive the kits were able to climb local hills and take GPS readings with expedition-quality equipment. They could use time-lapse cameras to monitor changes in nearby fields. They could use geologic rock hammers to sample the same kind of rocks that Lageson collected on Mount Everest. Limestone, granite, garnet and schist rocks were included in the kits. Students could also write their observations on waterproof tablets and use National Geographic maps to follow the climbers' progress. Lageson's research is funded by a grant from National Geographic's Expeditions Council, and his participation in the expedition was partially funded by the College of Letters and Science.

"The students are really jacked up. Some days it is hard to get them to think about the other parts of their education," said Bill Lee, who teaches fifth and sixth graders at Winifred School, located in north central Montana between Havre and Lewistown.

His students appreciated the enormous feat it is to climb Mount Everest when they had to breathe through a straw while climbing stairs with 10 pounds of textbooks on their backs, Lee said. In another activity, his students had to find and identify rocks that he hid on the school grounds.

Lori Chapman, math/science teacher at Sleeping Giant Middle School (SGMS) in Livingston, Mont., said one of her students was so enthusiastic about the Everest unit that he took a "Rite

in the Rain" notebook and pen home to see if he could find any conditions where the instruments wouldn't work. "Rite in the Rain" is all-weather writing paper that sheds water so explorers and other users can write anywhere, in any weather.

In addition, Chapman's students calculated how fast they walk in Livingston and compared it to the climbers in Mount Everest's "death zone." The students also kept track of the climbers' progress by placing markers on a scaled version they built of Mount Everest.

"The students have been ecstatic about being able to follow MSU's Everest expedition," Chapman said. "I feel this has been an excellent opportunity for SGMS students to tie in our earth science content with real world connections so they can better understand why and how scientists go about their investigations and the continuous opportunities to understand the history of how Montana and other similar geologic regions have formed and are changing."

The teacher kits came in waterproof expedition bags donated by The North Face. Seventeen companies, including National Geographic and Montana companies such as Baladeo, Bozeman Deaconess Hospital and Monkey Business, donated items for the kits. A grant from the Dennis and Phyllis Washington Foundation allowed the program to double the number of kits available to schools. The MSU Leadership Institute supported Corthouts' travel, so he could send updates and photos back to classrooms.

During the expedition, Lageson and Corthouts also sent dispatches, photos and videos to the team's Facebook page. Upon his return to Bozeman, Lageson visited local elementary schools to share his experiences first hand with students.

"This has been an excellent opportunity for (our) students to tie in our earth science content with real world connections so they can better understand why and how scientists go about their investigations."

**—LORI CHAPMAN,
Math/Science teacher,
Sleeping Giant Middle School,
Livingston, Mont.**

Want to know more?

www.montana.edu/lettersandscience/2012/Everest

Excerpted from Evelyn Boswell, MSU News.



1

Rare view of Venus inspires June 5 party at MSU football stadium

The College of Letters and Science and the Department of Physics co-sponsored an once-in-a-lifetime party on June 5 to watch Venus cross in front of the Sun for the final time in more than 100 years. The Montana Space Grant Consortium organized the event.



2

The “Transit of Venus” celebration was held at the MSU football stadium, and was free and open to the public. Safe solar viewing glasses and telescopes with filters were available for viewing the sun, and NASA images showing the transit from space were shown on the stadium’s scoreboard screen. Educational activities for kids related to the Sun and the Solar System were also provided.

“In a person’s lifetime, there are at most two opportunities to see Venus go across the face of the Sun. We only have one left. The last chance we had was in 2004. The next one will be long after we are dust,” said solar physicist, David McKenzie, who gave a talk about the transit during the event.



3

Venus is the second planet away from the Sun and Earth is the third. Since the planets orbit at different angles and different speeds, it’s highly unusual to see Venus cross in front of the Sun, McKenzie said. The transit generally occurs in pairs eight years apart. Between those pairs are 105 to 121 years.

“There wasn’t any transit in the 1900s,” McKenzie said. “The last pair was in the late 1800s before Montana was a state. That was when Jesse James was still terrorizing the West. Barbed wire had just been patented.”

The transit before that occurred in 1761 and 1769. The first pair of transits was estimated to have occurred in the 1600s. The 2004 and 2012 transits are only the second pair to happen during the space age. The next pair will occur in 2117 and 2125.



4

“This doesn’t happen often. It’s a chance to really see first-hand in person the relationship between the planets and our solar system,”

1. During a break in the clouds, Joseph Shaw was able to capture Venus (black dot in the upper right corner) as it crosses between the Earth and the Sun. It will be more than 100 years before Venus will again transit the Sun. *Photo courtesy of Joseph Shaw.*
2. Kelly Stephens and her son Cooper look through solar glasses at the Transit of Venus viewing event.
3. Four-year-old Brooke DuCharme looks through a small spectrograph.
4. MSU president Waded Cruzado watches the Sun for a glimpse of Venus.



Approximately 300 people attended the event. Photo courtesy of Joseph Shaw.

McKenzie said. “You can look at images and computers, but it’s not the same as seeing it in real life.”

Because the transit occurs so infrequently, the transit provides a unique opportunity for scientists to study Venus and answer questions about the solar system, McKenzie said.

Two solar missions that involve MSU faculty members—the Solar Dynamics Observatory (SDO) and Hinode—will both make images of the June 5 transit, McKenzie said. The SDO will make images from several different ultraviolet wavelengths. Hinode will make images in visible light and X-rays.

McKenzie was part of the team that made observations in 2004 from the space-based telescope called TRACE, or the Transition Region and Coronal Observatory. Scientists in the past discovered that Venus had an atmosphere when they watched Venus pass in front of the Sun. They also determined from the transit that the Earth was almost 93 million miles from the Sun.

“Knowing the scale and size of the solar system was a key discovery,” McKenzie said.

Venus is the planet most like the Earth up to a point, McKenzie said. Its diameter is five percent smaller than the

“In a person’s lifetime, there are at most two opportunities to see Venus go across the face of the Sun.”

—DAVID MCKENZIE, MSU Solar Physicist

Earth’s and its mass is over 20 percent smaller than the Earth’s. Someone who weighs 100 pounds on Earth would weigh 88 pounds on Venus.

Venus and the Earth are dramatically different in other ways, McKenzie said. The daytime temperature on Venus is about 750 degrees Fahrenheit. The air on Venus is almost completely carbon dioxide except for fluffy clouds of sulfuric acid. The atmospheric pressure on Venus is 90 times the pressure on Earth.

Those conditions would be deadly for astronauts, McKenzie said. If they happened to land on Venus and stepped outside their spacecraft, they would feel a little lighter than on Earth. “But then they would be crushed, melted and dissolved.”

Despite stormy weather, approximately 300 people attended the event, which was also sponsored by MSU’s Museum of the Rockies, the Southwest Montana Astronomical Society and the MSU College of Engineering.

Excerpted from Evelyn Boswell, MSU News.

DAVIS BRINGS “TUESDAYS WITH MORRIE” PROJECT TO MSU

By Jill Davis and Lauren Favero

What happens when a MSU writing student is partnered with an elderly Bozeman citizen for eight weeks in an interview project? All sorts of astonishing things! In fall 2011, Jill Davis, a non-tenure track instructor in the Department of English, introduced the “Tuesdays with Morrie Project” to her WRIT 201 students. The students had just completed reading Mitch Albom’s book, *Tuesdays with Morrie*, a non-fiction novel about the time Albom spent with 78-year-old Morrie Schwartz, a retired Brandeis University sociology professor who was dying from Lou Gehrig’s disease (ALS).

Lauren Favero, an English major, assisted Davis with the project, helping the student writers transform many interviews into polished essays for partner families. Seniors from various senior living residences jumped at the opportunity to tell their story to a willing listener.

“This was a life changing experience,” said Jenny Hankerson, a freshman who is majoring in nursing. “The truth is, I was blessed by Ruth. She presented me the gifts of friendship and inspiration as well as many insights about life.”

“Every week when I went to see Joyce, I found myself feeling happy. I loved our visits. She taught me about persevering through tough times,” said Garrett Pewe, a freshman in economics. “She really helped me appreciate my life. I learned about history and her place in the feminist movement.”

Bud Kumlien, a resident at the Bozeman Lodge, with MSU student Bill Jensen of Petersburg, AK. Photo by Matt Weigand.

“It is amazing what unforeseen joys arise when MSU students are partnered with senior elders...the student learns about life.”

—JILL DAVIS, Instructor, Department of English

Roelie Griffioen, an exchange student from Amsterdam who is studying business, said that this project helped her connect to Bozeman. “What a joy it was to mix our two cultures,” said her senior partner, Alene.

Bill Jensen, a freshman and mechanical engineering technology major, said it was the best experience he has had at MSU and plans on visiting his senior partner, Bud, during his four years at MSU.

“It is amazing what unforeseen joys arise when MSU students are partnered with senior elders. It is a win-win for both parties. The student learns about life and history and the senior shares of his or her great wisdom,” Davis commented. This is one of several interview projects Davis’ students are conducting in the community. Students used the writing skills they learn in class to make a difference in someone’s life; they spent time listening to another’s story and gifting the partner’s family with an essay. The project is continuing through fall 2012, and Davis and Favero are looking forward to more outstanding results.

Lauren Favero is a junior majoring in English Teaching in the Department of English.





SERVICE PROJECT IN REMOTE MOROCCO IS TRANSFORMATIVE FOR MSU STUDENTS

While spring break means an escape to fun and sun for many college students, it will forever conjure memories of service for four MSU students who spent spring break 2012 in the remote Atlas Mountains of Morocco helping a tiny Berber community connect with the outside world.

Led by Ada Giusti, a professor of French in the Department of Modern Languages and Literatures, the students spent a week conducting computer training, primarily in French, for the people of the remote village of Zawiya Ahansal. The area is so remote that it only received electricity a year ago and the people of the community, many who make their living serving adventure tourists to the Atlas Mountains, wanted to learn how to use donated computers.

Tessa Mosdal, Bronwyn Rolph, Christie Blaskovich and Samantha Hinckley taught basic computer use and maintenance. Helena LaFave didn't travel with the group but helped develop handbooks, written in French and English, to teach Microsoft Office Word, Excel and PowerPoint as well as basic computer skills. French is commonly spoken in Morocco, although Arabic and Berber are the official languages.

"I think that service-learning projects are extremely valuable to the communities that have identified a specific need because they receive services that they could not otherwise afford," said Giusti, emphasizing that the community or organization must choose the project.

In addition to providing an opportunity to help students learn about intercultural teamwork, and to live and work with people from different cultures and different economic backgrounds, service learning classes help students take knowledge they have learned in the classroom and apply it to real life projects, she said.

"Students have said over and over again that service-learning projects have changed their lives and made them feel privileged to study at MSU where such opportunities are offered to them," Giusti said.

Want to know more?

www.montana.edu/lettersandscience/2012/Morocco

Excerpted from Carol Schmidt, MSU News.



Samantha Hinckley and Christie Blaskovich walk children to school in the remote village of Zawiya Ahansal in Morocco's Atlas Mountains. *Photo courtesy of Ada Giusti.*

FOR SOLAR PHYSICS ALUMNUS, THE FUTURE LOOKS BRIGHT

Jonathon Cirtain, a solar physicist who earned his doctoral degree at MSU in 2005, received the highest award the United States government gives to science and engineering professionals who are in the early stages of their independent research careers.

Cirtain received the Presidential Early Career Award for Scientists and Engineers (PECASE) in recognition of his outstanding research on basic physical processes observed in solar and space plasmas through innovative engineering instrument designs. The Office of Science and Technology Policy within the Executive Office of the President coordinates the PECASE awards.

Before the PECASE award, he won the 2007 “Young Scientist Award” from the International Association of Geomagnetism and Aeronomy/International Union of Geodesy and Geophysics. He now heads the Solar Physics Group at NASA’s Marshall Space Flight Center. He is project scientist for the Hinode mission, which is a NASA/Japanese Space Agency solar observatory that also involves several MSU scientists. Cirtain also heads several NASA rocket experiments that test new innovative space instrumentation.

Cirtain said that he came to MSU for his doctorate, in part because he would have the opportunity to remotely operate the Transition Region and Coronal Explorer (TRACE). “It was an opportunity I don’t think I would have had if I would have gone to other graduate schools in astronomy,” Cirtain said. He added that, “The solar physics group (at MSU) is one of the best in the world. Having been a part of it, it opened up a number of opportunities for me.”

Two faculty members in the Department of Physics are previous winners of the PECASE. Dana Longcope received the award in 2000 and Charles Kankleborg in 2008.

Want to know more? www.montana.edu/lettersandscience/2012/Cirtain

Excerpted from Evelyn Boswell, MSU News.

Jonathan Cirtain, who received his doctorate in solar physics at MSU, has won a Presidential Early Career Award for Scientists and Engineers. Photo courtesy of Jonathon Cirtain.



Camille Stein receives a hug from her father, Wayne Stein, a professor in the Department of Native American Studies, during MSU's graduation ceremony.

MSU ALUM LANDS DREAM JOB, HELPS OTHER STUDENTS PURSUE CAREERS

Camille Stein, a recent graduate with a M.A. in Native American Studies, is enjoying a successful start to her career by helping others jump-start their careers.

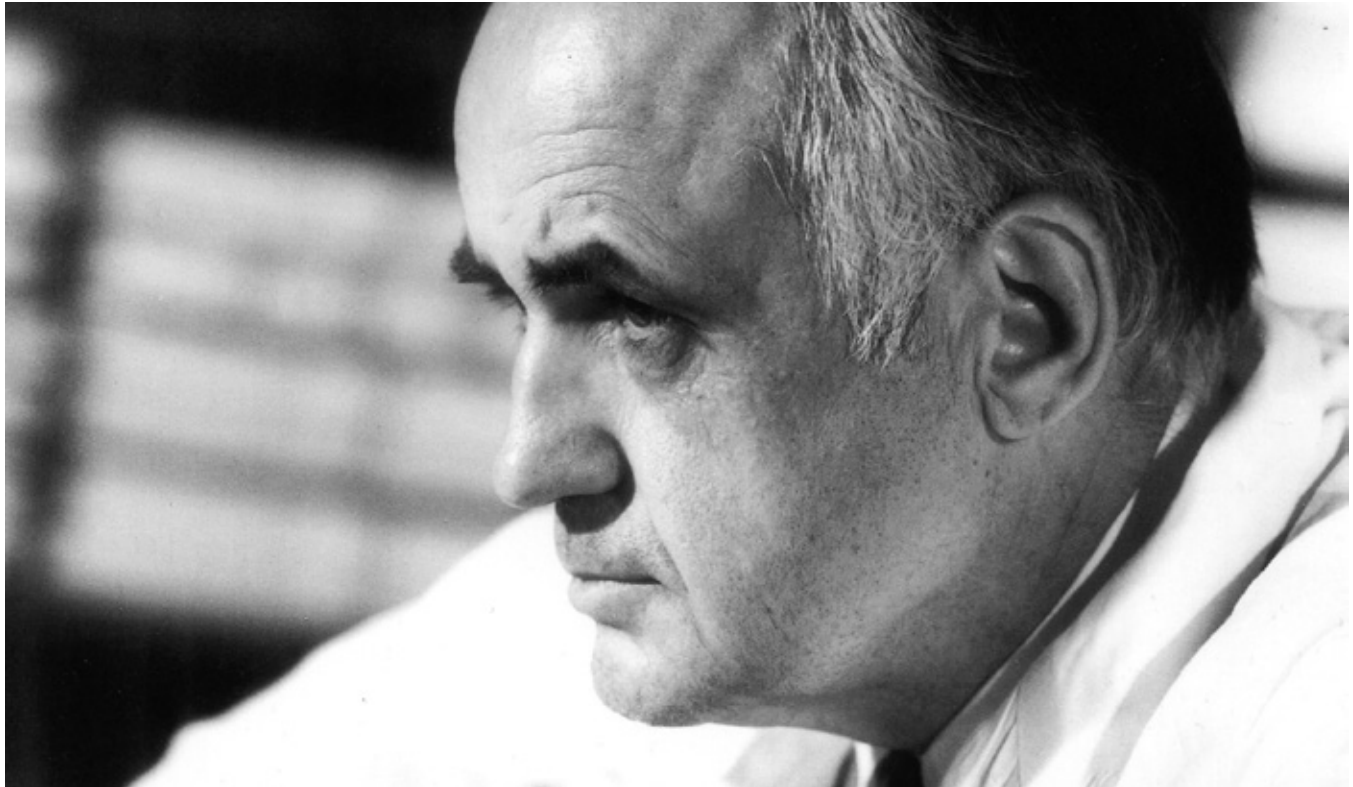
An enrolled member of the Aahniinin (or Gros Ventre) tribe, Stein works at Aaniiih Nakoda College in Fort Belknap, Mont. as the Student Outreach Support Coordinator for the Tribal College Consortium for Developing Montana and North Dakota Workforce Project (TCC DeMaND). She is responsible for developing and assisting in all student support and outreach activities related to the program, which creates pathways for displaced workers to quickly earn certificates and degrees.

“It has always been my dream to work at Aaniiih Nakoda College. There are things that this institution does that do not happen anywhere else in the world. I am excited and proud to be a part of this institution,” said Stein. “I’m also very proud of my foundation that I gained at MSU, both educationally and professionally, working with all the Indian programs and those who support Indian programs at MSU.”

The Native American Studies program is the reason that there are support services for Native students in other departments at MSU, Stein noted. “Many tribal college students transfer to MSU because of the support they receive from NAS.”

While at MSU, Stein worked in the College of Nursing for the Caring For Our Own Program, a student support network for Native nursing students. She also holds a bachelors degree from MSU in political science with a minor in Native American studies.





Maurice Hilleman, a Montana State College graduate in 1941, is known as one of the world's leading vaccinologists, having developed eight of the 14 vaccines routinely given for once-common childhood diseases. Photo courtesy of Lorraine Hilleman.

MSU GRAD'S VACCINES SAVE MILLIONS

With the campus community contemplating the onset of flu season and the annual question of 'to be vaccinated or not to be vaccinated,' it is worth noting that the world of human health, particularly in the area of preventive medicine, owes much to a graduate of MSU.

The abstract on a National Center for Biotechnology Information obituary on Maurice Hilleman, who died in 2005, is short and to the point: "Microbe hunter, pioneering virologist, and the world's leading vaccinologist."

Hilleman, a 1941 graduate from what was then called Montana State College, developed eight of the 14 vaccines routinely given to prevent an array of childhood diseases. Many of these once-deadly afflictions are now nearly eradicated from the developed world. His 2005 obituary in the *New York Times* credits him with probably saving more lives than any other scientist in the 20th century.

This scientist, born and raised on a farm in Miles City, Mont., also helped in understanding the ways that influenza viruses change slightly from year to year, a phenomenon known as genetic, or antigenic, drift. The need for an annual seasonal flu vaccine is due to these ongoing and subtle changes—not to be

confused with the major changes in influenza viruses known as antigenic shift, which often mark the beginning of the less frequent but more deadly influenza pandemics.

Mark Jutila, head of the Department of Microbiology, said there is no question about Hilleman's place in the history of modern science.

"Maurice Hilleman is one of a number of examples of people who have studied at MSU and gone on to do amazing things with their career," Jutila said. "And then, in his case, to have been responsible for the number of vaccines that are due to his efforts, he's had an amazing impact on human medicine. It's hard to imagine the number of lives he's had an impact on, and for MSU that's a huge thing."

That is why the Department of Microbiology honors Hilleman through the Hilleman Lecture Series in which an outstanding biomedical scientist from outside MSU is invited each year to present a campus-wide seminar.

Want to know more?

www.montana.edu/lettersandscience/2012/hilleman

Excerpted from Sepp Jannotta, MSU News.

DEPARTMENT HIGHLIGHTS



AGRICULTURAL ECONOMICS AND ECONOMICS



Carly Urban

Assistant professor Carly Urban joined the faculty of the Department of Agricultural Economics and Economics in fall 2012. She holds a bachelor's degree in economics and international affairs from the George Washington University, as well as a doctorate in economics from the University of Wisconsin-Madison. Her research examines the intersection of policy,

political campaigns and economic incentives. Urban documents that presidential primary campaigns provide a type of "fiscal stimulus" to each state's economy due to the influx of campaign dollars. In another paper, she found that areas of non-battleground states that receive political advertisements because their media markets overlap with battleground states experience higher rates and volumes of individual level campaign contributions. In addition, she has conducted research to determine how public policies, such as mandatory mediation and moratoria on foreclosure filings, have altered incentives in the mortgage market.

Anton Bekkerman and Gregory Gilpin, assistant professors in the Department of Agricultural Economics and Economics, spent the summer investigating cost-effective strategies for increasing technology and Internet access in Montana public libraries. Many U.S. public libraries have embraced electronic and Internet resources as powerful information tools. In Montana, where the majority of libraries serve rural and remote communities, the opportunities to provide similar resources have been limited due to deficient broadband infrastructure, high access costs and budgetary pressures restricting frequent replacement of outdated technology. The study, which was solicited by the Montana State Library and funded with a \$60,000 grant from the U.S. Department of Commerce-Broadband Technology Opportunities Program and the Bill and Melinda Gates Foundation, proposed four possible long-term strategies for sustainably updating technology and increasing Internet access, while potentially saving Montana public libraries nearly \$1 million annually. Gilpin and Bekkerman's ongoing research investigates the economic impacts of increased broadband access in rural communities across the U.S.



Anton Bekkerman



Gregory Gilpin

CELL BIOLOGY AND NEUROSCIENCE

As an undergraduate student, Lauren Barnett created a genetically encoded voltage sensor, ElectricPk, which is an order of magnitude faster than any other voltage sensor neuroscience has seen to date. There is a pressing need for genetically encoded fluorescent voltage sensors in neuroscience because these sensors can be targeted to specific neurons and circuits to allow the study of neural activity using fluorescent imaging. Due to the unprecedented speed, Barnett's voltage sensor is the first of its kind to be able to follow the rise and fall of neuronal action potentials, which is a major advance for the field. While improvements to the sensor still need to be made, this groundbreaking sensor may change the way future voltage sensor design is approached. Barnett and Thom Hughes, professor and former department head of cell biology and neuroscience, along with collaborators at Yale University and the John B. Pierce Laboratory in New Haven, Conn., co-authored an article describing their design principles and results. The paper was published in the online journal *PLoS ONE*. While applying to graduate programs, Barnett continues her research in the Hughes's lab working towards improving fluorescent imaging in neuroscience.



Lauren Barnett. Photo courtesy of Lauren Barnett.

John Miller, professor in the Department of Cell Biology and Neuroscience, developed and taught a hands-on neuroscience module for BioScience Montana. Through the program, 30 4-H members from throughout Montana were selected to conduct scientific research, learn about bioscience-related careers and collaborate via distance learning technologies. The intensive yearlong experience is funded by the National Institutes of Health through a Science Education Partnership Award given to MSU. In addition to neuroscience, students also participated in modules on infectious disease and metabolomics. The project kicked off with a week long campus experience, when 4-H'ers worked side-by-side with students from MSU and the University of Montana, as well as MSU faculty members. The program combines aspects of MSU's teaching, research and service missions and was developed by the MSU Department of Cell Biology and Neuroscience, MSU Extended University and the 4-H Center for Youth Development.



John Miller with BioScience Montana participants. Photo courtesy of Montana 4-H.

CHEMISTRY AND BIOCHEMISTRY

Chemistry major Hillary Stacey was one of the top five contestants in a science communications competition sponsored by NASA.

The competition, called FameLab Astrobiology, took place at the headquarters of National Geographic in Washington, D.C. last

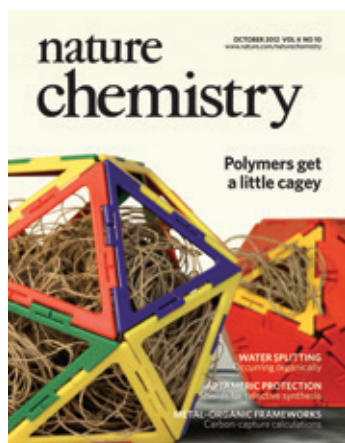
March. In the competition, early career scientists must convey their own research or related science concepts through two three-minute presentations with no slides or charts, just words and anything they can hold in their hands. Stacey spoke about MSU's astrobiology research in Yellowstone National Park and presented before 200 people and a panel of judges. She was representing MSU's NASA Astrobiology Institute team, the Astrobiology Biogeocatalysis Research Center. Stacey placed in the top five of 24 competitors. Stacey also had the opportunity to attend science communications workshops throughout the day. She plans to become a high school chemistry teacher.

Research findings from professor Trevor Douglas' lab in the Department of Chemistry and Biochemistry were recently published in the journal *Nature Chemistry* and highlighted on the cover of the journal. The work was part of the Ph.D. thesis of Janice Lucon, with assistance from Shefah Qazi (graduate student), Ben LaFrance (undergraduate student), Dr. Masaki Uchida (research assistant professor) and collaborators from the University of Alabama. Nikki Simon, a graduate of the MSU School of Art, designed the journal's cover art. The paper describes the growth of a polymer inside a viral capsid using a process called atom transfer radical polymerization (ATRP).

This protein-polymer hybrid is useful as a new vehicle for high-density delivery of small molecule cargos. In particular, through the attachment of coordination complexes of gadolinium, these materials are some of the most efficient MRI contrast agents made and measured to date.



Hillary Stacey. Photo courtesy of Hillary Stacey.



Cover art by Nikki Simon, an MSU School of Art alumnae.



Paleontologists Robert Sullivan, left, and Denver Fowler work in badland exposures of the Naashoibito beds at Alamo Wash in the San Juan Basin of New Mexico. Photo courtesy of W. P. Fowler.

EARTH SCIENCES

In a paper published in *Acta Palaeontologica Polonica*, earth sciences doctoral candidate Denver W. Fowler and coauthor Robert M. Sullivan from Harrisburg, Pa., unveiled enormous bones from North America's biggest dinosaur. The two gigantic vertebrae and a femur were collected in New Mexico from 2003 to 2006. The bones belong to the sauropod dinosaur *Alamosaurus sanjuanensis*, a long-necked plant eater related to *Diplodocus*. The *Alamosaurus* roamed what is now the southwestern United States and Mexico about 69 million years ago. The enormity of the new bones puts *Alamosaurus* in the same size league as other giant sauropods from South America, including *Argentinosaurus*, which weighed about 70 tons and is widely considered to be the biggest dinosaur of all. The *Alamosaurus* discovery may have important implications for other dinosaurs, including understanding growth (size change) and development (shape change) when interpreting dinosaur evolution.

During the active 2012-wildfire season, WildFIRE PIRE, a National Science Foundation partnership, had a variety of experts available to journalists working on big-picture stories regarding wildfires.

These experts included David McWethy, an assistant research professor in the Department of Earth Sciences and expert on the role of humans in past fire activity. WildFIRE PIRE is an international partnership focused on the causes and consequences of fire in the past, present and future. This partnership includes scientists, educators and fire specialists from several universities including MSU. The project also involves land managers from U.S. and foreign non-profit conservation organizations who are providing internship experiences for undergraduates and timely fire information. The expertise of the team includes scientists working on fire history, fire ecology, fire climatology, fire management, and invasive species. The team also includes specialists in natural history filmmaking and outreach, international education programs, project assessment and data management.



Scott Creel with a Zambian colleague. Photo courtesy of Scott Creel.

ECOLOGY

The Department of Ecology is collaborating with the Zambian Carnivore Programme (ZCP) and the Zambia Wildlife Authority (ZAWA) in an ambitious study of large carnivores in Zambia's huge but mostly unstudied national parks. The project is identifying conservation strategies for lions, cheetahs, leopards, African wild dogs and hyenas, and studying the effects of these predators on their prey. With a grant of more than \$1 million from the National Science Foundation, professor Scott Creel is leading the research with two former MSU graduate students—Matt Becker (Ph.D. 2008) who is now the CEO and program manager of the ZCP and Dave Christianson (Ph.D. 2008) who is now a professor at the University of Arizona.

The research program has involved many international exchanges, beginning in 2011 when Wigganson Matandiko, the former head of veterinary services for the ZAWA, received a prestigious Fulbright fellowship to begin a Ph.D. at MSU. Matandiko is now developing research to test how predation risk affects the transmission of infectious diseases in several antelope species.

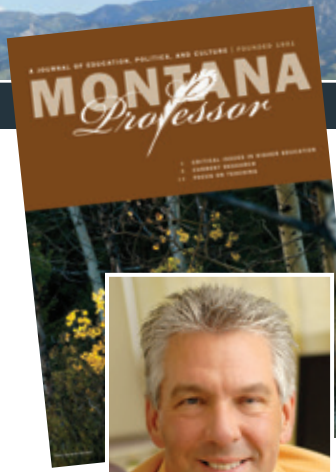
MSU doctoral candidate Angela Brennan was also awarded a Fulbright fellowship to travel to Zambia, extending her work on relationships between predation risk, herd size and the transmission of brucellosis in elk. Paul Schuette (Ph.D. 2012) is a postdoctoral fellow coordinating the project's predator-prey studies in South Luangwa, Kafue and Liuwa Plain National Parks.

The ZCP's Eli Rosenblatt has joined the department as a master's student, using a new genetic tool (single nucleotide polymorphisms) to census lion populations. Jassiel M'Soka, the current ZAWA project manager for Liuwa Plain National Park, will come to MSU in January to begin graduate studies, examining how lion reintroductions affect other carnivores. Finally, the ZCP's Thandiwe Mweetwa will begin graduate studies in fall 2013, using enzyme-linked immunoassays to study the factors that affect reproduction in lions.

Senior Ryan McClure spent the summer conducting research on stream ecosystems in Iceland through the research experience for undergraduates (REU) program. The Iceland project, which is a collaboration with the University of Alabama and the University of Iceland, is a five-year study to understand the effects of global warming on freshwater streams and what impacts that may have on the ecosystem. McClure's research observed the growth rate of a local freshwater snail (*Radix peregra*) across a temperature gradient ranging from 5 centigrade to 35 centigrade. Ryan is now working in the lab of Wyatt Cross, assistant professor in the Department of Ecology, running phosphorous samples and finishing his work from the summer. While in Iceland, he had the opportunity to travel to the tallest waterfalls, explore the unique culture and food of Reykjavik, and hike across the unique tundra landscape. When Ryan graduates this fall, he plans on attending graduate school, and continuing his research in freshwater ecology and observe further impacts that global warming may have on streams. For more information about the Iceland project, please visit icelandstreams.blogspot.com.



Ryan McClure (right) and Wyatt Cross, assistant professor in the Department of Ecology, prep chambers used to measure snail growth in a warm stream in Iceland. Photo courtesy of Ryan McClure.



DEPARTMENT HIGHLIGHTS



Philip Gaines

ENGLISH

After 20 years in Missoula, *Montana Professor*, a journal that addresses matters of interest and concern to the professoriate of the Montana University System (MUS) has moved to MSU.

Philip Gaines, associate professor of linguistics and chair of the Department of English, is serving as the new editor. The journal includes features such as Critical Issues in Higher Education, Focus on Teaching, Current Research, and Perspectives—a forum for alternative views on controversial issues. The journal is also richly informative, featuring a regular Tribal College Report, book reviews, selected new and notable books by MUS faculty, reports on exciting new programs on Montana’s campuses, as well as keeping tabs on new faculty hires. An exciting new feature of the journal is the Montana Professor Interview. In the current issue, Clayton Christian, Montana’s new Commissioner of Higher Education, answers questions about his background, his priorities and his goals for the MUS. Support for the journal comes from the offices of the President and Provost of MSU and the University of Montana.

The Department of English operates the MSU Writing Center, which provides free tutoring assistance to over 2,000 students per semester in all stages of the writing process—from generating an idea to honing a final draft. In recent years, significant improvements were made to the physical spaces that house the Writing Center’s two facilities. In the fall of 2011, work was completed that moved the center’s Renne Library satellite into the new Renne Library Commons. In the fall of 2012, a relocation and major renovation of the center’s Wilson Hall facility were completed. Previously, the Writing Center had been housed in several tiny windowless rooms in Wilson Hall and the Renne Library. These spectacular new spaces—complete with windows, sunshine and natural light—allow the center to expand their services and support of student writers. The new Writing Center in Wilson Hall is not only a space for tutoring, but also a space designed for celebrating writers and writing through events, workshops and readings.

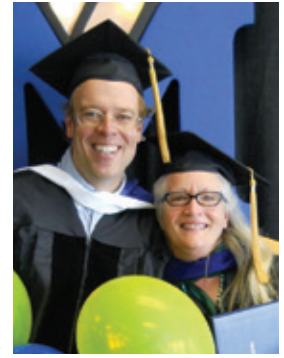


The MSU Writing Center’s newly remodeled facility in Wilson Hall. MSU photo by Sepp Jannotta.

HISTORY AND PHILOSOPHY

In May 2012, for the first time in the history of Montana State University, two students graduated with doctoral degrees in a humanities discipline.

Nine years after the Montana Board of Regents approved the Ph.D. program in history, Diane Smith and Bradley Snow received their degrees in American history. Diane Smith’s dissertation, “Animals and Artifacts: Specimen Exchanges and Displays in Yellowstone National Park, the National Museum and the National Zoo, 1846 to 1916,” is a fascinating exploration of the role that animals of Yellowstone played in the creation of scientific specimen collections for the Smithsonian, the National Zoo, museums and biology departments across the country. Bradley Snow’s dissertation, “Living with Lead: An Environmental History of Idaho’s Coeur d’Alenes, 1885-2011,” is an account of the complicated and often devastating human, environmental and economic consequences of lead smelting in the Coeur d’Alenes. Smith and Snow are currently working on turning exhaustively researched dissertations into books for a broad audience.



Bradley Snow and Diane Smith. Photo courtesy of the Department of History and Philosophy.

In 2012, the Montana Board of Regents approved the addition of a religious studies major in the Department of History and Philosophy. The new major in religious studies, which is the only religion major within the Montana University System, focuses on providing students with training in the study of religion as an academic subject. The major emphasizes the establishment of basic knowledge of world religions and global culture, together with in-depth analysis of means and ways in which religion and religious expression function in today’s world. Classes in the major focus on the historical development of religions, the interface between religion and society, literature and art, and emphasize the examination of religion as means of human cultural expression.



Lynda Sexson, an award-winning professor of humanities, was instrumental in development of the religious studies major at MSU.

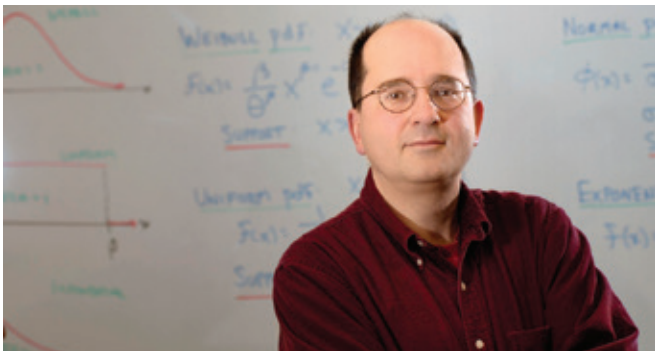
MATHEMATICAL SCIENCES

In 1982, the materials scientist Dan Shechtman discovered that a certain laboratory-created aluminum-manganese alloy produces an x-ray diffraction pattern with the sharpness of a crystal, but with symmetry previously thought impossible. Such materials are now called quasicrystals and Shechtman received the 2011 Nobel Prize in Chemistry for his discovery. The only known naturally occurring quasicrystal, found in Kamchatka, Russia in 2010, has recently been determined to be of extraterrestrial origin. Scientific and technological applications of these new materials are rapidly emerging and have created a need for their mathematical modeling and classification. MSU mathematics professor Marcy Barge, in collaboration with researchers in Europe, has developed mathematical methods for detecting quasicrystalline structures in atomic arrangements. This work led to considerable progress toward the solution of a long-standing mathematical conjecture known as the Pisot Conjecture.



Marcy Barge

Since 2005, professor John Borkowski has been visiting Thailand to assist Thammasat University (TU) in developing its doctoral program in statistics. During this time, he has co-supervised two doctoral dissertations, four master's theses, taught six graduate courses and continues to mentor graduate students in Thailand. In 2008, Borkowski received a Fulbright Lecture award to teach in Thailand. He has also received a Thammasat University Institutional Award for Dedicated Service (2011) and serves on the editorial board of *The Thailand Statistician*. With his aid, a five-year general agreement between MSU and TU was formalized in 2007 and renewed in 2012. Borkowski has also been involved as a World Bank project consultant to provide guidance in the development of the first statistics master's degree program in Vietnam. His efforts have led to recruiting doctoral students from Thailand and Vietnam into MSU's Ph.D. program in statistics, and he will supervise a post-doctoral student from Kasetsart University (Bangkok) who will arrive at MSU in 2013.



John Borkowski

MICROBIOLOGY

Microbiology major Emma Murter was one of two students in the nation chosen to participate in an international hot springs study through a National Science Foundation program for undergraduate scholars. Joining a five-year study that unites 20 U.S. and Chinese scientists from 14 institutions, the honors student and Presidential Scholar spent 10 weeks helping research microorganisms that live in the largest hot spring complex in China—Tengchong Volcanic Geological Park. Murter worked in a Shanghai laboratory extracting and analyzing lipids from the membranes of single-celled microorganisms, or archaea, that thrive in the hot springs. The lipids are of interest to researchers because they help form cell membranes that withstand near-boiling and acidic water, an amazing feat of nature's engineering that could have important applications for medicine and industry. Of all organisms, archaea hold the record for living in the hottest and most acidic environments.



Emma Murter at the Great Wall of China.
Photo courtesy of Emma Murter.

Elliott Barnhart, a former MSU football standout and a current graduate student in the Department of Microbiology, is studying the microorganisms that produce coal bed methane.



Elliott Barnhart

Barnhart hopes that his findings will help stabilize the economies in rural Eastern Montana communities such as his hometown of Broadus. He started studying the production of coal bed methane as an undergraduate student, continued as a master's degree student and now studies it as a doctoral student in microbiology at MSU's Center for Biofilm Engineering. He wants to know how the microorganisms that live in coal bed seams work together to produce methane. The only known organisms on the planet that are able to produce methane are microorganisms called methanogens, which are classified as archaea. However, little is known about the microorganisms responsible for producing methane, coal bed conditions that contribute to methane production and the way microbial communities interact to produce methane. If Barnhart can figure these things out, industry should be able to produce more methane and create more jobs.

MODERN LANGUAGES AND LITERATURES

Last April, the Department of Modern Languages and Literatures hosted the first “Word Wide Poetry Festival—A Night of World Languages” to coincide with National Poetry Month. Marc James Mueller, assistant professor of German studies, organized the event, including obtaining funding from MSU’s undergraduate scholars program and Humanities Montana. Nineteen international MSU faculty members and students from various disciplines presented original poems in their native languages and in English translation. Poems from languages and cultures such as Spanish, German, French, Russian, Hungarian, Portuguese, Turkish, Tatar, Japanese, Chinese, Bangla, Hindi, Haitian Creole and Crow celebrated literature, and poetry in particular, as a prime source for understanding a foreign culture. The festival enabled the department to reach out to a wider Bozeman community and to convey a strong statement for the study of foreign literature and culture as a core discipline in the humanities.



Hua Li

In 2008, the Department of Modern Languages and Literatures received its first major federal grant, Title VI funding for Undergraduate International Studies and Foreign Languages from the U.S. Department of Education. With the grant, the department was able to hire Hua Li, assistant professor of Chinese, in order to design and implement a China Studies minor, the newest addition to the department’s language

and culture offerings. Li brings her expertise in modern Chinese literature, film and culture to all of her courses. In addition, she plays an active role in the Chinese Culture Club, organized to bring together Chinese natives and members of the MSU community to explore the culture of China through the arts and literature. She is actively engaged in setting up study abroad programs, and is also currently developing service-learning opportunities for MSU students at a Beijing orphanage. In 2011, she published her first book, *Contemporary Chinese Fiction by Su Tong and Yu Hua: Coming of Age in Troubled Times*.



Contemporary Chinese Fiction by Su Tong and Yu Hua: Coming of Age in Troubled Times by Hua Li, assistant professor, Department of Modern Languages and Literatures.



Participants in the Native Pathways to Success orientation program.

NATIVE AMERICAN STUDIES

MSU’s Office of the Provost distributed \$104,000 to projects across the university, including three projects in the Department of Native American Studies, to bolster recruiting efforts and retention initiatives for Native American students. Rockin’ the Rez and Native Pathways to Success, two successful existing outreach programs, will receive \$14,500 over two years, for a total of \$29,000. Since Rockin’ the Rez was started in 2007 to recruit students from Montana reservations and Indians living in urban communities, MSU’s Native student enrollment has increased by 83 percent. The funds will also support “Native Pathways to Success,” a two-day orientation for incoming Native American freshman and their families. The department was also awarded \$3,000 to give Smart Pens, or pens that are able to record everything a student hears or writes, to 15 incoming Native students. The students will meet weekly for mentoring in note taking and studying skills and use of new technology.

John Marian, a graduate student in the Department of Native American Studies, interned with the Indian Land Tenure Foundation (ILTF) last summer to develop a database of information on tribal land holdings. His responsibilities included updating the foundation’s proprietary Indian land database, which captures the status and acreage of lands owned by tribes across the country. The service-learning project involved data verification, rebuilding the user interfaces and improving reporting functionality. Additionally, the project required the creation of user documentation and researching the best available data from various tribal, federal, state and county sources. ILTF also awarded Marian a grant in the amount of \$5,000 to defray expenses associated with implementing a summer workshop at Chief Dull Knife College in Lame Deer, Mont. Marian, whose research and work focuses on Indian housing issues and land rights, believes in giving back to the community and will donate the results of his service-learning project to the ILTF and the tribal college upon completion.



John Marian

PHYSICS

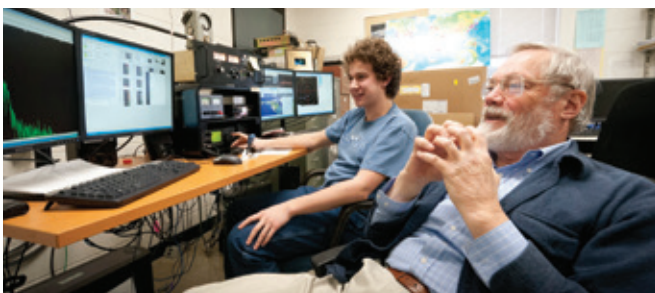
Bennett Link, professor of physics, has received NASA and National Science Foundation grants to study violent dynamical events in neutron stars, dense objects born in supernova explosions.



Remnants such as the Crab supernova contain the neutron stars that Link studies.

Observational evidence indicates that the conditions in a neutron star are extreme. With more matter than the Sun packed into an object the size of the Gallatin Valley, neutron stars contain the densest matter known; the average density is so high that a cubic centimeter of neutron star material would weigh 100 million tons if brought to Earth. Some neutron stars spin faster than a food processor, and surface temperatures typically exceed one million degrees Fahrenheit. Magnetic fields can be more than 100 million times bigger than the largest fields produced on Earth. The enormous gravity of a neutron star can pull gas from a nearby star onto its surface, creating thermonuclear explosions. Neutron stars consist of a solid outer crust and a liquid interior comprised primarily of neutrons. Link is studying how the crust breaks to produce starquakes and how the liquid acts on the solid to make spin glitches.

NASA has chosen another MSU satellite as one of 33 small research satellites to piggyback on rockets it plans to launch in 2013 and 2014. MSU's Space Science and Engineering Laboratory (SSEL) will build the satellite with partners from Colorado, Maryland, North Carolina and Kentucky. Like previous MSU satellites, the new satellite will be a cube that generally measure about four inches on each side and weigh 2.2 pounds. That's a standardized size that allows university-built satellites, called "CubeSats," to fit into an enclosed container called a P-POD and ride on a NASA rocket. However, unlike previous satellites that were made out of aluminum, the new satellite will be built out of nano-carbon-impregnated plastic using a process called 3-D printing or additive manufacturing. This process, which is also used to build Formula 1 racecar components and in the sport of motorcycle racing, is being tested to determine if it's a viable, affordable alternative for building satellites.



MSU freshman Matthew Handley, left, and SSEL Director David Klumpar watch as information is downloaded from MSU's orbiting satellite.

POLITICAL SCIENCE

Hannah Wahlert, political science, and Kenzie Weber, history, have been working as interns for the ACLU Montana's "Tell 3" project, which came to MSU as a part of the political science internship program. Hannah and Kenzie work around the state giving presentations on how to "tell three" friends or family members about the experience of being lesbian, gay, bisexual or transgender (LGBT) in Montana. While traveling the state, they discovered that many people did not know that Montana laws do not extend protections to the LGBT community. By providing this information, and encouraging people to talk to their loved ones, they hope to raise awareness and change these laws. "Through having personal conversations we hope to put a face to the issue. When people consider candidates, they'll think about how their policies will affect someone they love," said Wahlert. Wahlert currently works at the MSU VOICE Center as a campaign coordinator, and Weber works in a neuroscience research laboratory as a lab assistant.

Paul Lachapelle, associate professor in the Department of Political Science, is also a faculty member in MSU Extension, serving as the community development specialist in the Local Government Center (LGC). At the LGC, he is involved in a variety of projects that benefit rural communities throughout Montana. One of his latest programs is the continuation of the "Extended Conversation" webinar series.



Paul Lachapelle

The current series features authors from the spring 2012 issue of the *Montana Policy Review*. With a theme of "sustaining communities through philanthropy," the webinars examine challenges and opportunities in rural communities, including policy strategies, ways to capture community wealth, estate planning and community collaboration. Working with Janelle Booth, MSU political science alumnus and community resource associate specialist at the LGC, they coordinate the webinar series and work to promote the series across the state and nation. According to Lachapelle, "Montana faces a tremendous opportunity to capture transferable wealth and direct it toward building communities and creating programs to help them flourish within the state. This webinar series helps connect experts in the field with citizens interested in establishing or growing their community's philanthropic legacy."



PSYCHOLOGY

Jessi L. Smith, associate professor of psychology and special assistant to the provost, is serving as the principal investigator (PI) and director for a five-year ADVANCE Institutional Transformation Grant from the National Science Foundation. The five-year grant, which was announced in September, will provide MSU with \$3.4 million to help broaden the participation of women faculty members by improving the work environment for the entire campus. In particular, the grant focuses on ways to increase the participation of women in the STEM fields of science, technology, engineering and mathematics and the SBS fields of social and behavioral sciences. Those are two areas where MSU men outnumber women. Smith said that MSU has three goals for the program. One is to implement strategies, programs and policies that enhance research opportunities. The second is to improve work-life integration, and the third is to create a climate of “cultural attunement,” which emphasizes the value and appreciation of diverse perspectives. MSU President Waded Cruzado, MSU Provost Martha Potvin and Thomas McCoy, the vice president for research, creativity and technology transfer, are serving as the co-PIs for the grant.



Jessi Smith and MSU President Waded Cruzado. Photo courtesy of Diane Letendre.

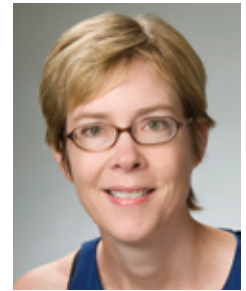
Richard Block, professor of psychology, was a recipient of the 2012 Charles and Nora L. Wiley Faculty Awards for Meritorious Research and Creativity. Sponsored by the MSU Foundation, the award is given in honor of the Wileys, who were pioneer ranchers in eastern Montana. Block is internationally recognized as the pre-eminent scholar of the psychology of time. He is the author of 82 scientific publications and the editor of a book, *Cognitive Models of Psychological Time*. His work on the psychology of time has been instrumental in changing the way the entire field of cognitive psychology regards temporal processing. In 2011, his work on the “return home effect,” where the trip back from someplace always seems shorter than the trip to get there, received considerable attention in popular media outlets such as *USA Today* and NPR News.



Richard Block. MSU photo by Parker Hilton.

SOCIOLOGY AND ANTHROPOLOGY

Sociologists David J. Eitle and Tamela McNulty Eitle have been awarded a three-year R01 research grant for \$657,195 from National Institute on Drug Abuse (NIDA) to explore alcohol and illicit substance use and abuse and HIV risk behaviors among American Indians and non-Hispanic whites.



Tamela McNulty Eitle

This represents the first NIH R01 grant awarded to the Department of Sociology and Anthropology at MSU and complements a NIDA R03 grant exploring stress and methamphetamine abuse among Montana teens that the two researchers are currently completing with research assistance from seven undergraduate students. Cumulative evidence indicates that American Indians are at a greater risk of alcohol and illicit substance use and abuse and HIV risk behaviors than other racial and ethnic groups in the U.S., yet there has been a relative paucity of research that has attempted to explain such behavior. The goals of the research team are to continue to explore how racial and economic stratification serve to produce health disparities from adolescence to adulthood, and to inform the discovery and implementation of efficacious prevention and interventions to reduce such disparities.

Last summer, 13 MSU students participated in a field school at an archaeology site located between Malta and Saco, Mont. Michael Neeley, associate professor of anthropology, and Nancy Mahoney, a non-tenure track faculty member, served as the co-field directors. The students helped excavate a series of tipi rings, stone cairns, drive lines and stone alignments, as well as a nearby bone bed associated with a bison kill area. The kill area was the focus of a 2010 summer field school excavation and dates back to 800-900 years ago (the Late Prehistoric Period). The 2012 field school reopened two of the units excavated in 2010 to determine if there were multiple episodes of occupation and use of the kill and processing area. The team hoped to gain an understanding of the geological and geomorphological history of the site, how was the site formed and destroyed. The team also analyzed the relationship between the bone bed and the nearby tipi rings and stone alignments. The project provided students with an excellent hands-on field experience and a better understanding of how archaeology is carried out.



Photo courtesy of Michael Neeley.

NICOL RAE NAMED DEAN OF MSU COLLEGE OF LETTERS AND SCIENCE

Nicol Rae, senior associate dean in the College of Arts and Sciences at Florida International University, has been selected as the new dean of the College of Letters and Science at MSU. Rae is a political scientist, with research interests focusing on American national political institutions, comparative political parties and party systems, European government and politics, and conservative politics. He is the author of five books on American politics. He holds a doctorate in politics from Oxford University and an undergraduate degree in politics from Edinburgh University. “We are extremely pleased to have Nicol join us,” said MSU Provost Martha Potvin. “He is a scholar, a highly talented and enthusiastic educator, and a skilled administrator. Colleagues and peers have the highest praise for him.” Rae will begin his duties at MSU on January 1, 2013.



Nicol Rae

TOMÁŠ GEDEON NAMED L&S DISTINGUISHED PROFESSOR

Tomáš Gedeon, professor in mathematical sciences and a member of the Center for Computational Biology, has been appointed as the newest Letters and Science Distinguished Professor, the highest honor the College of Letters and Sciences bestows upon a faculty member in the college. The appointment was made in recognition of Gedeon’s contributions to the college, to MSU and to the scholarly community at large, said Dean Paula Lutz. The appointment is for three years.



Tomáš Gedeon

Gedeon’s contributions to a wide range of applied mathematical problems are nationally and internationally recognized. Over the last few years, he has published several important papers in mathematical neuroscience, systems biology and mathematical biology, and has developed an international reputation for his excellent and insightful contributions to our understanding of the structure and function of biological systems.

His publication record is very prolific, with 69 papers published in many of the most prestigious journals available to applied mathematicians, including the *Proceedings of the National Academy of Science*, the *Journal of Computational Neuroscience*, and the *Journal of Mathematical Biology*. He has a sustained and impressive record of grant funding. Since 1996, he has been the principal investigator (PI) on National Science Foundation and National Institutes of Health grants totaling \$1,234,000, and a co-PI on grants totaling \$4,292,000.

UPDATE ON AMERICAN STUDIES AND LIBERAL STUDIES

In 2011, Provost Martha Potvin made the decision to move the American Studies and Liberal Studies programs back to the College of Letters and Sciences. The American Studies program is now being administered by the Department of History and Philosophy. American Studies offers a bachelor’s, master’s and Ph.D., which allow students to study the history, people, cultures and institutions of the U.S. in an interdisciplinary curriculum that combines the study of history, literature and the arts.

The Liberal Studies program is now being administered by Dean’s Office in the College of Letters and Science, with associate dean Sue Monahan serving as the director. The Bachelor of Arts in Liberal Studies offers students a general education degree designed specifically to meet the needs of students wanting to pursue a flexible cross-disciplinary educational program that is not as prescriptive as traditional curricula.



MSU senior Joe Thiel was selected as a 2013 Rhodes Scholar to Oxford University, where he will pursue master’s degrees in public policy and the economics of development. Thiel is set to graduate from MSU in May with degrees in chemical engineering and liberal studies.

DAVE DUENSING MEMORIAL GOLF TOURNAMENT



Dave Duensing. Photo courtesy of John Fisher.

Each year, the family and friends of Dave Duensing organize a memorial golf tournament to honor Duensing and continue his legacy by funding the Dave Duensing Scholarship. The third annual tournament was held in June.

Duensing, who graduated from MSU with a degree in microbiology in 1976, brightened the lives of generations of Montanans through his work at one of Helena’s most beloved landmarks, The Parrot Confectionery. He is remembered as an advocate for the Helena community, a revered native son and, above all, a good friend.



Microbiology major Kassidee Dalton received the scholarship in 2011. Next fall, Dalton plans to apply to the Montana Medical Laboratory Sciences program, which is offered through MSU. She hopes to pursue a career in a clinical lab or in public health.

A \$1,000 scholarship from the Dave Duensing Scholarship fund is awarded annually to a graduate of one of the Helena, Mont. high schools who is studying one of the hard sciences at MSU. Two scholarships have been awarded to date; microbiology major Kassidee Dalton received the scholarship in 2011 and chemistry major Jennifer Eller received the scholarship in 2012.

Plans for the 4th Annual Dave Duensing Memorial Golf Tournament are already underway. The event will be held in the spring of 2013 at the Green Meadow Country Club in Helena.



Golf tournament organizers. Photo by Kevin Hudson.



Participants in the 2012 Dave Duensing Memorial Golf Tournament. Photo by Kevin Hudson.

HAVE YOU INCLUDED MSU IN YOUR WILL?

Charitable gift planning is the process of making a gift to benefit MSU some time in the future. These gifts are extremely important because they are investments in the future to ensure continued excellence at MSU. The key to charitable gift planning is that you do not make a gift today. Instead, you include the Montana State University Alumni Foundation in your estate plan. You can also work with our Gift Planning Office to ensure that your express intentions are known and memorialized in a deferred gift agreement. It’s the best of both worlds.

Please consider including the Montana State University Alumni Foundation in your estate plan. If you have already made this wonderful commitment and have not notified us, please do so. We would like to make sure that we have the opportunity to thank you, know your intentions and include you in our Legacy Circle.

Please contact the College of Letters and Science development staff if you have questions regarding charitable gifts.

Melissa Dulin, Director of Development (sciences) melissa.dulin@montana.edu or 406-994-3046
Kelly Waterman, Director of Development (humanities) kwaterman@montana.edu or 406-994-2092



Melissa Dulin



Kelly Waterman

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