

INSIGHTS

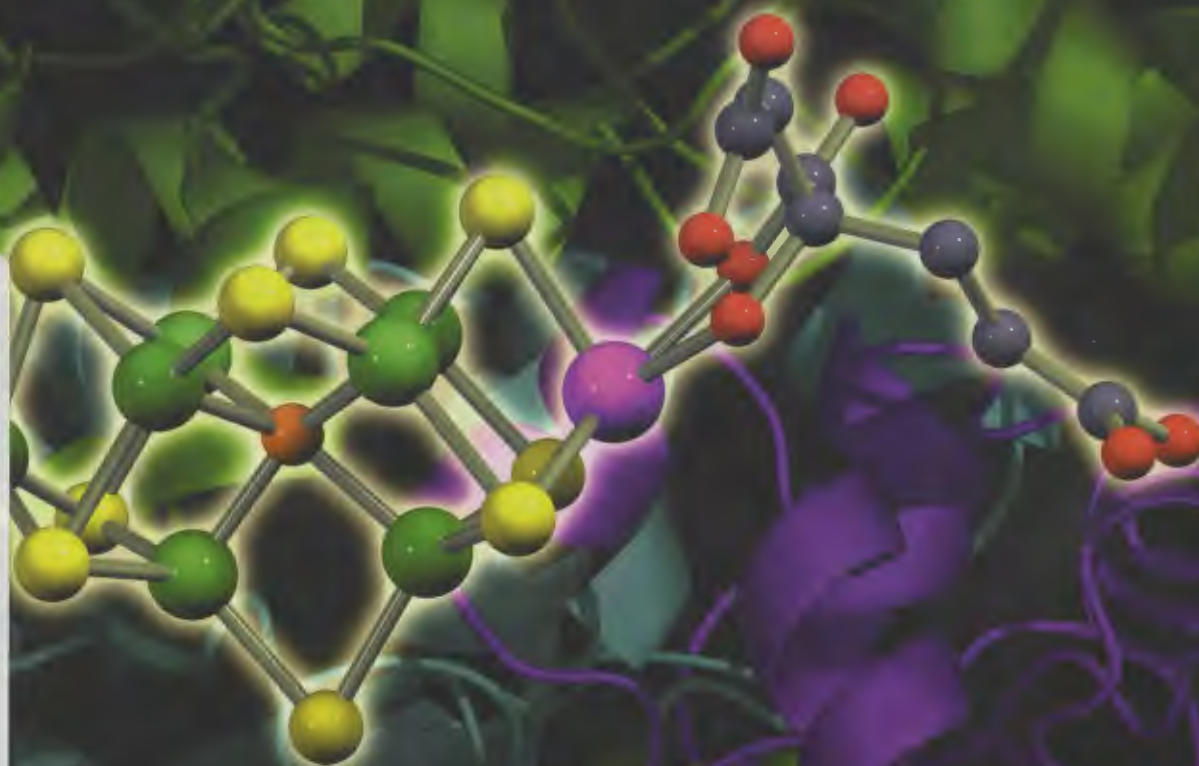
UTAH STATE UNIVERSITY - COLLEGE OF SCIENCE

When students and faculty learn together... discovery follows.

SUMMER 2006



Caught in the Act
*USU Chemists Catch Life-
Critical Enzyme in Action*



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Summer
2006

Biology | Chemistry and Biochemistry | Computer Science | Geology | Mathematics and Statistics | Physics



FROM THE DEAN'S OFFICE

We have finished the regular academic year and we are now well into summer session. The campus continues to buzz with all sorts of activity: academic, cultural, recreational, and physical. The Merrill Library site will soon be additional green space on the east side of the Quad and construction continues at a feverish pace on the new Living Learning Center buildings and parking structure directly west of Widtsoe Hall, site of the old steam plant. Here within the College of Science, Geology students have already returned from their four-week field camp course and ten new Willard Eccles Undergraduate Fellows have initiated research projects with their faculty mentors.



Dean Don Fiesinger

Of major significance on the research front was the legislative approval of the Utah Science, Technology and Research (USTAR) initiative this spring. This initiative brings outstanding researchers to campus with the idea that research discoveries in focused areas will create new technologies, jobs, and spin-off companies. One of USU's first USTAR hires is Dr. David York from the Pennington Biomedical Research Center in Louisiana. Dr. York, appointed as a tenured professor in the Department of Biology, will collaborate with current USU faculty on research in advanced nutrition and identifying causes of obesity. We look forward to highlighting Dr. York and his research team in a future issue of *Insights*.

Within this current issue of *Insights*, we are pleased to acknowledge the recent accomplishments of many of our students and faculty. You will note that we now have two valedictorians each year, reflecting our two university graduations, one in December and one in May. You will be able to catch up on the retirement activities of two emeriti faculty: Dr. David Drown and Dr. Don Sisson. Dave Drown was instrumental in developing our industrial hygiene program in Biology, and Don Sisson was head of the former applied statistics department and served on numerous graduate committees across campus, providing expertise on statistical methods and experiment design. Other articles will introduce the faculty promoted to the rank of professor in 2005 and their very diverse career paths, a dog-sled racing

Geology lecturer, and a chemist whose research has led to an understanding of the role of nitrogenases in converting nitrogen into important life-sustaining compounds.

I hope that you enjoy reading about the successes of our students, faculty, and alumni in the College of Science. Please contact me if you have any suggestions for future issues.

Sincerely,

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On the Cover: The fixation of N₂ from air is a critical reaction to all living systems. This reaction occurs in microbes where it is catalyzed by the enzyme nitrogenase. Shown is a portion of the nitrogenase enzyme along with the metal cluster where N₂ is fixed (foreground). Illustration by Michael Yurth.



CAUGHT IN THE ACT

USU Chemists Catch Life-Critical Enzyme in Action

USU chemists have solved a long-sought piece of the puzzle of how enzymes, known as nitrogenases, convert nitrogen into life-sustaining compounds on which all plants and animals depend.

Utah State Chemistry Professor Lance Seefeldt and Brett Barney, a USDA-funded postdoctoral fellow at USU, led an interdisciplinary team including scientists from Northwestern University and Virginia Tech that succeeded in capturing three steps of nitrogen fixation; that is, the process by which nitrogen is converted to ammonia.

The researchers' findings were published in the October 5, 2005 online issue of the *Journal of the American Chemistry Society*, and were featured in the October 17, 2005 issue of *Chemical & Engineering*



USU Chemistry Professor Lance Seefeldt (left) and postdoctoral fellow Brett Barney.
Photo by Donna Barry.

News, one of the world's most widely circulated trade publications. Additional findings have recently been accepted for publication in a special issue of the *Proceedings of the National Academy of Sciences* that will feature nitrogen fixation research.

"The structure of nitrogenase and the

general site at which nitrogen gets bound and reduced has been known for more than a decade," said Seefeldt. "But until now, we didn't know anything about how that process works."

The researchers developed a chemical methodology to trap and detect intermediates in nitrogenase-catalyzed reductions and flash-freeze samples. Using spectroscopy, they confirmed that the samples were indeed enzyme-bound intermediates.

Trying to capture nitrogenase in action is similar to trying to catch a single frame of movie film on a moving reel, said Barney. "You have to catch it in the act and freeze the frame so you can actually look at it and understand it." Using the same metaphor, Seefeldt explained that "once we collect all the frames we can watch the whole movie."

"We will be able to understand how the enzyme functions," he said. "This will drive a lot of research around the world and eventually could enable an alternative, clean method of producing nitrogen."

Currently, science and industry rely on the nearly century-old Haber process to produce nitrogen for fertilizer, paper, pharmaceuticals, plastics, mining, and explosives. Developed by German Nobel Prize winner Fritz Haber during World War I, the process, said Seefeldt, is costly, energy-intensive, and a source of pollution.

Humans and animals obtain nitrogen from protein in their food; plants get nitrogen from the soil. More than 80 percent of the earth's atmosphere is nitrogen, yet it is in a form neither humans, animals, nor plants access directly. "It's an incredible irony," said Seefeldt. "We need nitrogen to survive and we're swimming in a sea of it, but we can't get to it." ■

UNDERGRAD'S ARTISTIC EXPERTISE BENEFITS FACULTY AND FELLOW STUDENTS

Recent graduate **Michael Yurth's** artwork graces this issue's cover and represents a fraction of the work he's produced during his undergraduate career to benefit educational and research efforts in the College of Science. While earning a bachelor's degree in interdisciplinary studies with a minor in chemistry, Mike generously used his skills to create illustrated and animated teaching tools to help USU students understand complex scientific concepts and processes.

Mike studied art at Utah State from 1992-95 and got a job with a small Salt Lake software firm that was eventually acquired by Microsoft. Despite a lucrative position that enabled him to travel the world, the long hours and travel miles were taking a toll. He scarcely had time to spend with his wife and son before he had to hit the road again. He asked himself, "Was it worth it? At the end of the day, I was missing out on my son's childhood years and making games so kids could spend even more time on the couch."

A chipped tooth and subsequent infection landed him at the dentist, who suggested that he might enjoy the dental profession. After some soul-searching, Mike decided to return to Utah State for a science degree and prepare for dental school. Now, a new college grad at the ripe old age of 35, Mike has a phenomenal eight dental school acceptances in hand, which he credits, in part, to his undergraduate study and research experiences at USU.

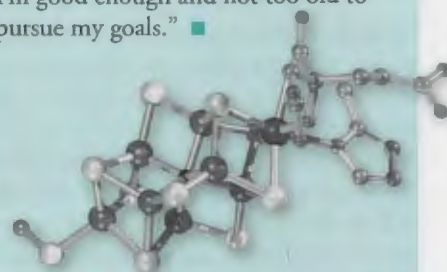
Mike praises his faculty mentors, including Lance Seefeldt and Andy Anderson, for helping him jump back into hard-core science studies following a ten-year gap from his previous college studies.

So which school did Mike choose? "University of Michigan, which has invested heavily in new technology," he says. "I'm a geek and, having worked for Microsoft, I'm accustomed to having access to the latest technology."



Mike Yurth

Mike starts dental studies in August. "I've erased my doubts and proven that I'm good enough and not too old to pursue my goals." ■



USU'S INTERMOUNTAIN HERBARIUM PASSES KEW IN THE QUEUE



یہ کی نگران بینڈنٹی آف ہیڈ ٹیٹ کی پھٹیر بھری دہس پائیز متارگل سے ملاقات کر رہی ہیں
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Please forgive **Mary Barkworth** if she takes a moment or two to gloat. She and colleague, **Michael Piep**, have earned it. Last November, USU's Intermountain Herbarium overtook the herbarium of London's Royal Botanic Garden, Kew in terms of the number of records each contributed to the Global Biodiversity Information Facility (GBIF). November 2005 scorecard: USU 85,563; Kew 85,497.

Why is this significant? "Well, for one thing, Kew is the largest herbarium in Britain and I'm British by origin," says Mary, director of the Intermountain Herbarium and associate professor in the Biology Department, who can't suppress the pride of watching the research center she's nurtured since 1979 in her adopted country compete in the league of a venerable institution in her homeland.

Sentimentality aside, the accomplishment is impressive. Kew is among the world's largest herbaria with seven million specimens and a staff of more than 550, of which about 100 are research scientists. In contrast, USU's herbarium houses around 243,600 specimens, has a staff of two, supplemented by a fluctuating number of students, volunteers, and individuals working on special projects. "Of course, Kew does a lot of things the Intermountain Herbarium does not do, but one does take delight in overtaking them in one small area for one brief shining moment," says Mary, who notes that the latest scorecard reveals that Kew has, once again, regained a solid lead over USU in record submissions.

Housed in an inconspicuous basement office of the Junction student cafeteria just north of the main campus, the Intermountain Herbarium offers what Mary describes as a treasure trove of resources. In addition to access to specimens, most of which are vascular plants but include some fungi and some bryophytes, visitors are treated to a work area with dissecting microscopes, a well-stocked reference library, a photographic slide collection, plant presses, computers, and a knowledgeable staff. For the past six

years, the staff has been meticulously cataloging all specimens into a database that can now be searched via the herbarium's Web site.

Mary notes that studies requiring plant identification should always be documented by herbarium or "voucher" species. "Voucher specimens can make it possible for others to evaluate the specimens you studied from a different point of view, giving added value to your work," she says. "Voucher specimens also add to existing knowledge on species distributions and diversity."

Beyond USU's campus, Mary has been assisting colleagues in Pakistan with plans to construct a national arboretum and biodiversity center at the University of Peshawar. She traveled last summer to the site of the proposed facility, located in the provincial capital of the North-West Frontier Province along Pakistan's border with Afghanistan. "Pakistan is making a major commitment to higher education and seeking partners to help them upgrade their higher education programs," she says. "The university's project will play a vital role in academic and research activities of teachers and students, and will be unique addition to the world's herbaria."

Mary hopes her involvement in providing technical assistance in the development of the herbarium will lead to faculty and student exchanges between the University of Peshawar and Utah State.

Back in the Intermountain West, Mary and Michael maintain a robust schedule of events designed to foster appreciation among academics and laypeople alike of the region's floristic diversity. Along with providing daily public access to the herbarium, the center offers guided wildflower hikes and plant identification treks, in cooperation with local plant societies, into Logan Canyon and other local areas of interest. Workshops offered by the herbarium cover a variety of plant and fungal groups. For more information, visit the herbarium Web site at www.herbarium.usu.edu. ■

ROAD SCHOLARS TOUR

USU'S RECENT "ROAD SCHOLARS TOURS" ARE TARGETING PROSPECTIVE AGGIES IN UTAH AND IDAHO.

College of Science administrators, faculty, and ambassadors were "front and center" in recent university efforts to recruit top scholars to USU. Our students and personnel participated in multiple "Road Scholars Tours," designed to initiate personal contact with prospective Aggies in Utah and Idaho.

USU President Stan Albrecht led a group of teams from each college to venues in Davis County, Provo, Salt Lake City, and



Associate Dean Dick Mueller talks with prospective students at Provo Open House, January 25, 2006.

Preston, Pocatello, and Malad, Idaho, this past academic year. With a focus on student recruitment and the many benefits Utah State has to offer, USU personnel met with nearly 2,000 people, mostly high school students and their parents, in open houses and high school campus visits. One high school principal commented



Science Ambassador Ryan Warner explains fields of study to aspiring Aggies.

that it was the first time a university president had taken the time to visit their campus.

The tours resulted in more than 150 new applications, 118 scholarships awarded on the spot, and the review of 121 transcripts of students who had already applied to USU and were still deciding on their college destination. ■

Oh, Beautiful for Amplified Waves of Gravity

USU doctoral candidate **Kim Nielsen** and Physics Professor **Michael Taylor** are investigating the first documented case of intense, fast-moving gravity waves in the polar mesosphere, the highest level of the Earth's atmosphere. Called a "bore," features of the 2001 event are relatively common at lower atmospheric levels. The researchers suggest that studying such phenomena at all latitudes will help refine global atmospheric circulation models. Their work was recently featured in the American Geophysical Union's *Geophysical Research Letters*.

INAUGURAL PROFESSORS

The following faculty members were promoted to full professor during the 2005-06 academic year. During the course of the year, the inaugural professors are invited to present a lecture about their academic and professional journeys with family, colleagues, and friends at USU President Stan Albrecht's home. We congratulate these outstanding scholars and educators who contribute immeasurably to our college.

Diane Alston, Biology • Alexander Boldyrev, Chemistry & Biochemistry • John Stark, Biology • Michael Taylor, Physics • Paul Wolf, Biology

Balancing Bugs



Diane Alston

As a child growing up in southern California, **Diane Alston** enjoyed tagging along on her father's junior high science field trips to the ocean shore and points beyond. Her favorite destination was the Corona del Mar tide pools near Long Beach, where she delighted in the colorful variety of marine animals and plants. "I wondered how so many different plants and animals could exist in

such a harsh environment," she recalls.

THOUGH SHE WASN'T RAISED ON OR NEAR A FARM—ALSTON'S INTEREST IN INTEGRATED PEST MANAGEMENT (IPM) GREW AND SHE EVENTUALLY EARNED A DOCTORAL DEGREE IN THE FIELD. "IT WAS THE NICHE I WAS MEANT TO FILL," SHE SAYS.

Alston, who joined the faculty of USU's biology department in 1989, initially dreamed of becoming a marine biologist. "But faculty mentors cautioned that job opportunities in the field were few and far between," she says.

After completing undergraduate studies at University of California-Riverside, Alston headed to the opposite side of the country—North Carolina State University—to continue her academic pursuits. Though she wasn't raised on or near a farm—"I didn't have agriculture in my upbringing," says Alston—she became interested in entomology and crop protection.

"I was 23 or 24 years old before I took my first entomology class. Work in a plant hematology lab opened my eyes to the importance of agriculture," she says. "We rely so much on plants for our lifestyle."

Alston's interest in integrated pest management (IPM) grew and she eventually earned a doctorate degree in the field. "It was the niche I was meant to fill," she says.

IPM, says Alston, is a concept of trying to protect plants from all different types of stresses, including insects, pathogens, nematodes, and weather. Biorational approaches provide a broad range of

viable alternatives to harmful pesticides, she says. Such approaches use a combination of insect growth regulation, conservation of biological agents, and application of microbial insecticides, as well as insect attractants and repellents to affect insects' communication systems.

Talking with growers on the front lines of agriculture, Alston realized that she must venture beyond the research arena and provide practical solutions. Her work at USU, where she has both a research appointment and an Extension appointment as an entomology specialist, is "the ideal job for me."

Alston considers her work with the 17-year-old Utah Tree Fruit Program among the highlights of her career. "Our goal has been to provide growers with viable alternatives to heavy pesticide use," she says. "We've really seen dramatic changes in how growers approach pest management."

She is encouraged by the evolution of Extension, which is changing to meet the increasingly urban needs of Utah. "Extension provides unique opportunities to share knowledge," she says. "The people of Utah should have free access to information that will improve their lives."

Her current research endeavors include a USDA-funded reduced risk pest management program for U.S. tart cherry production, along with a USDI-funded threatened and endangered plant pollinators project in Capitol Reef National Park.

Exploring Gold's Hidden Properties



Alexander Boldyrev

When we think of ultimate gifts or rewards, gold often comes to mind—a gold wedding band, a gold watch at retirement, or a coveted gold medal at the Olympics. The gold standard, though no longer used for monetary systems, is still the term used to describe utmost achievement and quality.

"Throughout history, gold has been highly valued because it doesn't rust," says USU chemistry professor **Alexander Boldyrev**. "Golden artifacts recovered from ancient Mayan temples and Egyptian tombs are as brilliant today as when they were carefully tucked away centuries ago."

INAUGURAL PROFESSORS

But is the enduring element really so immutable? No, says Boldyrev. He and his students' research on the structure and bonding of boron and gold molecular clusters was featured in the cover article, "Gold Apes Hydrogen," in the January 2006 issue of *The Journal of Physical Chemistry*.

Boldyrev and colleagues used photoelectron spectroscopy to examine the tiny structures at their most fundamental level. "We're trying to understand how atoms form clusters," says Boldyrev. "Starting with a boron atom, we added additional boron atoms—one by one—to form a stable structure."

The researchers tried adding hydrogen atoms and found that hydrogen bonded with boron; however, building stable boron-hydrogen clusters experimentally proved difficult. Boldyrev's collaborator, **Lai-Sheng Wang**, from Pacific National Laboratory, suggested trying gold. "We tried with gold atoms and were surprised to discover that gold behaved similarly to hydrogen—gold mimics hydrogen."

This was an exciting discovery, says Boldyrev, because gold—steadfast gold—has not been thought of as reactive in the past. In fact, he says, recent research indicates that gold is a very good catalyst at the nanoscale. Catalysts, he explains, are necessary for all living and non-living substances and processes.

It's too early to determine what sorts of applications might develop from such a discovery, says Boldyrev, but it opens the door to further exciting research. "Suddenly, gold has become a very important catalyst," he says.



Boldyrev and students' research was recently featured in *The Journal of Physical Chemistry*. Cover by USU student researcher Dmitry Zubarev.

now a postdoc at Yale, and **Dmitry Zubarev**, along with computer science student **Eldon Koyle**.

Already, the research team's article is garnering attention from the physical chemistry community, including a note to Boldyrev from chemist **Jesus Ugalde** of Spain's University of the Basque Country, who called the work "wonderful research."

Asked about the journey that led him to USU, Boldyrev says he prefers to talk about his students rather than himself. He's quick to praise the research contributions of doctoral chemistry students **Anastassia Alexandrova**,

Boldyrev proudly points out that Alexandrova was named the College of Science's Ph.D. Graduate Researcher of the Year in 2005. "I have very good students," he says.

A native of Siberia, Boldyrev left his homeland as the Soviet Union was collapsing. An invitation for a research fellowship in Germany, which he hadn't been allowed to accept when it was initially extended, was again offered and Boldyrev took it. He subsequently received employment offers in both the United States and Australia.

"The prospect of seeing Australia's unique wildlife was enticing," says Boldyrev. "But we decided that the American educational system might be better suited to my son, then 17."

Boldyrev accepted a visiting professorship at the University of Utah, from which his son earned a computer science degree. USU offered him a permanent position in 1999.

Utah's mountains differ from Siberia's endless steppe, but the forests remind Boldyrev of home. "I liked Utah and wanted to stay here."

Boldyrev graduated from Siberia's Novosibirsk State University with a bachelor's degree in 1974. He earned a doctorate degree from the Institute of New Chemical Problems, Academy of Sciences, Moscow in 1974 and a doctor of science degree from the Institute of Chemical Physics, Academy of Sciences, Moscow, in 1984.



John Stark

Risky Science

Growing up along the San Andreas Fault in rural Leona Valley, California, Biology Professor **John Stark** reveled in the beauty of southern California's wildflower zone.

"It looks as though someone took huge buckets of multi-colored paint and splashed them on the mountains and hills," says Stark of the area near the state's poppy preserve, where his father moonlighted as a wildflower photographer.

Stark credits his parents with encouraging his interest in science. He says his mom was "extremely tolerant" about the bug and animal collections he kept in his room. He admits, however, that his live snake collection just about sent her over the edge.

An enthusiastic sixth grade science teacher further stimulated Stark's inquiries, and time spent with an old chemistry textbook,

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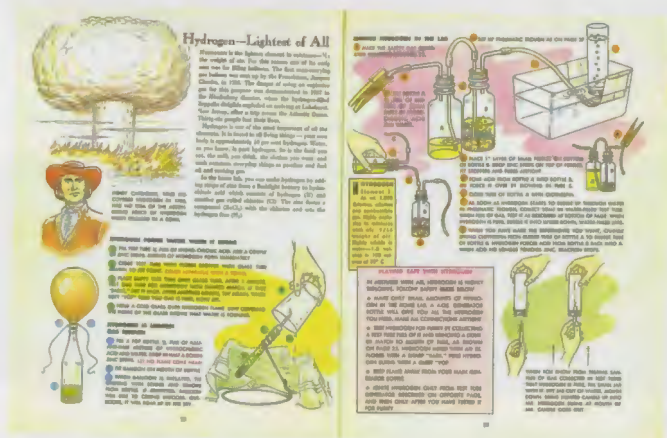
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You—Scientist!



Illustrations from the 1962 chemistry textbook that sparked John Stark's interest in science.

copyright 1962, fueled his curiosity. "The book had some really cool experiments that were too dangerous to be found in any of today's home chemistry books," says Stark.

Weekends found the youngster mulling over instructions for generating hydrogen and chlorine gas, as well as chloroform. "Nowadays chemistry sets are too sanitized, too safe, to get kids excited," he says.

This may be the major problem with science education today, Stark says. While he doesn't advocate letting children loose with dangerous chemicals, he laments the loss of risk and discovery in science classrooms.

"Students who aren't introduced to the hands-on excitement of science don't understand where science lives," Stark says. "Too often, kids are first exposed to science by teachers who were not science majors and who don't share the excitement of the scientific perspective."

Stark is also concerned about the current political assault on science and science education from powerful interest groups. "The scientific community has identified ecological concerns, including global warming, that people don't want to think about," he says.

Because interest groups search out the small minority that disagrees with these findings, says Stark, the public gets the impression that scientists can't agree on anything. This misconception erodes trust in sound scientific research.

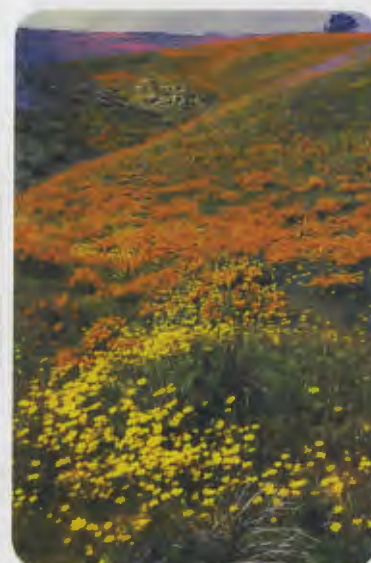
He notes that life sciences have been under particular attack due to political and religious reasons. "The scientific community is afforded much less respect than in previous generations and is treated as simply another special interest group."

In his teaching, Stark, a member of USU's biology faculty since 1991, emphasizes several key points to his students. "The first thing I talk about is the chemistry of life—life is a series of chemical processes," he says.

Stark also stresses how heterogeneity—or variety—is responsible for so much of biological phenomena. "We tend to think in terms of averages, but that's not reality. If you look only at averages, you miss what's really happening."

He notes that radioactive waste leaching from Washington State's Hanford Nuclear Reservation into the Columbia River is an example of scientists' failure to look beyond averages and foresee the long-term environmental impact of the site's operations. "As a result, the Hanford facility has created one of the largest environmental disasters in our country," says Stark.

Lastly, Stark emphasizes the value of modeling. "All humans create conceptual models of reality in their heads," he says. "It's a good way to organize ideas and formalize your own view." When you go through the process of developing a model, says Stark, you understand your own ideas better and you quickly expose areas of ignorance.



Wildflowers in Antelope Valley, California, by photographer O.M. Stark, John's father.

INAUGURAL PROFESSORS

These three principles became the basis for Stark's work in determining rates of nutrient cycling in soil and the resultant impact on greenhouse gases. "The assumption was that microbial production was regulating the flow of gas, but we discovered that microbial consumption actually plays a more important role in controlling the rate at which certain gases escape from the soil," he says. "Also, microbial consumption is extremely important in regulating nutrient availability to plants and retention of nutrients in ecosystems."

Stark completed his undergraduate studies at California's Humboldt State University in 1981. He earned a master's degree from Colorado State University in 1984 and completed his doctorate degree from University of California-Berkeley in 1991.

Stark's current research topics include microbial controls on N-cycling in forest and rangeland ecosystems, trace N-gas production by soil microorganisms, the ecology of nitrifying bacteria and the role of microorganisms in controlling plant community structure. He is director of USU's Stable Isotope Laboratory.

Capturing Stardust in the Sky



USU Physicist Mike Taylor
(photo courtesy of NASA)

After the heady experience of capturing video from a NASA DC-8 of the fastest manmade object to ever breach the earth's atmosphere, USU physicist **Michael Taylor** and research team members diligently returned to the mundane task of packing gear and offloading the aircraft.

The NASA plane was on to the next assignment in its tight schedule and he and his research team had to quickly

relinquish their turn; but not before collecting valuable data as NASA's Stardust Comet Sample Return Mission capsule, carrying cometary and interstellar particles, successfully touched down on the West Desert salt flats of the U.S. Air Force Utah Test and Training Range. "It was a very exciting, if short-lived, experience," said Taylor, who added that he and his colleagues were grateful for the opportunity to record the memorable January 15th reentry of the Stardust capsule.

Taylor's long held fascination with atmospheric gravity waves and the dynamics of auroras—"those beautiful curtains of red and green lights"—fueled his research and rare expertise in photographing atmospheric phenomena.

"As the DC-8 flew in circles, we trained our Xybion intensified camera on Stardust and were able to start collecting data well before its parachute deployed," said Taylor. "We had experience in photographing meteors and the capsule acted like a giant meteor."

While Stardust's primary mission was to rendezvous with comet Wild 2 and fetch pristine particles held in a cosmic deep freeze for billions of years for earthly study, NASA is keenly interested in the capsule's performance.

Taylor said Stardust is the first NASA vehicle to sport a heat shield comprised of PICA (phenolic impregnated carbon ablator). "As NASA looks toward future missions and the next generation of spacecraft, protecting vehicles during reentry is a key concern," he said.

Taylor's original career path pointed toward the telecommunications industry, but an obscure bulletin board notice caught his eye just days before graduation from the University of Southampton in his native England.

"I had several jobs lined up, including telephone communications engineer, but I saw a notice seeking research assistance with atmospheric sounding rockets," recalled Taylor. "It was a late Friday afternoon, but I hurried in to talk with the professor conducting the project. An hour later, I had the job."

Utah State's emphasis on atmospheric studies and space research enticed Taylor to USU. "I was a grad student when I happened to meet (USU Professor) **Doran Baker** at a conference in Dublin, Ireland," said Taylor. "He told me about the atmospheric research underway at Utah State and we cooked up a joint project in the early 1980s that worked out extremely well."

Taylor eventually joined USU's Space Dynamics Laboratory in 1991 and was subsequently offered a faculty position in the university's physics department and Center for Atmospheric and Space Sciences in 2001.

He said coming to the United States and joining Utah State have provided significant opportunities. "It would be difficult to access similar opportunities in Britain," said Taylor, who explained that, in the United Kingdom, research grants are typically reserved for tenured faculty only. "Here I am encouraged to write applications and can talk directly with grant program managers. It's been a big springboard for me."



The Stardust capsule burst through the Earth's atmosphere like a giant meteor.
(Photo courtesy of Mike Taylor.)

Beyond research, Taylor said he enjoys teaching and the interaction with students. "We have top notch students here at Utah State," he said. "The involvement of undergraduate and graduate students in research is a very important part of the learning experience."

For more information about the Stardust mission, visit its Web site at <http://stardust.jpl.nasa.gov>.

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Bluethroats vs. Bluebloods



Paul Wolf
Biology Professor

As a young teen, **Paul Wolf** received a school report that described him as “unfocused and easily distracted.”

Wolf, who joined the faculty of USU’s biology department in 1992, conceded that he is easily distracted. “Curiosity continually drives me,” he says.

But whether or not Wolf is unfocused may be ‘in the eye of the beholder.’ He recalled an incident in secondary school in his native England, where he was a member of the reception committee preparing for a visit from Prince Charles.

“I was also an avid member of a bird watching group that was continually on the lookout for the return of resident species,” says Wolf, who explained that a number of resident bird species in England were killed off during the harsh winter of 1962-63.

Lo and behold, an elusive bluethroat was spotted near campus and Wolf rushed off to watch for it. He completely forgot about the royal visit. “My headmaster was not happy,” says Wolf.

Try as he might, Wolf simply couldn’t make his headmaster understand that seeing a bluethroat was a much rarer and more significant opportunity than meeting a blueblood. “I guess I knew then that I was doomed to academia,” says Wolf.

He entered the University of Leicester, where he decided to pursue botany rather than zoology because the former promised a field trip to Mallorca. “I was looking forward to sunny beaches, discos and cheap wine,” admits Wolf.

Once ensconced in the popular Mediterranean tourist destination, however, Wolf spent most of the trip (willingly) hunched over a dissecting scope. Thus began his shift in focus from animals to plants.

Today, Wolf’s research is focused on DNA sequencing and how plant genes and genomes evolve over long periods of time. He’s involved in a National Science Foundation-funded project called the “Tree of Life,” which seeks to depict how all organisms are related. “This is not a trivial task,” says Wolf.

As part of the project, Wolf is focused on the collection of developmental, morphological, and genomic data of green plants.

“Green plants are among the most well understood organisms and we can apply the principles we’ve learned from these plants to other parts of (the Tree of Life),” he says.

Most of Wolf’s current efforts involve looking at chloroplast genomes and watching for changes, including particular divergent events. These changes may or may not be associated with evolutionary adaptation. Wolf and colleagues suspect not. “They may simply be rare events that indicate common ancestry, much like backbones indicate that all vertebrates share a common ancestor,” says Wolf.

Wolf was named a USU Mortar Board Top Professor in 1998. He earned a bachelor’s degree in biological sciences from the University of Leicester and a master’s degree in botany from the University of Kansas. He completed a doctoral degree in botany at Washington State University and postdoctoral studies at the University of California, Irvine. He has published numerous peer-reviewed journal articles and book chapters. ■



Paul Wolf (at about 18 months) and his Austrian-born father enjoy rare skiing during England’s record cold winter of 1962-63. Paul says he inherited his father’s love of mountains and nature.

Reptilian Retrospective

USU student researcher **Bronson Barton** and Geology Professor **David Liddell** are taking a closer look at relatively unknown armored reptiles that emerged during the Late Triassic Period. Among these creatures was *Vancleavea campii*, a reptile resembling both an armadillo and an iguana. A partial skeleton of an animal belonging to this group was recently discovered in Arizona’s Petrified Forest National Park.

CHEMISTRY ALUM OFFERS A TALE OF ACADEMICS AND INDUSTRY



Carl Wittwer, 2006 recipient of the Department of Chemistry/Biochemistry's Alumni Achievement Award.

USU chemistry alum **Carl T. Wittwer** recalls that his days at Utah State weren't all spent laboring over a hot bunsen burner and memorizing complicated acronyms and formulas. He indulged his interest in mime, as well.

"I took classes from (former) theatre instructor **Ron Ross** and later joined his mime troupe," says Wittwer, who attended USU from 1975 to 1982. "We gave a

few summer performances at the (Caine) Lyric Theatre—it was a fun time."

Utah State's chemistry and biochemistry department welcomed Wittwer back to campus as guest speaker April 18. In his talk *"A Tale of Academics and Industry: Real-time DNA Analysis,"* he reminisced about the academic experiences that shaped his professional journey.

The recipient of the department's 2006 Alumni Achievement Award, Wittwer holds the *Watkins Endowed Chair of Pathology* at the University of Utah and serves as chief science officer and vice president for research for Idaho Technology, a company he co-founded in 1990.

He earned a bachelor's degree in chemistry and a doctorate degree in biochemistry from Utah State. He received a medical degree from the University of Michigan School of Medicine in 1984.

Wittwer surmises that he was probably the last doctoral student of the late **Gaurth Hansen**, USU Distinguished Professor Emeritus and renowned biochemist. Wittwer remembers working industriously at the lab bench when Dr. Hansen stopped by and said, "Carl, you're doing a great job but once a day you need to stop and think about your basic hypothesis and what your research is trying to tell you."

Wittwer recalls that another valuable piece of Hansen's advice was not to take things at face value. "He asked me, 'Carl, why do you think the chemical in the bottle is what you say it is?'"

"Dr. Hansen taught me to ask more questions," says Wittwer. "And not to necessarily believe everything I read, saw, or heard."



During his student years in the mid-70s, Wittwer performed mime under the tutelage of Salt Lake TV personality Ron Ross, also known as "Fireman Frank" and "Dr. Volapuk."

In his initial entrepreneurial venture in the early 1980s, Wittwer teamed with fellow Aggie, **Kirk Ririe**, to lay the groundwork for what is now Idaho Technology. The company had its humble beginnings, appropriately enough, in a potato farming equipment warehouse.

"I'm impatient, lazy, and cheap," says Wittwer. Qualities, he hastily adds, he didn't acquire from Utah State, but qualities that fuel his business endeavors. "I remain an academic and sometimes it's hard to achieve a balance between academia and industry," he explains. "But sometimes it's better to do things quickly with minimal effort and expense."

The key to transforming a research process into a commercial one, he says, is using simple, relatively inexpensive components. Wittwer's initial product prototypes included common household appliances, such as blow dryers and vacuum cleaners.

In the ensuing years, Wittwer developed innovative rapid polymerase chain reaction (PCR) techniques that perform DNA amplification in 10 to 15 minutes. These techniques, now used throughout the world in real-time PCR instruments, permit timely analysis of tiny DNA samples, which aid multiple scientific applications. Wittwer also holds the patent for the Ruggedized Advanced Pathogen Identification Device (R.A.P.I.D.®) system that serves as the platform for U.S. military defense against biological weapons.

A 2003 recipient of the Governor's Medal for Science and Technology, as well as numerous awards from the scientific community, Wittwer has published 100 peer-reviewed papers and holds more than 20 patents covering DNA detection methods, including the LightCycler® system for research and diagnostics.

Wittwer says he and his wife, **Dr. Noriko Kusakawa**, are frequently humbled and instructed by their young son, **Tori**. ■



Wittwer holds more than 20 patents for DNA detection methods.

BIOLOGY DEPARTMENT SHOWCASES UNDERGRAD RESEARCH

Utah State University biologists stepped into the spotlight last November to present cutting-edge research findings ranging from tissue-engineered cardiac stents to an update on the Nobel Prize-winning polymerase chain reaction 'technique of the decade.'

Were the scientists distinguished professors? Doctoral candidates? Actually, no. The more than 20 presenters were all undergraduate biology majors, some of whom were in their first semester of research, who displayed posters and gave talks at the USU Biology Department's first Semi-Annual Biology Undergraduate Research Conference.

"The idea for the event came from an informal faculty meeting in spring 2005 where we were kicking around ideas about how to enhance our undergraduates' learning experiences," says **Professor Jon Takemoto**, who has served as department head for the past three years and passes the helm to **Professor Daryll DeWald** this summer. "We thought the conference would provide a way for the students to get together and share their experiences and gain confidence in presenting to their peers."

Since the initial showcase, the department held a second successful conference this past spring and plans to continue the semi-annual gatherings.

Takemoto says that students engaged in original research, particularly in the earliest phases of their education, perform better in college and in their eventual careers. In addition, he says, it is imperative for undergraduates seeking admission to competitive graduate and professional schools—including medical schools—to have research experience. Over the past several years, USU's medical school acceptance rate has been 15 percent higher than the national average, and its dental school acceptance rate 25 percent higher than the national average.

LAM SAYS SHE WAS NERVOUS BEFORE PRESENTING HER RESEARCH—HER FIRST FORMAL PRESENTATION BEFORE FACULTY AND PEERS. "I WAS AFRAID THEY'D ASK QUESTIONS I COULDN'T ANSWER." "I'M NEW AT THIS AND STILL HAVE A LOT OF WORK TO DO."

"Med schools don't even look at your application if you don't have research experience," says **Uyen Lam**, a conference presenter and an aspiring physician. Lam, a second-year Aggie who graduated from Utah's Logan High School in 2004, displayed her efforts in optimizing a technique for early detection of Whirling Disease in fish.

Lam says she was nervous before presenting her research—her first formal presentation before faculty and peers. "I was afraid they'd ask questions I couldn't answer." But as she took the podium her jitters calmed, she said, as she began talking about her work. "It was a good experience. I got some great suggestions from faculty on ways I could improve my experiments," Lam says. "I'm new at this and still have a lot of work to do."

The types of research USU undergrads pursue aren't trivial, says **Professor Joseph Li**, who serves as a faculty mentor to Lam and

a number of other undergraduates. Lam's research could accelerate efforts to prevent the spread of Whirling Disease, which impacts recreational and commercial fishing throughout North America.



Undergraduate researchers Glen de Guzman and Uyen Lam share a light moment at the inaugural Biology Undergraduate Research Conference last fall.

"Our students are involved in research that is competitive at national and international levels," says Takemoto. "It is likely that more than one of these students will be presenting their current work at professional and scientific meetings."

He adds that conducting research is one thing, explaining it is another. "Presenting work orally or as a poster is a great way to make students think about what they're doing. It makes them take a hard look at their results and data and often reveals what's missing or needs to be done."

Senior and 2005-06 Eccles Undergraduate Research Fellow **Rochelle Gainer**, who worked in **Paul Wolf's** lab and presented her research findings on a plant endangered by Las Vegas' burgeoning development, said her lab partners help her rehearse. "This was my first presentation, so my lab buddies really put me through the gauntlet."

Research isn't complete until the results have been shared with others, says **Mary Barkworth**, associate professor and a conference organizer. "One often finds new questions and goes back and does things differently. It's all part of the research experience."

Beyond honing presentation skills and building a resume, all the faculty members agree that the research experience is an enriching end in itself. Undergraduate research propels students beyond what they learn in the classroom and in books, says Li. "To conduct research, you have to make a decision to seek information in uninvestigated areas, you have to identify your objectives, plan an experimental approach and perform experiments to support or challenge existing hypotheses," he says.

"From research I learned about surviving disappointment and frustration," says **Emily Warnock**, who presented American Heart Association-funded research she conducted this past summer in **Tim Gilbertson** and **Kytai Nguyen's** lab. Warnock graduated this spring and plans to enter pharmacy school.

Research results are not always as exciting as one would hope, says Barkworth, but time spent in the lab or the field engages the student in a way that leads to a greater depth of learning than the classroom. "Fifty years from now, our students may not be able to remember what they learned in a textbook. But they'll probably be able to tell you the results of their undergraduate research studies." ■

DEWALD NAMED BIOLOGY DEPARTMENT HEAD

Sometimes new bosses walk into workplaces where everything's broken and needs immediate repair. **Professor Daryll DeWald** is quick to point out this is not the case with USU's Biology Department. DeWald, who succeeds **Jon Takemoto** as department head July 1, describes the department as a "well-oiled machine."

"We have outstanding faculty and staff," he says. "I'm inheriting a very healthy department from Jon and **Butch Brodie** before him, and we're poised for even more growth."

Growing research and teaching connections across campus, along with the state's new Utah Science, Technology and Research Initiative (USTAR), open new doors of opportunity for the department, says DeWald. "USTAR bolsters our ability to recruit top-notch researchers and strengthens our collaborations with the University of Utah. This initiative will have far-reaching, positive effects for USU and for our department."

Like his predecessors, DeWald says, he's a "huge advocate" for undergraduate research. "Our department has unique strengths in this area and I want to continue to foster faculty-student collaborations."

DeWald, who also serves as associate director for research for USU's Center for Integrated BioSystems, has been actively involved in the university's Multicultural Science Research

Fellowship program. The scholarship program seeks to provide students from underrepresented groups with science research opportunities. "Pairing students with faculty mentors and involving them in meaningful research ventures is critical for student retention," he says.

Another goal DeWald plans to pursue is growth in the department's graduate programs. "This is very important for us and is a growing challenge as competition among universities for the best and brightest candidates increases," he says. "Graduate schools are offering more generous teaching and research assistantships and we need to keep pace."

Along with increased recruitment comes the need to plan for future facilities. "The university has been considering new space for our department for some time and I look forward to being involved in that process," says DeWald.

Yet another area where DeWald seeks growth for the department is the establishment of endowed chair professorships. "Having the opportunity to recognize outstanding faculty in the department and bringing in established investigators would greatly enhance our programs," he says.

"We have a strong infrastructure and a strong team in place," says DeWald. "I look forward to continued progress in our research and teaching endeavors." ■

BIOTECHNOLOGY ROUNDTABLE II

College of Science faculty and students joined with prominent USU alumni in the biotechnology field for Biotechnology Roundtable II March 16-17. Together, the group asked where the biotechnology industry is headed. How can USU and industry work together to enhance research and economic opportunities? What knowledge, skill sets, and experience will students need to succeed in biotechnology careers?

Alumni panelists included **Bill Barnett**, director of research and product development, Hyclone; **Don deBethizy**, president and CEO, Targacept Corporation; **Ned Israelsen**, managing partner, Knobbe, Martens, Olsen & Bear Patent Attorneys; **Henry Nowak**, executive-in-residence, management and human resources department, USU College of Business, and manager, Small Business Accelerator, USU Technology Commercialization Office; **Vernon Rice**, intellectual property law specialist, Workman Nydegger Attorneys; **Alan Smith**, chief operating officer, Cognate Therapeutics; **Richard Thomas**, president and CEO, Intercet, Ltd.; and **James Thompson**, director of research and development, Spendlove Foundation.

USU faculty members shared information about current research in genomics and bioinformatics, along with industry collaborations. Alumni panelists discussed areas in which biotechnological skills are in highest demand, including bioterror defense, medical research, and agricultural applications.



Alumni panelists, from left, Ned Israelsen, Richard Thomas and Alan Smith shared their expertise with Biotechnology Roundtable II participants.

Panelists advised students to pursue a solid core of classes in chemistry, physics, math, computer science, and related fields, as well as courses in business and management. Critical thinking and problem solving skills and management experience were cited as sought-after attributes in job candidates.

"We convened Biotechnology Roundtable I back in 2003, which provided an opportunity for our alumni, faculty and students to become acquainted with one another," said **Dean Donald Fiesinger**. "Biotechnology Roundtable II provided the opportunity to strengthen these collaborations and position ourselves for the future." ■

CHASING THE NORTH STAR

USU GEOLOGIST PARTICIPATES IN ALASKA'S 2006 IDITAROD

For the time being, **Sue Morgan** is in no condition to corral high-energy canines, but she's already setting her sights on future sled dog competitions. The USU geology lecturer crashed in the 2006 Iditarod, broke a rib and was forced to drop out of the race.



Sue Morgan, geology lecturer and Iditarod veteran, on the trail.

"My side is still sore and I have to be careful not to do too much," says Sue. "I am disappointed, of course, but I plan to run races in Montana and probably Canada next season to qualify for Iditarod 2008."

Sue's March 8 mishap came during a particularly treacherous stretch near Rainy Pass, where the Iditarod trail crosses the Alaska Range. On its Web site, outdoor retail giant Cabela describes this portion of the trail as "a half-mile descent (that) borders on an out-of-control free fall. Wrecks on this section of trail are legendary."

"I am fine," says Sue, who took a leave of absence this past spring semester and resumed teaching this summer. "And my dogs are fine. They had a great time and loved the twisty winding trail."

More than 80 competitors competed in this year's Iditarod, which starts at Wasilla, about 43 miles north of Anchorage, runs west along the Yukon River through two mountain ranges and concludes in Nome. Sue was among 20 rookies competing in the formidable 1,150-mile trek known as "The Last Great Race." Sue is matter-of-fact about her experience, which belies the enormous persistence, commitment and courage required for

such a pursuit. So what would possess a person to go to such great lengths to endure such a grueling undertaking?

"I'm into adventure," says Sue, a Chicago native and avid back-country skier. She assembled a small team of dogs in 1999 and discovered "it was a blast running with dogs." "You really get to know the dogs," says Sue. "The dynamics with the group is really interesting."

She gradually added more dogs to her team and successfully completed a 50-mile race in Montana five years ago. "After that race, the dream of running the Iditarod surfaced and took over my life." From there, Sue and her dogs worked up to 300-mile races, which qualified them for the ultimate sled dog competition.

Sue says the key to race readiness is "getting the training miles in." When snow cover is sparse she races the dogs with an ATV instead of a sled. "The dogs are extremely strong and, believe me, they want to go."



Sue hits the trail with her sled dog team.



Sue waves to spectators during a qualifying event in Montana.

As with any team, the human musher and canine athletes must learn to work together. Sue runs a tight ship. "I won't tolerate dogs biting each other," she says. "Dogs are extremely intelligent animals and, when racing, they don't make mistakes."

Sue maintains that a long sled race is as mentally challenging as it is physically challenging. "The fatigue, the tough trail conditions, the cold—it's hard to watch the dogs struggle, yet they can do it."

Training for the race itself is just part of the endeavor. As with many worthwhile pursuits, coming up with the cash to fund the dream and completing race preparations are necessary tasks. Sue's description of the logistics involved in simply transporting 19 race dogs from Utah to Montana to Alaska and back sounds like a complicated military maneuver. "I put a flatbed on my Ford 250 (truck) with double-decker dog boxes," she explains.

Trying to decipher the origin of the name "Iditarod" reveals a number of conflicting opinions, which comes as no surprise to seasoned Alaskophiles. The confusion simply reflects the enigmatic culture of North America's last frontier.

Though most agree the race was named for western Alaska's Iditarod River, some claim the name is derived from the Shageluk Indian words meaning "clear water." Others insist the name comes from Ingalik and Holikachuk words meaning "distant place." Whatever the origin, the race's nickname, "The Last Great Race," aptly describes the world's most famous sled dog race.

Her smallest dogs weigh about 50 lbs. each. "I put them in the top boxes because they're the easiest to lift down," she says. Sue won't allow the dogs to jump down from their berths on their own. "There's too much risk of shoulder or other injuries."

Other preparation includes packing food, water containers, protective paw booties and harnesses—and that's just for the dogs. Mushers, the human race participants, must prepare for extended darkness in subzero temps and unpredictable winter weather. Sue remains undaunted. "There's nothing finer than being on the sled," she says. "We have a great time together." ■

Branching Out

USU College of Science Undergraduate Research Fellow **Arthur Mahoney** and Computer Science **Associate Professor Daniel Watson** are developing a "Pseudo Rapidly-exploring Random Leafy Tree" (PRRLT) algorithm to improve communication between robots. Increasingly used in military and workplace applications, robots are often required to operate as a team. PRRLT could overcome shortcomings of existing line-of-sight radio communications, which are often foiled by physical obstacles.

2006 COLLEGE OF SCIENCE AWARDS PROGRAM



Scholarship Recipients Left to Right: Elizabeth A. Smith, Oscar Wood Cooley; Randy Bowen, Seely-Hinckley; Kody Crowell, Seely-Hinckley; and Justin Thorpe, Seely-Hinckley. Not pictured: Samantha Odle, Theodore M. Burton; N. Tyler Elison, Joseph E. Greaves; Lincoln Webb, Questar, and Daniel Housley, Seely-Hinckley.



College of Science Scholarship Recipients Left to Right: Landon Preece, Brian T. Lee, Chris Healey, and Michael Bailey. Not pictured are Kandis Carter, Michael Dana, Douglas Holt, Samantha Odle, and Brandon Wright.



Left to Right: Melissa Beighly, Lawrence H. Petite Endowed Graduate Student Scholarship; Martha Garlick, Graduate Student Teacher of the Year; and Chris Feldman, Graduate Student Researcher (PhD) of the Year.



Left to Right: Willar. Eccles Undergraduate Fellows Kristi Rider, Brittany Webb, Matthew Jorgensen, Melody Anderson, Amanda Mortensen, and Keith Rimington. Not pictured are Daniel Housley, Elizabeth Smith, Kellen Springer, and Amber Stayner.



Left to Right: Undergraduate Research Mentor of the Year Lisa Berreau, Faculty Researcher of the Year Alvan Hengge, and Teacher of the Year, Gregory Podgorski.



Scholar of the Year Glen de Guzman and Spring Valedictorian Julie Crockett.

ALUMNI PARTY AT GSA MEETING



USU alumni, students, and faculty gather at the Geological Society of America National Meeting October '05 in Salt Lake City, Utah. Back row, from left, Steve Kerr MS, Dean Don Fiesinger, Kevin Thomas, MS in progress; Dave Leppert, BS; Art Mendentall, Cam Snow, MS, Paul Grams, MS, Associate Professor Pete Kolesar; and Matt Pluta, BS. Front row, from left, Associate Professor Susanne Janecke, Jon Greg Solum, BS; Dan Rogers, BS, MS; Professor Jim Evans, Stephanie Carnie, MS; Zo Shipton, Postdoc, Temporary Faculty; and Stephan Kirby, MS.

PREVIEW MAJOR FAIR



Assistant Professor Dave Brown, Mathematics & Statistics (seated), advises prospective student about College of Science Programs of study at the October 2005 Preview Major Fair.



USU student Ryan Hoffman, left, joins John L. "Jan" Hall, 2005 Nobel Prize Laureate in Physics, at the American Physical Society Four Corners Regional Meeting last October in Boulder, Colorado. Hoffman received an award in the Graduate Student Paper category.

AMERICAN PHYSICAL SOCIETY FOUR CORNERS MEETING



USU students pose with Nobel Laureate John Hall and his wife, Lindy, at the 2005 APS 4 Corners Meeting held at the University of Colorado. USU Physics Associate Professor Mark Riffe was elected region president. USU hosts the 2006 regional meeting October 6-7.

PHI KAPPA PHI HONOR SOCIETY



Dean Don Fiesinger, Far Right, at the March 30, 2006 Induction Ceremony of students into the Phi Kappa Phi Honor Society. Inductees were Kenneth Peña, Richard Walker, Elizabeth Parrish, Brett Hamilton, Michael Addae-Kagyah, Ashley Butler, and Glen de Guzman.

BOISE BASKETBALL GAME & ALUMNI GATHERING

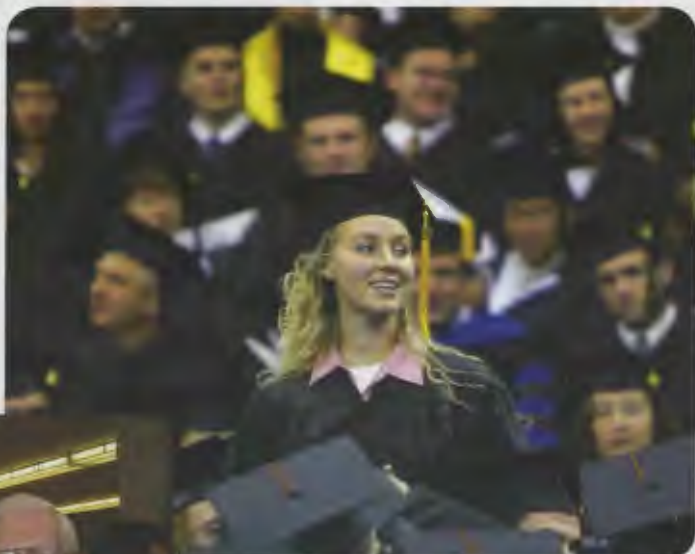


Idaho Aggies celebrate the USU's men's basketball team's victory over Boise State at the February '06 Boise Alumni Gathering. From left, Chris Tallackson, development director; Gary Godderidge BA'90 MS'94, Beth Godderidge, Mark Salisbury BS'02, Kim Salisbury, BS'98 MS'00, Joe Grover BS'01, Lyle Taylor BA'99, Nadine Taylor, Mary Horne, Craig Horne BS'84, and Dean Don Fiesinger.

GRADUATION



Smiling Graduates gather at Spring '06 Commencement



Fall '05 Valedictorian Maria Horrocks



Computer Science Technician and graduate Bob Wood celebrates with his father, Physics Professor Emeritus John Wood.

DON'T CALL THEM GEEKS

GOLD MEDALISTS LIGETY AND MANCUSO WERE USU PHYSICS DAY ENTHUSIASTS

Before they were gold medal stars of Torino's 2006 Winter Olympics, U.S. skiers **Julia Mancuso** and **Ted Ligety** teamed up in 2000 for a USU Physics Day project.

The dynamic competitors were high school classmates at Park City, Utah's Winter Sports School. The small private academy holds classes from April to November to accommodate the busy training schedules of budding winter athletes.

Physics Day, initiated by USU's physics department in 1989, currently draws some 6,500 middle and high school students each spring, accompanied by more than 300 teachers, from Utah and surrounding states to Davis County's Lagoon amusement park. This year's May 19, 2006 gathering yielded yet another well-attended round of hands-on learning experiences, academic competition, and fun.

"We estimate that more than 65,000 students have attended Physics Day over the years," says J.R. Dennison, USU physics professor and a founding organizer of the event. "What better laboratory to entice young people than an amusement park?"

USU coordinates the day-long extravaganza with partner Idaho National Laboratory (INL). In addition to logo, demonstration, and ride design contests and a Physics Bowl academic competition, the day's activities include experiments performed directly on the park's rides. Students build their own accelerometers to measure G-forces on the Colossus roller coaster and design their own protective containers to drop a raw egg to a ground target from a moving car on the Sky Coaster. The Sky Drop Contest, which involves dropping an egg



Champion skier Ted Ligety participated in Physics Day 2000's ride design contest. Photo courtesy of the U.S. Ski Team.



Olympic gold medalist Julia Mancuso is a former Physics Day enthusiast. Photo courtesy of the U.S. Ski Team.

Participation, sponsorship, activities and prizes for the event have steadily grown during the past 17 years. This year, as it did in 2005, USU's admissions office offered four-year scholarships to the

bombardier-style, without breaking it, from a 15-meter-high ride, was introduced to Physics Day in 2005. Designed by USU physics education student Amanda Otterstrom as her senior project, the contest is a big hit, says Dennison.

"Nearly 1,000 participants dropped eggs about every 20 seconds for almost three hours," he says. "Only about 15 percent of the eggs survived the fall, but we were impressed by the enthusiasm of the contenders."

top six Physics Bowl competitors. An additional scholarship was offered to a participating student from the Idaho Falls area by USU supporter Marie Putnam. More than \$22,000 in prizes from sponsors went to other contest winners.

While the day includes a boatload of conventional amusement park fun, Dennison says it's gratifying to hear youngsters' lively discussions about free fall, drag forces, projectile motion, energy conservation, impulse, gravity, and centrifugal force. "Who says physics has to be dull?"

In addition to INL, USU's admissions office, and Putnam, Physics Day sponsors include ATK Launch Systems, Boeing, Idaho NASA Space Grant Consortium, IM Flash Technologies, Lagoon, Mathsoft Engineering and Education, Micron, Moog Aircraft, North Wind Environmental, Rocky Mountain NASA Space Grant Consortium, SAIC, S&S Power,



Some 6,500 teens from Utah, Idaho, Wyoming, Nevada, and Arizona attended USU's 2006 Physics Day. Photo by Ben Renard-Wiart.

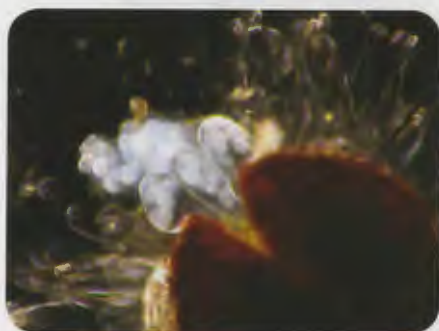
DON'T CALL THEM GEEKS...
Continued on page 19

COLLEGE OF SCIENCE ENTRANTS SWEEP USU PHOTO CONTEST

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WHO KNEW MILDEW, FUNGI AND BACTERIA COULD BE SO BEAUTIFUL?

The results are in for the first Small World Photomicrography Competition of USU's Center for Integrated BioSystems (CIB) and the College of Science was well represented among the top prize recipients. The Center invited campus-wide participation of photomicrography enthusiasts, who submitted an array of striking and visually fascinating entries.

First place went to **Kent C. Evans**, USU Extension plant pathologist and assistant professor in the Biology Department, with his entry, *Powdery Mildew Cleistothecium and Asci with Spores*. Evans' winning entry was submitted to the international 2006 Nikon Small World Contest and he received a \$200 credit at CIB Service Labs.



First place photo of powdery mildew by Kent Evans.

DON'T CALL THEM GEEKS...

Continued from page 18

the U.S. Navy, and the USU College of Science. Numerous volunteers tackled registration, organization and contest judging, including 90 faculty and staff members and students from USU's physics department.

So what was Ligety and Mancuso's Physics Day project? The two were members of a team that placed third with their "Big K" entry in the ride design contest. "I really don't remember (the project)," says Ligety's mom, Cyndi Sharp. "Ted was good at math and science and thought he might like to study engineering in college."

David Seiger, Ligety and Mancuso's physics teacher who mentored their project, passed away last year, says Winter Sports School Headmaster Rob Clayton.

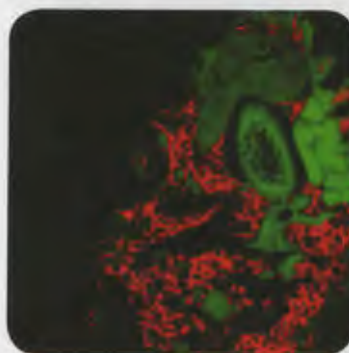
At the Torino games, Ligety and Mancuso bested their favored teammates and foreign competitors in two alpine skiing events. The youngest member of the U.S. men's squad, Ligety, 21, captured gold in the combined. Mancuso, 22, became the first American woman since 1984 (her year of birth) to win Olympic gold in the women's giant slalom. The two skiers were the only two Americans to win medals in alpine skiing events in Torino.

Clayton says students from the Winter Sports School attended this year's Physics Day. Perhaps we'll cheer alumni of Physics Day 2006 to victory at the 2010 Winter Olympics in Vancouver. ■



Ellen Klinger's winning photo entry of fungi.

Ellen Klinger captured second place with her entry, *Fungal Invaders*. Klinger is a biological science technician in the USDA Bee Biology and Systemics Laboratory at Utah State.



Third place entry by student Usha Spaulding.

Third place was awarded to **Usha Spaulding**, a student in Associate Professor Carol von Dohlen's lab, in USU's Biology Department. Her submission, produced with a laser-scanning confocal microscope, was *Rod-Shaped Bacteria in the Hemocoel of A. tsugae*.

Klinger was awarded a \$100 credit at CIB Service Labs, while Spaulding received a \$50 credit.

CIB is hosting a traveling exhibit of winning photographs from the 2005 Nikon Small World Contest. Utah State is one of only 25 locations worldwide where the photos will be displayed. CIB plans to repeat the Small World contest next year. ■

Blue Tongue-Lashing

Bluetongue is an insect-borne virus that affects sheep, cattle and wild ruminants. Infection can result in blue discoloration of the tongue, fever, fetal malformation and often, death. Undergraduate Research Fellow **Uyen Lam** and undergraduate researcher **Janette Starks**, along with **Biology Professor Joseph Li**, are delving into the structure of cells infected with the virus to determine how Bluetongue leads to their demise. The student researchers are also screening anti-viral compounds that can inhibit the virus.

EMERITUS PROFESSOR VOLUNTEERS TIME, TALENTS WHERE NEEDED

Don't toss your old eyeglasses, says **Don Sisson**. "They're desperately needed around the world," says the USU emeritus professor of statistics, who, along with his wife, **Jean**, has been involved in a number of humanitarian projects in this country and overseas. "In order to travel you need three things – time, money and health. It's a fairly narrow window, so we're trying to make the most of it."



Emeritus Professor Don Sisson, left, and wife, Jean, far right, learned of a unique service opportunity in Cambodia.

Don and Jean traveled to Iquitos, Peru in February 2005 as part of a team assembled by The Hope Alliance, a nonprofit humanitarian relief organization headquartered in Park City, Utah. The group's mission was to distribute some 5,000 pairs of eyeglasses, most of which were collected through Lion's Club used glasses programs, to needy individuals.

"It was such a touching experience," says Don. "You helped someone put on a pair of glasses and their eyes just lit up. The recipients, all of whom really needed the assistance, ranged from youths to old folks."

The couple planned a second eyeglass distribution trip this past spring to Katmandu, Nepal, which was derailed at the last minute by unsettling political events in the Himalayan country. "We already had our plane tickets so we decided to visit India," says Don. Their travels took them to the Taj Mahal and allowed them to witness Hindu cremation ceremonies on the Ganges River. "It was fascinating," he says.

Travel to India and Peru are among a number of trips Don and Jean have undertaken since Don's retirement from USU in 1999. "I turned in my keys to USU on the Monday following Commencement and we headed down to Provo for missionary training on Tuesday," he says.

Don was less than thrilled when their first LDS mission took them to New York City's Bronx. A series of unfortunate events



Happy smiles as Jean Sisson gets acquainted with new friends.

during a New York trip some years prior had him insistent that "if I never return it will be too soon."

Yet Don was pleasantly surprised by the warm reception he and Jean received in their new neighborhood, where they encountered 43 different languages during their stay. "It was a crowded, low income neighborhood jammed with dilapidated projects," he says of the largely immigrant community.

Don laughs at the memory of trying to find miniature U.S.

flags at a local craft store for an Independence Day party. "The proprietor had Puerto Rican flags, Dominican flags – flags from numerous countries, but no American flags," he says. "He told me no one had ever asked for them before. I wondered what country I was in."

A second LDS mission in 2003 landed the couple in Knoxville, Tennessee,



Ready to learn: Thanks to the efforts of volunteers, Vietnamese refugee children in Cambodia start school with new uniforms.

EMERITUS PROFESSOR VOLUNTEERS...
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EMERITUS PROFESSOR SAYS RETIREMENT IS FOR THE BIRDS—AND THE FISH

Growing up along the shores of Lake Superior in northern Wisconsin, **Dave Drown** would have been content with a life of working on a steamboat like his father, uncles, and ancestors before him. “But I derailed and went to college—the first in my family,” says the emeritus associate professor of biology, who retired from Utah State in 2000.



Emeritus Associate Professor Dave Drown

During his undergraduate years, Dave studied biology and geology at the University of Wisconsin-Superior. Summers were spent working as a deckhand on steamboats that carried iron ore from Duluth and points north to steel mills in Cleveland and other port cities. The boats returned laden with coal to heat northernmost Great Lake communities. “I loved it,” says Dave. “But I’m also glad for the opportunities and experiences I’ve had in my career.”

Graduate studies followed in aquatic ecology at Michigan Tech and environmental biology at the University of Minnesota’s School of Public Health, where Dave earned master’s and doctorate degrees.

Conducting aquatic research in Lake Superior was a very solitary activity, Dave soon discovered. “There was not much contact with people,” he says.

In contrast, public health study provided plenty of human contact, which appealed to Dave’s personable nature. “Industrial hygiene, my field of eventual choice, is extremely people-oriented,” he says. “I enjoyed that aspect of the field and the broad training in varied disciplines that public health studies afford.”

After several years of working as a water quality consultant, Dave joined the USU biology department faculty in 1979. “For a while, I was the only person working in industrial hygiene,” he says.

His early years at USU were spent laying the groundwork for an American Board of Engineering Technology-accredited industrial hygiene degree program, which was achieved with the help of colleague **Will Popendorf**, professor in the Biology Department.

“USU’s program is one of only five ABET-accredited undergraduate programs in the country,” says Dave. “And our students have enjoyed nearly 100 percent employment upon graduation.”

Heightened attention to homeland security since September 11 has boosted the demand for scientists with expertise in biological, chemical, and physical hazards in the workplace, he says.

Dave is especially excited that this past spring’s college valedictorian, **Julie Crockett**, is an industrial hygiene major. “We’ve had a lot of outstanding students through the years and it’s been very gratifying and rewarding to help them find the right direction for their studies and career pursuits,” he says!

Dave says opportunities for hands-on learning through internships and summer jobs in their chosen discipline are especially important for undergraduates. “Students need to experience their fields first-hand to know if the type of career they’re pursuing is really right for them. It’s not too late to retrench and try a new direction,” he says.

During his years of teaching at USU, Dave also kept fresh in his field by consulting in gold-mining operations in northern Nevada, southwestern Wyoming’s trona mines (which yield a whitish mineral used in detergents), and the coal mines of eastern Utah. He notes that seven or eight coal miners who attended his Extension courses in Price eventually earned bachelor’s degrees in occupational safety and health from USU.

Now six years into retirement, Dave enjoys travels with his wife **Susan**, whom he describes as a “super birder.” The couple is active with the Bridgerland chapter of the Audubon Society. Dave serves on the group’s board of directors, while Susan leads field trips and volunteers as the group’s perpetual treasurer.



Emeritus Associate Professor Dave Drown and wife, Susan, prepare for a pelagic birding trip on California’s Monterey Bay.

RETIREMENT IS FOR THE BIRDS...

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UNIQUE USU JOURNAL OFFERS NATURE AND SCIENCE WRITING



Isotope

is published with support from Utah State University's College of Humanities, Arts and Social Sciences; the College of Science; and the Department of English.

"Isotope offers a place, almost uniquely, for science and nature writers to explore their common interests."

—Chet Raymo

Boston Globe Columnist and Author

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The College of Science is among a number of benefactors supporting *Isotope: A Journal of Literary Nature and Science Writing* produced by USU's Department of English. Launched three years ago, *Isotope* features an eclectic array of artwork, poems, lyric and narrative essays, micro fiction, and short stories exploring the nuances of science and nature.

Marion Roach, host of *The Naturalist's Datebook* on Martha Stewart Living Radio on the SIRIUS Satellite Radio Network, has read poems from *Isotope* on her radio program. "It's not cute nature poetry," she said. "It's provocative poetry about the natural world."

Isotope Editor **Chis Cokinos**, assistant professor in USU's Department of English, describes *Isotope* as a break from the "limited emotional range" usually associated with nature writing. "I just felt there was a need for a magazine that was distinctly literary that published nature and science writing that sort of challenged people's stereotypes about the genre," Cokinos recently told a local reporter.

"I don't know of another literary magazine in the country that receives funding from its university's College of Science," said Cokinos. "We're grateful to the College for its support."

Isotope is published twice a year. For subscription information, visit <http://isotope.usu.edu> or contact Leslie Brown, managing editor, at lbrown@cc.usu.edu or 435-797-3697. ■

Taming Data

Statistics enables biologists to quickly view how physiological factors, such as metabolic reactions and stress, impact gene expression data. USU statistician **Adele Cutler** and collaborators throughout campus are demonstrating how analytical tools built from resources available in the public domain can be used to distill huge volumes of data into graphical depictions of complex biological processes.

Programming For Not-So-Dummies

Cutting-edge software enables computers to perform multiple complex tasks. But such systems require precise programming to prevent data corruption and ensure satisfactory performance, says USU computer scientist **Jerry James**. He's developing a tool to uncover common mistakes made by programmers and thus streamline multithreaded software development.

COLLEGE OF SCIENCE SCHOLARS (2005-06)



Fall '05 Valedictorian Maria Horrocks with faculty escort, Jim Cangelosi.

When you talk with **Valedictorian (Fall) Maria Carley Horrocks**, you forget that you're talking with a recent graduate who just barely completed her student teaching. Maria, who has been tutoring students since her high school graduation in 2002, speaks with the wisdom and assurance of a seasoned educator.

"I knew in fifth grade that I wanted to be a teacher," says the Presidential Scholarship recipient from Hyrum, Utah. "By 7th grade, I knew I wanted to be a math teacher."

Through education classes at USU and student teaching, Maria honed her teaching skills, which are grounded in respect and tolerance for each individual. "It's crucial that students feel comfortable making mistakes," she says. "I won't tolerate put downs and I encourage an environment where everyone's opinion counts."

Maria's supervisors were impressed when she memorized the names of 140 students within her first two days of student teaching. "You need to gain students' trust and respect," she says. "The first few days in a classroom of new students makes or breaks the academic year."

Accompanied by faculty escort Jim Cangelosi, Maria graduated in December with a BS degree in composite mathematics/statistics education. Following graduation, she assumed an 8th grade teaching position at the Cache Valley Learning Center. "I expect a lot from my students," says Maria. "And I let them know that I do."

When **Valedictorian (Spring) Julie Ford Crockett** called her mother with the news that she was tops in her college, her mom laughed and said, "But you told me you hated science in junior high." Looking back, the North Salt Lake native says her dislike was probably just boredom. High school classes in chemistry and physics reignited her interest and she decided to pursue electrical engineering (EE) studies at Utah State.

More undergraduate exposure to science lured Julie away from the EE path to biology, through which her interest piqued in industrial hygiene studies. She interned at Monsanto's Soda Springs, Idaho facility, where locally mined phosphorus is processed and shipped to other facilities for use in herbicides, fertilizers, food products, and toothpaste.



Spring '06 Valedictorian Julie Crockett is congratulated by Biology Senior Lecturer David Wallace, left, and faculty escort Will Popendorf.

"I worked with a senior industrial hygienist at Monsanto and learned that the field isn't strictly scientific," says Julie. "A big part of the job is working with people and educating them about biological, chemical, and physical hazards in the workplace."

Following graduation, Julie heads to Phoenix where she's landed a job monitoring chemical use at Intel Corporation's chip manufacturing plant. "Intel's campus is huge—as large as Utah State," she says.

Julie praises her faculty mentors Will Popendorf, her faculty escort at graduation; John Flores, and Dave Wallace. "They've provided constant encouragement and learning and helped me get my internship and job," she says.

Julie says she'll miss Logan and her favorite local pursuits—hiking in Logan Canyon, skiing at Beaver Mountain, and playing Frisbee golf. And though she abandoned her initial major, her early engineering studies yielded a significant benefit. She met her husband, John Crockett, while working on a sophomore engineering project.

COLLEGE OF SCIENCE SCHOLARS...

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COLLEGE OF SCIENCE SCHOLARS (2005-06)

COLLEGE OF SCIENCE SCHOLARS...

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Glen de Guzman

Scholar of the Year and Undergraduate Researcher of the Year Glendell "Glen" de Guzman has garnered repeated recognition and praise on campus as a dedicated student, motivated researcher, and enthusiastic supporter of student-enriching activities. But one goal he'd hoped to achieve during his undergraduate career has, so far, eluded him: medical school acceptance. "At first, I was devastated," says Glen, who spent

the first 11 years of his life in his native Philippines. "But I knew that I just need to work harder to bring up my verbal scores on the MCAT."

His early years in the United States were a struggle. "I was trying to learn English and attending middle school, which is tough under the best of circumstances," says Glen, who settled with his mother and siblings in Pocatello, Idaho. "Eventually, I learned to adapt." Undergraduate research, a beautiful campus and a scholarship convinced him to come to Utah State. Glen has reveled—and excelled—in undergraduate research opportunities, including stream ecology studies with faculty mentor Michelle Baker, microbiology studies at Boston's Tufts University, and American Heart Association-funded cardiac research with biology professor Daryll DeWald. He was recently awarded the 2006 Robins Award for Scholar of the Year, one of the university's highest academic honors.

"I feel so prepared with the tools I need to succeed," says Glen. "This is the best thing I got from USU."

Beyond academic demands, Glen served as a lab assistant, tutor, and peer advisor and helped to found the USU chapter of the Circle K community service club. "I like to be busy—it makes me feel productive," he says. "To me, if I enjoy something, it doesn't seem like work."



Martha "Marti" Garlick

When **Graduate Student Teacher of the Year Martha "Marti" Garlick** arrived on campus with the desire to pursue math studies after an 18-year gap in her schooling, one of her professors advised against it. "He told me it would be easier for an out-of-shape 50-year-old to run a marathon than for me to major in math," she says.

Marti, a self-described displaced homemaker, refused to be dissuaded. She likes math and, with encouragement, she thinks most students will also like it, once they grasp the basic concepts.

"There's a pervasive attitude that you're either good at math or you're not," she says. "People tend to give up too easily. You have to convince students that, with some persistence, they, too, have the ability to succeed."

She says one of the biggest rewards of teaching is "when you see the light turn on" for a student who has been struggling to understand a mathematical concept.

Marti plans to pursue doctoral studies in the fall. She hopes to eventually work in industry or perhaps teach and conduct research at the university level. Her current research involves modeling the extension phase of the polymerase chain reaction process.

How did nearly two decades of full-time homemaking prepare her for university teaching and research? "It taught me that drudgery is a part of life and from that I gained tenacity," she says. "Every pursuit has its drudgery and you do that, too."



Chris Feldman

Utah State wasn't on **Graduate Student (PhD) Researcher of the Year Chris Feldman's** radar screen when he was pursuing his early college studies in his native California. But a visit to Logan to reconnect with an old friend brought him in contact with Professor Butch Brodie and others in USU's Biology Department. "I thought, 'What a great group of people and what exciting research they're doing.'"

Then his wife, Marjorie Matocq, landed a faculty position at Idaho State and USU's doctoral program and its proximity to Pocatello—relative to the West Coast—became even more attractive.

The Los Angeles native recently returned from his home state, where he and colleagues collected varied species of garter snakes along California's central coast for research on the reptiles' molecular adaptations to prey consumption. "My work builds on research Dr. Brodie, doctoral candidate Shana Geffeney and others have pursued concerning sodium gene channel mutations in the snakes that offer resistance to toxic newts, the snakes' main food source," says Chris, who conducts research in the lab of Mike Pfrender, assistant professor in USU's Biology Department. "We want to find out if other species of garter snakes, beyond those studied, also have this resistance."

Beyond the college, Chris received university-wide recognition of his work as a 2006 recipient of USU's prestigious Robin's Award for Graduate Research Assistant of the Year.

Chris, who completed a BA degree in integrative biology from the University of California-Berkeley and a MA degree in ecology and systematic biology from San Francisco State, looks forward to a career in university teaching and research. "I've seen how much fun my wife and USU professors have with teaching and how exciting they make research for students," he says. "I view one-on-one student training has an integral component of my own graduate education."

In the midst of busy research and teaching schedules and the Logan-Pocatello commute, Chris and Marjorie recently welcomed a newborn son into their family. Chris says he's grateful for USU's flexibility in allowing him to conduct some research from his wife's lab at Idaho State. "It's a big help to us," he says, adding, "I had no idea how wonderful parenthood would be." ■

MORTENSEN NAMED GOVERNOR'S SCHOLAR



College of Science Undergraduate Research Fellow and Eccles Undergraduate Research Fellow Amanda Mortensen meets with Utah Governor Jon Huntsman.

Biology major **Amanda Mortensen** was among four students from Utah State and 44 students statewide to be named a Governor's Scholar in November 2005 under a new program initiated by **Governor Jon Huntsman**. The initiative prepares students early in their college careers to compete for prestigious fellowships, including the Rhodes, Truman, and Udall scholarships.

Amanda, both an Undergraduate Research Fellow and Eccles Undergraduate Research Fellow in the College of Science, is a native of South Jordan, Utah. She presented her research, "Antipredator Behavior in a Toxic Salamander," which she is conducting with Biology Professor Butch Brodie, at the 2006 Research on Capitol Hill gathering in Salt Lake City, Utah. ■

(Really) Tiny Utah Communities

Eccles Undergraduate Research Fellow **Isaac Westfield** and Geology Professor **Dave Liddell** are investigating distinctive microbial communities that thrive in the uppermost part of the Wheeler Formation in west central Utah's Drum Mountains. The communities display pronounced changes in form and composition due to variations in water depth during the Middle Cambrian Period some 500 million years ago.

EMERITUS PROFESSORS

EMERITUS PROFESSOR VOLUNTEERS...

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where Don says the pair definitely earned their keep. "We worked long hours – my wife on the computer all day long and me working as the fleet coordinator, arranging furniture for missionary apartments and the like," he says. "I joked that I went on a mission to become a used car salesman because that's part of what I did."

Yet another sojourn to Cambodia five years ago had the intrepid travelers entertaining an interesting proposition. Six weeks before leaving Utah, the couple, along with Jean's sister and brother-in-law, asked how they could best help people in need at their trip's destination. The answer was by providing school uniforms for Vietnamese refugee children. "We thought the request was rather unusual, but it turns out that the children had nothing suitable to wear to school—or anywhere, for that matter," says Don. "They needed clothing."

The quartet hastily located suitable patterns and fabric, and enlisted an enthusiastic army of tailors from their LDS wards, neighborhoods, and Logan's Roman Catholic parish. Sewing parties were held in churches and in the Sisson's basement-turned-sewing room. "We sewed simple jumpers for the girls and shorts for the boys," says Don. "We collected funding and arranged to purchase white shirts in Cambodia for all the children."

Delivering the new clothing to Cambodia was another challenge. Don and his family delivered about half the uniforms and found other volunteers among friends, who were also traveling to the southeast Asian country and able to lend a hand.

Growing up on a farm in Minnesota, Don says he never dreamed he'd travel all over the world. He attended college in his native state and earned advanced degrees from Iowa State University. He joined USU in 1959 and relishes his experiences at Utah State. "One of the biggest changes I observed in 40 years on campus, obviously, is the growth of the university," he says. "When I arrived the camaraderie among faculty was strong because we were a small community. Everyone knew each other."

Don, who served as department head for applied statistics and assistant dean under former dean **Ralph Johnson**, says he continued to enjoy getting to know colleagues in varied disciplines through his participation on graduate committees. Throughout his tenure, many a USU research project relied on Don's expertise in statistical methods and experimental design; he estimates he served on about 1,000 committees. "It was very rewarding."

Other changes Don observes are tougher requirements for obtaining tenure and heightened competition for funds. "Faculty members are under more pressure to publish, which doesn't allow as much time to put into teaching. There's also greater competition

across campus for fewer funds," he says. "I'm not sure we have a perfect solution to address these issues."

Don is grateful for his association with USU and the opportunities he's been afforded during his career and beyond. "We do not even begin to appreciate what we have in this country—we can eat and have a clean drink of water whenever we want. So many in the world have so little." ■

RETIREMENT IS FOR THE BIRDS...

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Their travels take them around the globe, with trips to Australia, Alaska, and Mexico, where Dave recently pursued bonefishing. "It's a sport fisherman's ultimate challenge," says Dave of the sport that consists of fly-fishing for bonefish in the ocean flats of areas such as southern Mexico and the Florida Keys.

"No, bonefish are not good to eat," he adds. "It's just a real challenge to catch one—a fish of a lifetime kind of fish."

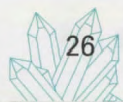
Next on Dave's travel agenda is a trek to native villages surrounding Dillingham, Alaska, for salmon and rainbow trout fishing. A trip to Hawaii is on tap for next January, followed by a long-awaited journey to Trinidad and Tobago. "We're really looking forward to that," he says.

When he's not on the road, Dave stays busy with a variety of pursuits. His interest in ham radio now competes with his newfound hobby of digiscoping. The latter allows digital photography of birds through a spotting scope. Another passion is making wooden toys for his grandson, who resides in Maine. "I've made perhaps a hundred wheeled toys for him; great fun to say the least," he says.

Dave is often found fishing in local reservoirs from his personal pontoon boat, a parting gift from his students upon his retirement from USU. "I was just blown away when they presented me with this gift," he says. "My colleagues joked, 'How much did you bribe them for that?'"

Dave says he was also touched by the gift from former students of a scholarship endowment in his name, the **David B. Drown Scholarship for Public Health**. "(Former Department Head) **Butch Brodie** got the ball rolling on that and I'm always pleased to come back each year to present the scholarship," he says.

"I had 21 great years on the faculty at USU," says Dave. "I'm grateful to my students and colleagues for a wonderful experience." ■



MURRAY AWARDS ENCOURAGE BUSINESS-SAVVY M.D.s



R. Pepper Murray, M.D.

Following graduation from Harvard Medical School and the completion of a residency in orthopaedic surgery at the Mayo Clinic, USU alum **R. Pepper Murray, M.D.** was well prepared to tackle sprained ankles, ACL injuries, and broken bones. What he wasn't prepared for was the dollars-and-cents challenge of running a medical practice in a rapidly changing industry.

Pepper, who is co-founder and partner of Mountain Orthopaedics LLC in Bountiful,

Utah, notes that in the grind to prepare pre-professional undergrads for highly competitive medical and dental school entrance requirements, fundamental business training is overlooked. "Ultimately, these students will be running their

own practices," he says. "Those who are uneducated in business tactics and principles will fail in today's complex business environment."

To address this need, Pepper established Murray Scholar Awards with USU's College of Science and Biology Department to provide two \$1,500 scholarship awards each year to pre-medical and pre-dental undergraduate students. The award stipulates that recipients enroll in one business class per semester for the duration of the award year. The inaugural Murray Scholar Awards were presented to students Newell Tyler Elison and Sterling Kellen Hansen this past spring to be used for the 2006-07 academic year.

Pepper, who serves on the advancement board for USU's College of Business, graduated magna cum laude from Utah State in 1982 with a B.S. degree in biology and was inducted into the Phi Kappa Phi honor society. His seven-member orthopaedic surgery subspecialty group provides complete orthopaedic care through a progressive team approach using state-of-the-art techniques. ■

Heritage Society

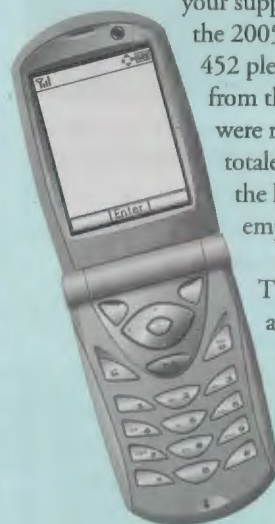
The Heritage Society recognizes individuals who have made bequests or other planned gifts to Utah State University. Such generosity and commitment honors the rich heritage of Utah State and helps create a brighter future. Partnerships in philanthropy are increasingly vital to the future of Utah State as it fulfills its vision of becoming one of the nation's leading research and teaching universities. We invite you to join the Heritage Society.

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For more information about including Utah State and the College of Science in your will, or if you would like to make a planned gift, please contact Development Director Chris Tallackson at (435) 797-3510 or chris.tallackson@usu.edu.

THANKS TO YOU, STUDENT PHON-A-THON A SUCCESS

We extend our sincere thanks to all of you who pledged your support to the College of Science during the 2005 Phon-a-thon. Thanks to your support, 452 pledges were made (a 24 percent increase from the last year) and 78 of these pledges were received from new donors. Pledges totaled \$79,051 (38 percent higher than the last year), including \$6,080 in employer matched funds.



Thank you for your financial support and thank you for taking the time to talk with our student callers. The 2006 Student Phon-a-thon takes place, once again, during the Thanksgiving season. Please pick up your phone when you see USU AGGIE

FUND on your caller ID and enjoy the opportunity to visit with a fellow Aggie (and offer encouragement with end-of-term projects and finals.)

Thank you for helping to strengthen the College of Science. Your support at all levels allows us to achieve our vision: "When students and faculty learn together . . . discovery follows."

FACULTY AWARDS & RECOGNITION

Biology

Anne Anderson and **Charles Miller's** research is featured in an article titled "A Taste for the Toxic" in the 2006 *Research Matters* published by USU's Office of the Vice President for Research. The article discusses using their bioremediation research using bacteria to clean up toxic waste. Anderson and Miller collaborate on this research with Ron Sims, Department of Biological and Irrigation Engineering.



Edmund D. "Butch" Brodie, Jr., was named the university's Outstanding Graduate Mentor for 2006.

Research being conducted by **Timothy A. Gilbertson** and his graduate student, **Bhavik Shah**, was featured in the 7 February 2006 edition of *The Herald Journal* (page C1).

Timothy A. Gilbertson has been named to the Board of Directors and Chair of the Health and Scientific Advisory Board of the Institute for Public Health and Water Research (IPWR). IPWR provides scientific direction, funds, and other support to investigators to encourage research, publications, and meetings to expand knowledge on water and health and produce technical and non-technical information on water consumption and health.

The magazine, *Nurture: The Magazine for Nature Authors*, reports that during the months of September – November 2005, the paper authored by **Shana Geffeney** (PhD, USU Biology 2005), **Esther Fujimoto**, **Edmund D. Brodie III**, **Edmund D. Brodie**,

Jr., and **Peter C. Ruben** titled "Evolutionary Diversification of TTX-Resistant Sodium Channels in a Predator-Prey Interaction" (437:69-87, 2005) was third in the list of "The Top Ten Most Downloaded Nature Papers." It was downloaded 25,165 times!

Can The Frogs Be Saved? That is what **Joseph R. Mendelson III**, curator of herpetology at Zoo Atlanta and adjunct associate professor of biology, is attempting to do. Throughout Latin America frog populations are dying at an accelerated rate from the chytrid fungus. Joe's colleague, **Karen Lips** of Southern Illinois University and former seminar speaker here in the department, has been researching this fungus and the declining frog populations. CNN has the story: <http://www.cnn.com/2006/TECH/science/02/21/frog.fungus/index.html>.

Gregory J. Podgorski was named College of Science Faculty Teacher of the Year for 2005-06.

The research paper of **Peter C. Ruben** and **Jennifer Abbrusese** was featured with an editorial titled "Tunicates Set Trend for Potassium Channel" in *The Journal of Experimental Biology* (2006 209:ii). See coverage at <http://jeb.biologists.org/cgi/reprint/209/4/ii>.

One of **Peter C. Ruben's** collaborative research efforts is featured at <http://www.worldhealth.net/p/cloning-could-fix-hearing-problems-2005-09-15.html>. The research focuses on sensory cells in the ear.

Chemistry & Biochemistry

Lisa M. Berreau was named College of Science Undergraduate Research Mentor of the Year for 2005-06.

Alvan C. Hengge was named College of Science Faculty Researcher of the Year for 2005-06. ■

Physics and The Center for Atmospheric & Space Sciences

Jan Sojka was featured in the *Aggie Parents and Family Newsletter* for March 2006. The article can be found at: <http://www.usu.edu/parents/newsletter/newsletter-3-06.html>. ■

COLLEGE OF SCIENCE UNDERGRAD NAMED GOLDWATER SCHOLAR, ANOTHER RECEIVES HONORABLE MENTION

USU physics student **Heidi Wheelwright** was named a 2006-07 Goldwater Scholar, along with electrical engineering major **Logan McKenna**. Physics major **Keith Warnick** received an honorable mention. The prestigious awards were recently announced by **Peggy Goldwater Clay**, chair of the board of trustees of the **Barry M. Goldwater Scholarship** and Excellence in Education Foundation. "Our Goldwater scholars are concrete evidence of dedicated students and caring faculty mentors," said **Joyce Kinkead**, vice provost for undergraduate studies and research.

The three Aggies were chosen from a field of 1,081 mathematics, science, and engineering students who were nominated by the faculties of colleges and universities nationwide.

A Lindon, Utah native, Heidi is a member of the university Honors program. She transferred to Utah State from Utah Valley State College in order to pursue undergraduate research, and was awarded the Utah State Presidential Transfer Scholarship. Heidi's research emphasis is nanotechnology and her faculty mentor is Physics Associate Professor **T.-C. Shen**. She plans to pursue a doctorate in nanotechnology and nanoelectronics.

Last summer, Heidi participated in a nanotechnology study program at Stanford University. This summer, she heads to Los Alamos National Laboratory in New Mexico for study, as well as a week at Princeton.

Outside the lab, Heidi enjoys hiking and ham radios, an interest she shares with her dad.



Physics major Heidi Wheelwright is the recipient of a Goldwater scholarship.



Physics major Keith Warnick received an honorable mention from the Goldwater Foundation.

Keith has lived in five states — Nebraska, Illinois, Indiana, Texas and now, Utah. New acquaintances often assume he's a military brat but, no, that's not the case. Keith explains that his dad, **Alan Warnick**, has worked in human resources management and is now executive-in-residence and principal lecturer for USU's College of Business.

Keith participated in USU's inaugural Biotechnology Summer Academy for high school students, which is hosted each year by the Center for Integrated BioSystems. He narrowed his college choices to USU and BYU and eventually chose the former because "it seems to have a friendlier environment for undergraduate research."

"I'm confident I made the right decision," says Keith, who is currently researching acoustic and electromagnetic waves in groups of particles under the faculty mentorship of **Timothy Doyle**, research associate professor in the Physics Department.

Keith is a National Merit Scholar and a member of USU's Honors program. He served an LDS mission in Peru and Bolivia and plans to pursue graduate studies.

*A federally endowed agency, the Goldwater Foundation offers a renowned scholarship program honoring the late **Senator Barry M. Goldwater**. Designed to foster and encourage outstanding students to pursue career in the field of mathematics, the natural sciences and engineering, the program has awarded 4,885 scholarships worth approximately \$48 million in its 18-year history. ■*

On the Defensive

When provoked, the *Taricha torosa* newt displays an antipredator posture known as the unken reflex. The deadly toxic salamander lifts its head and tail, stretches its limbs and reveals its bright orange underbelly. Eccles Undergraduate Research Fellow **Amanda Mortensen** and Biology Professor **Butch Brodie** found that females of this species exhibit a more intense defensive reflex than their male counterparts.

Leave No Stone Unturned

Geneticists have discovered that even the tiniest changes in a few yeast genes can affect traits—a discovery that may apply to higher organisms as well. You can't just look at candidate genes—that is, genes that are known to have a specific function—says Biology Assistant Professor **Paul Cliften**. Rather, every gene, at the molecular level, may have the potential to influence inherited traits.

USU College of Science

0305 Old Main Hill • Logan, Utah 84322-0305
Phone: 435.797.2478

scido@cc.usu.edu www.usu.edu/science/

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Are Genes Why We Can't Fit in Jeans?

Biology Professor **Tim Gilbertson** says certain fats activate receptors in our bodies that make sweet and salty foods taste better. This may account for our love of potato chips and chocolate. Craving and storing fat was critical for our Paleolithic ancestors' survival but creates a formidable health challenge in our current era of plentiful food and leisure.

Whole Lotta Shakin'

What causes the San Andreas Fault system to generate earthquakes? USU student researcher **Corey Barton** and geology professor **Jim Evans** are analyzing drill cuttings from deep within the famous California fault that reveal belts of rock deformed by crushing movement. called "shear zones," these areas offer clues to powerful forces simmering beneath the earth's surface.

TRANSITIONS

30 YEARS OF SERVICE

Robert J. Wood, Computer Science

RETIRING FACULTY & STAFF

Ann E. Aust, VP Research Office
and Chemistry & Biochemistry

Chris S. Coray, Mathematics & Statistics

Marilyn R. Griggs, Physics

Gregory W. Jones, Computer Science

TENURE & PROMOTION

Tom Chang, Associate Professor,
Chemistry & Biochemistry

PROMOTION

Adele Cutler, Professor, Mathematics &
Statistics

Daryll DeWald, Professor, Biology

Timothy Gilbertson, Professor, Biology

IN MEMORIAM

Former **College of Science Dean Ralph M. Johnson, Jr.** passed away February 25th at the age of 87. Johnson served as Dean of the College from 1968 until 1984, when he retired from USU. He was instrumental in establishing Utah State's space research program. A native of Ririe, Idaho, Johnson earned a bachelor's degree in chemistry from USU in 1940, and master's and doctorate degrees in biochemistry from the University of Wisconsin. He is survived by his wife, Gwendolyn, four children, 23 grandchildren, and 16 great-grandchildren.

Dying Frogs, Dying Planet?

Biology Adjunct Associate Professor **Joe Mendelson III**, also curator of herpetology at the Atlanta Zoo, says a fungus is threatening hundreds of frog species. Why the hardy frog, which scientists consider a good indicator of overall environmental health, is succumbing to the fungus is a mystery. Mendelson and colleagues have launched a massive mission to rescue frogs in the path of the fungus, which is spreading through South and Central America.

KEEPING IN TOUCH

1950s

John Thieret (BS 1950; MS 1952 Botany), Highland Heights, Kentucky. Dr. Thieret, professor emeritus at Northern Kentucky University, received the 2005 Outstanding Academy Service Award from the Kentucky Academy of Science. He received his doctorate degree from the University of Chicago in 1953 and joined NKU in 1973.

1970s



Jon Stephan Beesley

Jon Stephan Beesley (BS 1972, Physics), Crowley, Texas. An employee of Lockheed Martin, John is chief test pilot for the F-35 Joint Strike Fighter. A former Air Force pilot, Jon received an Air Medal from the USAF Chief of Staff in 1986 for safely recovering a badly damaged F-117. He is a co-recipient of the Society of Experimental Test Pilots Ivan C. Kincheloe Award. Jon and his wife, Evona Christensen Beesley, have six children and nine grandchildren.

Alan L. Rockwood (BS 1973, Biology; PhD 1981) Provo, Utah, is scientific director for Mass Spectrometry at ARUP Labs. He also serves as an adjunct associate professor of pathology at the University of Utah School of Medicine and is an adjunct researcher at Brigham Young University.

1980s

Ken Richman (PhD 1989, Chemistry & Biochemistry) Las Vegas, Nevada, was recently promoted to the position of Vice President, Research and Product Development at American Pacific Corporation.

1990s

David Bienvenue (BS 1995; PhD 2001, Chemistry & Biochemistry), Seattle, Washington, was recently promoted to senior scientist at Dendreon Corporation. He manages the Protein Purification Development group, developing cancer immuno-therapies.

Heidi Adams Campbell (BS 1997, Chemistry & Biochemistry), Austin, Texas, earned a doctorate degree in biological chemistry from the University of Michigan in 2003. She is currently conducting postdoctoral research at the University of Texas.

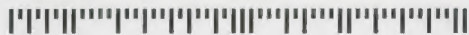
A. Bryce Castillon (Attended 1993-96, Biology), Green River, Wyoming, opened a dental practice in his hometown in May 2004. Bryce left USU just a few credits short of his bachelor's degree and entered Virginia Commonwealth University School of Dentistry, where he earned a DDS degree.

Carrie Finchum Queshell (BS 1990, Mathematics/Statistics), Kaysville, Utah, is a mathematics lecturer at Weber State University.

Morten Sørli (PhD 1998, Chemistry & Biochemistry), Aas, Norway, is an associate professor at the Norwegian University of Life Sciences.

2000s

Rex Watkins (B.S. 2005, Chemistry & Biochemistry), Madison, Wisconsin, was awarded a National Science Foundation Predoctoral Fellowship this past spring. He just completed his first year of graduate study in biochemistry at the University of Wisconsin-Madison, where he is studying secretory ribonucleases, with emphasis in investigating protein interactions with a human ribonuclease inhibitor. ■



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Insights is the alumni newsletter of the Utah State University College of Science. Our mission is to inform alumni and friends of current events, project, and news within the college. The newsletter also provides a forum for alumni to follow the careers and professional development of colleagues.

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