INSIGHTS

UTAH STATE UNIVERSITY - COLLEGE OF SCIENCE

When students and faculty learn together ... discovery follows

SPRING 2005

Howard Blood Endowment

Eccles Scholar Reports from the Front

Unprecedented Global Challenges

Plants that Compute

Robotics—The Future is Here

Emeritus Professor Richard Shaw

UtahState UNIVERSITY

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

FROM THE DEAN'S OFFICE

Dean Don Fiesinger

Greetings from the College of Science. As I look out my office window, there is still plenty of snow on the ground, but we are all anxious for the transition to spring. It has been an interesting winter here at Utah State University, where we saw our first December graduation ceremony, the departure of President Kermit Hall in December, and the naming of our former Provost and Executive Vice President Stan Albrecht as the new president in February. Earlier in December, Utah State University opened an office in the Wells Fargo Building in Salt Lake City. This office will house our new Vice President for University Advancement Scott Mietchen, and provide a point of contact for USU alumni and friends on the Wasatch Front.

But regardless of these changes, our students and faculty continue to excel in their various endeavors. Within this issue of *Insights,* we have highlighted some of these recent successes, including profiles of our first December Valedictorian Jeff Luke, a composite biology teaching major; our two Goldwater Scholarship recipients, biology major Stephanie Chambers and physics major David Hatch; and the research work of faculty and students in Computer Science, Biology, and Physics. You will find answers to questions about how plants "compute" in a rather unique and sophisticated manner, and how robotics may serve as assistive technology for vision-impaired individuals. You will also be able to read about Biology Professor and former Dean Jim MacMahon, who is now deeply involved in a major NSF project to create a national ecological observatory network (NEON); and Emeritus Professor Richard Shaw, who was an outstanding botany teacher and author of numerous books on the flora of various parks and regions of the Intermountain West. We have added some outstanding young faculty to our ranks and their profiles are presented as well.

As you read of our accomplishments, please keep in mind that much of our success is due to the support received from you, our alumni and friends of the College of Science. Remember that there are many ways to get involved and support us, such as providing contacts for undergraduate internships and/or employment opportunities, encouraging outstanding high school students to consider studying science at Utah State University, and participating in various alumni events in support of scholarships and endowments. There are many dimensions to life here on campus and consequently many areas where you might be able to help us.

I hope that you enjoy this issue of *Insights* and please do not hesitate to contact me if you have suggestions for future articles, such as a favorite faculty member or program that you would like to see highlighted, or a profile on alumni accomplishments. *Insights* will be successful only if it provides information of interest and appeal to you, the reader. Please let us know.

Sincerely,

Inside Insights

About the cover: Noctilucent ("night-shining") clouds have been observed in high latitudes for more than 100 years. The highest clouds on Earth, they can be viewed during summer twilight hours at the edge of space. This photo was taken in Finland by physics undergraduate ***David Hatch****, who works as part of a collaborative research program run by* ***Mike Taylor*** *at Utah State's Center for Atmospheric and Space Sciences.*
(See story on page 15)

UNPRECEDENTED GLOBAL CHALLENGES GIVE RISE TO 'NEW WAY OF DOING SCIENCE'

UTAH STATE HELPS SPARK REVOLUTION

NEON Science Committee Chair Jim MacMahon

There is a frenetic pace in **Jim MacMahon's** office these days. The phone rings constantly, e-mail messages pop up by the hundreds, and papers get stacked ever higher. Jim chairs the Science Committee of what may become one of the most critical collaborations in the history of scientific inquiry.

We are confronted by unprecedented ecological challenges: Climate change is wracking havoc with weather patterns around the globe, threatening lives and regional economies. Land-use patterns are permanently altering the landscape, with biodiversity losing ground across every region. Freshwater and coastal ecological systems are threatened by biogeochemical imbalances caused by runoff. And in our new, interconnected world, emerging infectious diseases and invasive species have broken down traditional boundaries.

In response, scientists are working harder than ever to find answers. But for some, the solution is not just working hard, but working smart. Jim and four co-authors envisioned the world's first large-scale collaborative platform for ecological research in order to find more effective ways to meet the challenges.

"The problems we face require a whole new way of doing science," Jim says. As early as 1991, the ecological research community recognized the need for an integrated observation system and shared research platform. Individual researchers working across separate disciplines weren't able to look at the larger picture, but recent advances in science—including genomics, wireless technology, miniaturized analytical instruments, information technology, and promising new tools in nanoscience and engineering—now make a holistic science platform possible. And the ingenuity and push of a small group of scientists, including Jim, are creating the infrastructure to make it happen. They've designed the National Ecological Observatory Network, known as NEON, with funding from the National Science Foundation. Six million dollars have been allocated for the design phase, and it is anticipated that millions more, perhaps billions, will flow toward the project after it's up and running. The team is already lobbying Congress to ensure funding for the project's 30-year life span.

neon
NATIONAL ECOLOGICAL OBSERVATORY NETWORK

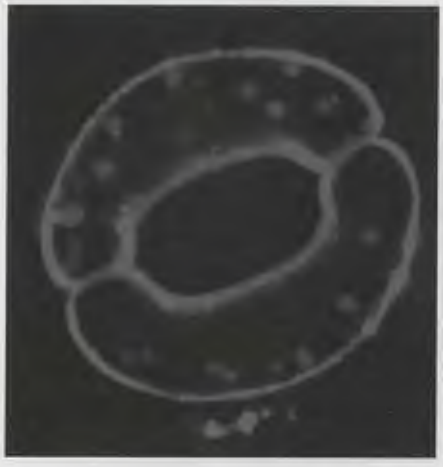
NEON will integrate information across many disciplines—including ecology, hydrology, genomics, engineering, computer science, and social science. More than a thousand scientists have been involved in the initial design stages, and Jim expects thousands more to join. Universities, government agencies, and nonprofit organizations have signed on, and Canada and Mexico have sent representatives to the meetings. Jim envisions that public school children will also be a part of the process, accessing real-time data from their classrooms—fueling scientific curiosity, social responsibility, and understanding. Perhaps most importantly, NEON research will inform planning and policy decisions, providing easily-accessible information for leaders and citizens.

"This will change the way we do science," Jim says. "It's so encompassing. It's bigger than anything single individuals could address. No normal group of scientists could tackle these issues."

In addition to serving as chair of the Science Committee, a member of the senior management team, and co-author of the original proposal, Jim will chair the regional monitoring network of NEON—the Intermountain Regional Observatory Network (IRON). He is truly chagrined that for the first time in his 34 years at Utah State, a simple lack of enough hours in the day will force him to desert his teaching post. "Only for a semester," he says. This winter he'll be chatting with scientists, public school teachers, Native Americans, and federal agency officials in far-flung outposts. He'll enthuse with researchers in Washington, DC, where the project is headquartered, and stalk the halls of Congress, telling everyone he meets: "Join up—the revolution is here!" ■

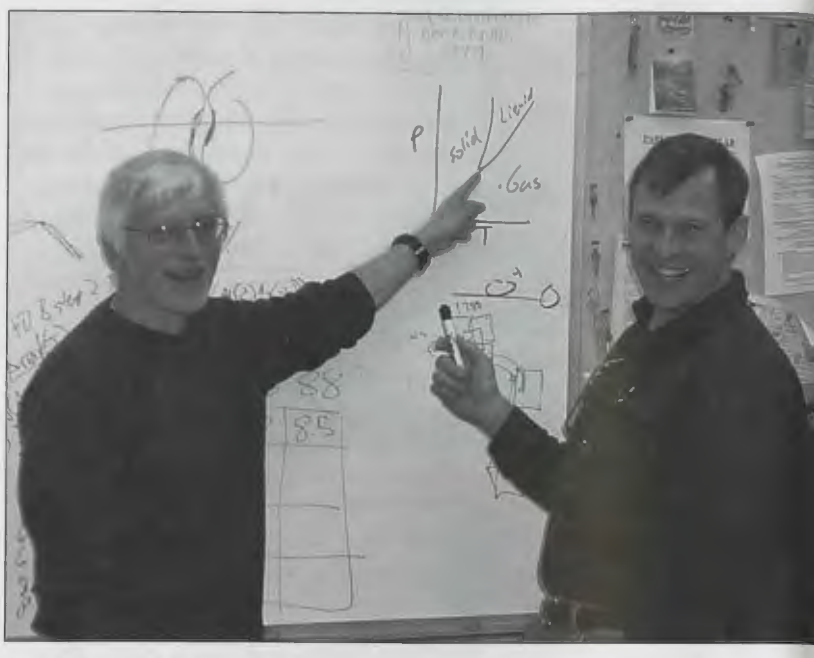
For more information go to www.neoninc.org

PLANTS THAT COMPUTE Make Worldwide News



Stoma hole (in center) surrounded by guard cells

Keith Mott is a biologist who knows next to nothing about physics. **David Peak** is a theoretical physicist who admits to knowing nothing about biology. That may be why their unusual research collaboration works, says David, with a laugh. "We're unfettered by the prejudices of our own disciplines." Perhaps it was that naivety—or freedom—that gave them a fresh perspective on a subject that has been "studied to death," according to botanist Michael Frohlich of the Natural History Museum in London. "It's amazing that something this surprising is found in a field that has been studied so hard for so long," Frohlich says of the Utah State research.



David Peak and Keith Mott explain their research

What David and Keith discovered is that plants may compute—not quite like computers, because they don't have central processing units, and not quite like brains, because they don't have nervous systems, but in a fairly sophisticated manner. When the Utah State findings were reported in the *Proceedings of the National Academy of Sciences,* researchers across the globe sat up and took notice. (So did computer aficionados! A short time after the research made its way into *Science News Online,* no less than a hundred computer science Web sites provided links.)

PLANTS MAY COMPUTE—NOT QUITE LIKE COMPUTERS, BECAUSE THEY DON'T HAVE CENTRAL PROCESSING UNITS, AND NOT QUITE LIKE BRAINS, BECAUSE THEY DON'T HAVE NERVOUS SYSTEMS, BUT IN A FAIRLY SOPHISTICATED MANNER.

"We want to understand at what point sophisticated processing begins to occur in the range of biological systems," David says. "We're working at the simple end of it because it's doable," Keith says. "The problem with brains is that they're very complicated. What we've tried to do is find simpler biological organisms where we can see if adaptive problem-solving exists. Plants are great." The part of the plant the researchers work on is two-dimensional, unlike the brain, which is three-dimensional. It can be easily observed, and researchers can access its components rapidly and nondestructively.

"Plants need to solve a complicated problem," says Keith. "They need to take in as much carbon dioxide from the atmosphere as possible while losing as little water as possible." When leaf pores—called stomata—open to take in carbon dioxide, the pores lose water, which can dehydrate the plant. Making the balance even more difficult, environmental conditions such as light and humidity vary throughout the day. What these College of Science researchers found is that plant pores work together, continually processing information to adjust their opening and closing. In essence, plants respond as an entire organism in spite of the fact that they don't have a brain or a central processing unit.

There are several hundred stomata per square millimeter, and the pores could solve this problem in a "stupid way," with each pore doing its own processing, says David, but it's pretty clear the pores are "talking to each other" at a leaf level.

The research sits squarely in the middle of no-man's-land, somewhere between physics, bioinformatics, systems biology and computational biology, making funding a catch-as-catch-can process. "We've been funded by hook or crook for four or five years now," says David. "Contemporary science is becoming less and less like traditional science, with boundaries eroding and researchers experimenting with interdisciplinary ventures, but collaboration isn't without its frustrations," says David, who feels that granting agencies are ill-equipped to evaluate interdisciplinary research proposals. In spite of the difficulties, Keith and David remain optimistic. "This project is very central to where biology is going," says Keith.

A SHORT TIME AFTER THE UTAH STATE RESEARCH MADE ITS WAY INTO *SCIENCE NEWS ONLINE*, NO LESS THAN A HUNDRED COMPUTER SCIENCE WEB SITES PROVIDED LINKS.

The two researchers, who became acquainted when Keith was a student and David a professor at Union College, New York, work with graduate students **Susanna Messinger** and **Jevin West,** along with five undergraduate students.

"It's exciting to be part of this project," Susanna says. "I love the interdisciplinary nature of the research. It's great to see how so many different perspectives can come together and illuminate something entirely new."

Jevin agrees. "In one day, I can have discussions with a computer scientist, a biologist and a physicist." In applying for PhD programs around the nation, Jevin has discovered that interdisciplinary experience is becoming increasingly important to many schools. "Science seems to be heading more in this direction, as opposed to the strictly defined boundaries that existed previously."

Jevin considers bioinformatics and computational biology somewhat "messy fields," because so much is still left to be worked out. "I like working in 'messy' science," he says, "because I think science history has shown that the greatest discoveries are found in these kinds of areas." ■

See http://bioweb.usu.edu/kmott/

Jevin West and Susanna Messinger analyze data

PUTTING FAT ON THE TASTE MAP

What do you feel like eating? Beef or fish? Chinese or Mexican? Pasta or potatoes? Chocolate or vanilla? Perhaps the more important question is: What does your body need?

Clues to answering those questions are right on the tip of your tongue. Actually, they're all over your tongue—in your stomach, small intestine, and brain. Taste receptor cells that send and receive signals from the brain allow us to taste our favorite things, help us avoid eating potentially dangerous ones, and trigger searches for certain foods. They also—neurobiologist Tim Gilbertson says—prompt us to eat things our bodies need.

Why we like some foods, dislike others, crave certain flavors or textures, and sometimes eat more than we should are all complicated questions. Finding answers requires a careful blending of molecular biology, physiology, biochemistry, and behavioral studies. "Our primary goals are to understand how taste receptor cells function," Gilbertson says. "We also want to know how the body recognizes carbohydrates, proteins, fats, and the essential nutrients we need for survival." People have long believed that the taste system is passive, that it does nothing until a stimulus comes along, and then it reacts. By contrast, Gilbertson says he believes the taste system has a very active role in controlling what we choose to eat.

Fat is among the nutrients we need, though it has gotten a bad name as obesity and its accompanying health problems have become more prevalent. In the days when people expended more calories doing physically demanding tasks just to survive—hunting for food or carrying water—fat was an especially important part of the diet. "If you're an animal foraging in the wild or someone out there trying to find food the best thing you could find is fat," Gilbertson says. "It is the most energy-dense food."

Scientists long believed that fat did not have a taste. Several years ago, Gilbertson and his research team set out to challenge that notion. "We talk about salty, sweet, sour, and bitter, but we've left out a big one—fat," Gilbertson says. Gilbertson explains that flavor—the combination of taste, smell, and texture—is a complex thing and people have long known that when you add fat to food it enhances the flavor. But most believed that fat contributes only to the texture, enhancing what food scientists and chefs refer to as "mouth feel." Gilbertson's research was the first report that showed that something in fat activated the taste system.

Gilbertson says one reason fat substitutes may not have become wildly popular is that they are designed to imitate the texture of fat while ignoring the taste factor. "Ask people about fat-free foods and most of them say, 'They don't taste right,' or 'They taste like cardboard,'" Gilbertson says. "Texture contributes to flavor, but we think it also involves taste. We're looking at the

PUTTING FAT ON THE TASTE MAP ...
Continues on page 15

NATURALIST SOWS SEEDS OF KNOWLEDGE

PERSONAL ACCOUNT BY LINDA FINCHUM, WRITTEN WITH NADENE STEINHOFF

Utah State University, 1961, 7:50 a.m.: I began my first college class with trepidation. The blackboard was covered with a highly detailed, colored-chalk diagram of a cell. And then Dr. Shaw entered and began his introduction to Biology 120. He was immediately engaging, describing a subject he clearly loved. Day by day, I was drawn in by his meticulously prepared lectures, and by quarter's end, I had become a botany major.

Richard Shaw grew up the youngest of four boys in Ogden, Utah. "My older brothers greatly influenced my life," Richard says. In 1929, when he was six, the stock market crashed, and the Depression cost his family their grocery business. His father landed on his feet, as a bookkeeper, while his mother worked as a librarian.

In high school, Richard found his calling in Willis Smith's botany class, but World War II put his career plans at Weber College on hold. In 1942, Richard enlisted in the Navy and was shipped out to the Pacific Theater, where he served in a fleet hospital stationed on the island of Guam. He attended to injured Marines flown in from Guadalcanal, Iwo Jima, and Okinawa.

After the war, Richard enrolled at the Utah State Agricultural College, where he pursued a BS in botany, and then an MS in plant taxonomy. Along the way, he met up with a former high school classmate, Marion Abplanalp, who had graduated from the University of Utah in biology, and the two began a life together that would include camping, hiking, fishing, gathering plant specimens, and raising three children who accompanied them on their adventures.

After receiving a master's, Richard began his career as a seasonal ranger-naturalist at Grand Teton National Park, in 1950. He and Marion lived in primitive conditions: a tent house with no running water and only a small wood burning stove for cooking and warmth. This began a pattern that was to continue for 30 years, with Richard—often accompanied by Marion—donning his Stetson and heading for the Tetons in the summer, and putting on his "mortarboard" in the winter, teaching at the "AC" in Logan. The summers in the Tetons were "the greatest experience of my lifetime," Richard says. He and Marion climbed mountains, with Richard scaling the Grand Teton in 1950, at age 27, and again in 1980. "It was a great deal more difficult at age 57," he says. He shared his passion for the natural world with park visitors and helped establish a park herbarium. When a wildflower expert once failed to identify a plant, he was told, "The one you need to talk to is Dick Shaw at Colter Bay; he knows them all."

When Richard began teaching in Logan he emulated a colleague's methods, **W.S. "Sid" Boyle**. Inspired by Sid's enthusiasm, and the clarity and organization of his lectures, Richard began each lecture with a preview of the material to be covered, the lecture itself, and a review, hoping to increase retention of the material. The lectures were reinforced by the establishment of audio-tutorial labs, which allowed students to attend at their convenience.

Richard returned to school, obtaining a PhD in biosystematics from Claremont Graduate School in California, and then resumed teaching at what had become Utah State University (1957). He settled into academic life with a lively department, one that included **Herman Wiebe, Ivan Palmblad, Arthur Holmgren, Gene Miller,** and **George Welkie**. A sense of humor was a necessity, as certain unnamed faculty enjoyed playing practical jokes on the unsuspecting. Richard contributed technical papers to the field and became a popular lecturer. Former student Nadene Steinhoff says, "The only college textbook I never gave away was the text from Dr. Shaw's class. I still read *Seed to Civilization* and remember his lectures. His passion for plants became part of my life." Richard's lectures were supplemented with laboratory field trips to the foothills and canyons east of campus.

Marion helped Richard collect and press plants, and their quest for specimens took them through the western states and into Canada, Mexico, and New Zealand. During the last 55 years, they contributed some 5,600 specimens to the USU Intermountain Herbarium, with duplicates sent to 25 other herbaria in the U.S. and Canada. Richard was appointed director of the herbarium in 1984, where he initiated the alphabetical arrangement of plant families and made a significant contribution to its regional and

national status. Richard retired in 1987, but continued to teach until 1989 as an emeritus professor.

Richard's retirement hobbies include photographing wildflowers and building birdhouses, which Marion paints and decorates—no two are alike. He leads budding naturalists with the Utah Native Plant Society and USU Emeriti on wildflower walks to Tony Grove in Logan Canyon, introducing new generations to plants and pollinators. He finds delight in 11 grandchildren and one great-granddaughter. Richard and Marion, in their upbeat, positive way, have beaten cancer several times over, with Richard recalling a quote from Garrett Hardin, of U.C.-Santa Barbara: "The struggle for existence cannot be escaped; only the form which it takes can be altered."

His prodigious collecting and writing have left a lasting legacy for naturalists, botanists, national park visitors, and the general public. His field guides include *Wildflowers of Yellowstone and Grand Teton National Parks,* (now in its fifth edition); *Wildflowers of Wasatch and Uinta Mountains; Plants of Yellowstone and Grand Teton National Parks; Plants of Waterton-Glacier National Parks and the Northern Rockies; Vascular Plants of Grand Teton National Park, Wyoming; Utah Wildflowers; Vascular Plants of Northern Utah* (which includes contributions from **Mary Barkworth** and **Sherel Goodrich**), and others. Royalties from the field guides allowed the generous couple to establish the Richard J. and Marion A. Shaw Scholarship Endowment Fund, which has benefited 17 students since its inception in 1989.

Richard Shaw's life exemplifies integrity, hard work, good humor, enthusiasm and, especially, generosity of time and resources. When asked how he would like to be remembered, he said, "I hope I was able to influence my students." Indeed, Dr. Shaw has inspired hundreds, perhaps thousands of plant enthusiasts. Now in his eighties, he seems just the same to me as he did back on that golden September day in 1961 when I met him for the first time. Because of his mentoring, I studied science, and my life was enriched beyond measure. ■

THE CENTURY PLANT

On a 1961 visit to San Francisco, Richard found a small Agave plant in a gallon can. Richard being Richard, he carried it home on the plane, in his lap. Installed in the biology greenhouse, it outgrew its container several times, and then several times again. In 1992, 31 years later, it bolted and sent up a flowering stalk. When the plant broke through the roof, several panes of glass were removed. At 15 feet, the *Agave americana* became a TV and newspaper celebrity. The flowering came to an abrupt end when a windstorm broke the stalk, but its offspring still inhabit the greenhouse. Visitors are welcome. The next flowering? Only time will tell.

HOWARD BLOOD ENDOWMENT

A LASTING LEGACY

Dr. Howard Blood attended Utah State back when it was the Utah State Agricultural College. He studied physics, joined Pi Kappa Alpha, and played football and tennis. In 1943, he enlisted to fight in World War II as a member of the U.S. Air Force. Home on leave, he met June Anderson, who was singing with a dance band, and in 1945, the young lieutenant married his fellow Aggie. From there, he began a meteoric rise to the top tier of military, industry, and government organizations, playing a key role in the development and oversight of numerous defense-related science and engineering projects.

Howard now lives on a bluff overlooking the Pacific Ocean, in San Diego, California, where he is being treated for pancreatic cancer. He feels a sense of urgency about tying up loose ends. One loose end is a memory he has of his fellow students at Utah State. "Many of them were struggling," he remembers, and he wants to help.

Howard obtained a PhD in solid state physics, with minors in electrical engineering and mathematics, at the University of Washington in 1954, and served as a teacher—he was voted one of the ten most popular instructors—and administrator there for 20 years. He then branched out into industry, helping direct the futures and fortunes of technology-based companies. He headed up the Naval Ocean Systems Center in San Diego, and later transferred to Gould, Inc., as vice president, to help the company develop defense-related technology. Along the way, Howard oversaw projects for NATO and the U.S. Navy. He worked on numerous cooperative, multinational projects with Japan, Australia, New Zealand, the USSR, and several NATO countries, and has been honored with a host of awards and medals for distinguished service.

In the early 1990s, Howard was invited to join a small team of experts who were puzzling over the lack of alternatives for airport expansion in San Diego. Crowded into a geographical cul-de-sac, the city has been stymied in its plans to enlarge its airport, and planners believe that the limited size of its current airport is hindering economic expansion. With few alternatives, the team suggested an offshore alternative—a floating airport—and began to develop and test pneumatically stabilized platform technology, which allows large platforms to float. The partners formed Float, Incorporated, and began to look at other potential applications as well: offshore ports, military bases, and oil industry platforms. "Right now the offshore hub proposal is receiving a bit of attention from the Department of Homeland Security," Howard says. "The hub would allow container ships to dock at offshore ports, where cargo would be transferred to U.S. ships. This would be a way to get a handle on one of the most dangerous aspects of U.S. security."

Long ago, before Howard consulted on projects spanning the globe, before he taught or invented, he served his country in World War II. While there, Lieutenant Blood was handpicked by filmmaker George Cukor to appear in 20th Century Fox's motion picture, *Winged Victory*. The man who got his humble start at Utah State has now established a generous scholarship program which will provide the wings for other young men and women to fly. The Dr. Howard L. Blood Undergraduate and Graduate Scholarship Endowment Fund will award significant amounts to needy and under-represented students in the Department of Physics. Howard hopes their victories will be as fulfilling as his own. ■

Dean Don Fiesinger, philanthropist Dr. Howard Blood and Physics Department Head W. John Raitt

ECCLES SCHOLAR REPORTS FROM THE FRONT

Although **Kristin Bakkegard** received a prestigious Willard L. Eccles Graduate Fellowship, she wasn't anywhere near her lab last year. The biology graduate student was sleeping in a dusty, ten-person tent in Kuwait. On good days, the temperature dipped into the 100s. On bad days, she says, "It poked 120." Called up to help provide harbor security, she spent her days managing soldiers and providing harbor security for the large ships that unload trucks, helicopters, and tanks. It was pretty quiet, she reported, although ever-present dangers included terrorist boats exploding against the sides of ships.

Stationed only 20 miles from Kuwait City, troops were not allowed a day on the town. "We didn't have liberty to mix with the locals," Kristin says. "The Army already has a huge presence there, so we don't want too many Americans roaming the city. We're there as guests. We also reduced the threat of terrorism by staying put.

"Actually, the most dangerous thing we worried about was the roads." Kristin was in charge of busing the troops 20 miles to the harbor for duty. "Kuwaitis tend to drive fast," she says, "and sometimes they drive at night without headlights. They don't do fender benders." Accidents often result in "seriously mangled cars." Other dangers included heat injuries, choppy seas, and fatigue, but morale was high in her unit, she says.

The naval officer first went to Kuwait in 1998—when Saddam Hussein threatened to invade the country—as part of a four-ship convoy. Her ship, in full wartime mode, patrolled coastal waters as deterrence.

THE WILLARD L. ECCLES GRADUATE FELLOWSHIP IS DESIGNED TO ATTRACT TOP-NOTCH STUDENTS WHOSE RESEARCH FOCUSES ON SOLVING THE PROBLEMS OF OUR TIME WITH CREATIVE AND AMBITIOUS APPROACHES.

Kristin's career has bounced around—from biology and chemistry labs to active military duty and back—ever since she enrolled at the U.S. Naval Academy in Maryland, at the suggestion of a high school guidance counselor. After graduation, she was commissioned as an ensign and spent ten years of active duty serving on ships in Pearl Harbor; San Diego, California; and Norfolk, Virginia. She completed a master's in chemistry at Boston University while serving as a Navy ROTC instructor, and then shipped off for the Persian Gulf. In 1998, she flew home from Kuwait to begin working on a master's in zoology at Auburn University.

"I knew then that I wanted to a be a biologist rather than a chemist. It's more fun to be outside catching critters than inside running reactions. I had to do a second master's because I hadn't had biology since high school."

In 2001, she entered Utah State on a Willard L. Eccles Graduate Fellowship, which provides $18,000 a year for three years of graduate study. Now back a second time from Kuwait, she's happily ensconced in her "cave" in the basement of the biology building, when she's not studying amphibians near Mount St. Helens. Working alongside professor **Butch Brodie**, she's analyzing population genetics at the site of the 1980 eruption, tracing populations of newts, salamanders, and frogs. But she still drills in Fort Worth, Texas, each month, commanding a 100-person unit.

"I'm happy to be here," Kristin says, "although I'm still looking for a good barbecue joint. I'm thrilled to death for that scholarship." It enables her to concentrate full-time on research. "Someday I'll graduate," Kristin says, although she could be called-up again at any time. "There's always that wild card." ■

The Willard L. Eccles Graduate Fellowship is designed to attract top-notch students whose research focuses on solving the problems of our time with creative and ambitious approaches. The Willard L. Eccles Foundation has been a longtime supporter of the College of Science, funding both graduate and undergraduate research fellowships.

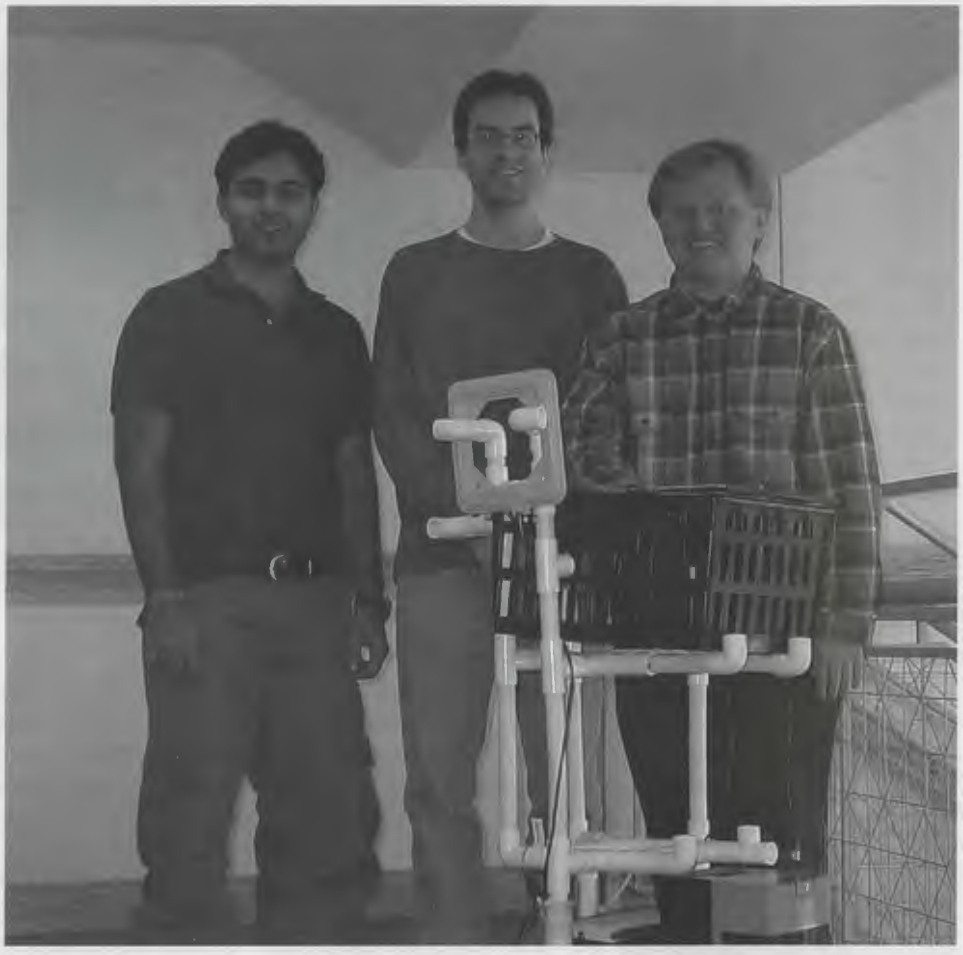
THE FUTURE IS HERE, says robotics inventor

Even guide dogs have trouble when it comes to picking groceries for their visually impaired companions. The canine nose hasn't evolved to sniff out the difference between competing brands of clam chowder, nor can the dog locate the detergent aisle. Airports are even worse. The best guide dog can't lead its owner to the connection gate on the other side of the airport, and white canes are essentially useless in such a complex visual environment.

This dilemma gave computer scientist **Vladimir Kulyukin** an idea. The Russian native, housed in his office under the eaves of Old Main—yes, Old Main does have a fourth floor!—has imagined and begun to create a navigational robot that will help the visually impaired.

"Grocery shopping is one of the most complicated activities we do," Vladimir says. People without sight find the array of aisles and products overwhelming, leaving them dependent on others for groceries.

The idea was partly inspired by a brother who is hearing impaired, and fueled by Vladimir's sense of idealism. He wants to combine robotics with serving others.



Graduate students Amit Banavalikar and John Nicholson assist Vladimir Kulyukin in developing "RG1," the robot. (Student Chaitanya Gharpure missing from photo)

The robot, which could also help people with cognitive difficulties, looks a little like a shopping cart, and is currently being tested at the USU Center for Persons with Disabilities and on-site at Lee's Marketplace in Logan. The shopper punches in items, using Braille, and robot antennae guide the individual to the selected products, which are tagged. Graduate students are helping develop the robot, which maneuvers using laser signals and radio waves, and the National Science Foundation has invested half a million dollars, by way of a five-year career grant.

With this technology, travelers could easily find connecting gates at airports, Vladimir says, including stops at restrooms and restaurants. They would be left at the correct gate with a cheery: "You've reached your destination. Goodbye."

Although the idea may seem far-fetched, it's not entirely impractical, nor is it wildly futuristic. Airports and grocery stores already have smart carts that help customers. A similarly priced robot, which serves the visually or cognitively impaired, would open up a new market for airlines and department stores, and expand the range of technology already in use.

Watch the KUTV Channel 2 news video at http://www.kutv.com/freshlook. Click on "Seeing Eye Robot." ■

PUBLIC HEALTH PROGRAM MAKES THE GRADE

Health hazards at work are a growing national—and often personal—concern. Carbon monoxide from poor combustion can cause headaches, nausea, and even death. Lead can cause brain or nerve damage. Asbestos and silica dust often result in respiratory disease. Formaldehyde or blood-borne pathogens in medical settings pose risks. Newer, more exotic hazards include hazardous waste, endocrine disruptors, and airborne molds. The persistence of these problems and the expanding number of new, or newly recognized, hazards creates an increasing demand for public health experts.

Thanks to Program Head **Will Popendorf** and team members **John Flores** and **Dave Wallace,** USU's Public Health Program turns out some of the nation's most qualified experts in public health education, environmental health, and industrial hygiene. The Industrial Hygiene Program (IH) was recently reaccredited by the Accrediting Board for Engineering and Technology (ABET) with flying colors, with the chair of the site visit team remarking, "I've been doing this for years, and I think I can remember only one reaccreditation process that went more smoothly."

The IH program is a historic legacy of a public health program at USU that dates back to 1898. After the Department of Bacteriology and Public Health, and other small departments, were folded into the Department of Biology in 1973, the program was resuscitated by **Bob Parker** and kept alive through the 1980s almost single-handedly by **Dave Drown**. The program grew slowly for about ten years before it really took off, mostly by enthusiastic word of mouth. Most students enter this program from other science fields on campus, and the program now graduates about 20 students each year, who are snapped up by companies across the nation.

The ABET site visitors expressed initial reservations about the USU program. "Public health careers require applied science," Will Popendorf says. Specialists, such as industrial hygienists, also need to know a lot of on-the-ground regulations. Most public health programs focus on practical or regulation-based training, as opposed to a broad-based science education. At the opposite end of the spectrum are educational programs that emphasize research. They're grounded in theory, and require creativity and imagination, but offer little practical training.

"The ABET site visitors came here thinking that you can't do both," Will says. "They left seeing that you can." USU's unique approach gives students a solid background in the sciences, which is then overlaid with practical and real-world training, including site visits to manufacturers and summer internships.

"The number one complaint of employers is that their hires don't know enough science, especially chemistry," Will says. "That's not true in our case. Our program is rigorous. Our students have to work hard."

"THE NUMBER ONE COMPLAINT OF EMPLOYERS IS THAT THEIR HIRES DON'T KNOW ENOUGH SCIENCE," SAYS WILL POPENDORF. "THAT'S NOT TRUE IN OUR CASE. OUR PROGRAM IS RIGOROUS. OUR STUDENTS WORK HARD."

The ABET report cites the "exceptionally strong foundation in natural sciences." In interviews with alumni, former students said that the strong undergraduate education they received provided the capability to learn whatever their careers required with relative ease. "The program provides a strong opportunity for students to learn how to learn," the report said. It pays off. "A lot of companies come here looking for employees," Will says. "Our students look awfully good." The placement rate into fulfilling—and lucrative—jobs or graduate school is virtually 100%. ■

PAUL JAMISON FOSSIL

Paul Jamison (BS Geology, 1982) with 50-million-year-old fossil, (also shown, Associate Dean Dick Mueller and Ecology Center Statistical Consultant Susan Durham). The "stone bird," an extinct ancestor of flightless birds and the first complete specimen of its order to be discovered, was found by one of Paul's former high school students in Paul's Clear Creek Quarry. It will be housed and studied in the American Museum of Natural History in New York City.

PREVIEW DAY

(L-R) College of Science Ambassadors Ashley Liddell, Dustin Keele, & Ryan Warner discussing degree programs with prospective new freshman.

GEOLOGY ALUMNI DINNER GATHERING, OCTOBER 23, 2004— KICK-OFF FOR PETER MCKILLOP SCHOLARSHIP ENDOWMENT

Pictured left to right: Dean Don Fiesinger, Matt Novak (MS Geology 1993); Holly (Langrock) Novak (BS Geology 1993); Matt Pachell (MS Geology 2002); Jill (Hammond) Pachell (MS Geology 2002); Adrian Berry (MS Geology 2004).

AGGIE FAMILY DAY

CHILDREN EXPLORE THE WONDERS OF SCIENCE AT AGGIE FAMILY DAY.

GOLDWATER SCHOLARSHIPS

TWO GOLDWATER SCHOLARSHIPS LAND IN COLLEGE OF SCIENCE

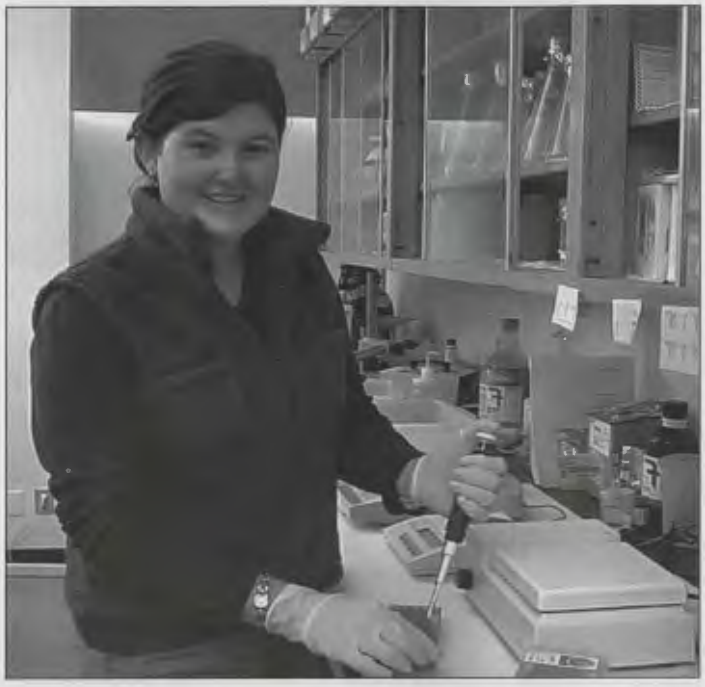
College of Science students Stephanie Chambers and David Hatch were awarded highly-coveted Barry M. Goldwater Scholarships. The national scholarship program was established by Congress to provide a continuing source of highly-qualified scientists in the areas of mathematics and engineering.

Stephanie Chambers is a vivacious biology major from Providence, Utah, who grew up with a yen for performing backyard science experiments. She collected insects and leaves, and stored samples of muddy water in her room "to see what would happen. Of course, they just ended up smelling bad!" she says. She loved "all things science." She suspects some of her interest rubbed off from her mother, an avid gardener who helped her children build rock walls and plant vegetable gardens—even fruit orchards. "I swear it was forced labor," Stephanie laughs, but the exposure forged a keen desire to learn more about natural processes and organisms.

Several summer sessions at University of Utah research camps solidified her passion for biology. "We studied pheromones in the lab, and because I was in high school, the study of pheromones was quite relevant," she joked.

Once at USU, she landed a job in a biology lab to supplement her income. "I like learning about things by doing them rather than reading about them," she says. Seeing Stephanie's enthusiasm, **Joyce Kinkead**, vice provost for undergraduate research, took Stephanie under her wing, making her an assistant. "I really enjoyed working with her," the young researcher said. "I learned about student research and became familiar with grants. I learned how universities work. The more I learned, the more I was impressed with the dedication of the university administrators here." In her junior year Stephanie worked with Biochemistry Assistant Professor **Joan Hevel**, starting a tissue culture lab to isolate proteins, and presented her findings at the National Conference on Undergraduate Research. She wrote an honors thesis on cardiac regulatory proteins.

Now she's headed off for the MD-PhD program in toxicology at the University of Utah. "You do two years of MD work, squish a PhD in the middle, and then finish the MD." It should be a snap for the honors student, who sailed through USU on a Presidential Scholarship.



Stephanie Chambers in the lab

Stephanie's most meaningful accomplishment wasn't the day the "A" on Old Main was lit for her or the afternoon she attended a football game with former President Kermit and First Lady Phyllis Hall. It wasn't the presentation the University Scholar gave at the president's home, or representing the College of Science on the university holiday card. (Her grandma smuggled extra cards to give to her golfing friends!) It's a struggling group she's nurtured along—Women in Medicine. "So many women tell me they want to be a doctor, but also want to be a mother, so they whittle down their dreams and go into nursing," Stephanie says. "From my perspective, you have much less autonomy as a nurse. It's easier to balance motherhood with a medical practice. There's a need to show women that it's possible." As president of the mentoring group, she's hoping to broaden its perspective and change the name to Women in Science. "It's something I care about deeply," she says.

Where does Stephanie see herself in ten years? "At a research university. With a job! Out of my parents' house! Maybe I could even get a car." With Stephanie's talent, she can probably get pretty much anything she wants.

"SO MANY WOMEN TELL ME THEY WANT TO BE A DOCTOR, BUT ALSO WANT TO BE A MOTHER, SO THEY WHITTLE DOWN THEIR DREAMS AND GO INTO NURSING," SAYS STEPHANIE CHAMBERS. "THERE'S A NEED TO SHOW WOMEN IT'S POSSIBLE."

David Hatch with cloud photos

David Hatch comes from a solid line of USU alumni. Both grandfathers were Utah State professors, and both parents and a brother became Aggies. "It's a family thing," the Wellsville, Utah, native explained. "I planned to go to Utah State my whole life."

A renaissance teenager, David split his time between the cross-country track team, road bike racing, skiing, snowshoeing, classical and jazz piano, and reading. As for a profession, "I always expected to do something in science." He fell under the spell of his father and brother, who were physicists. "I didn't want to just follow in their footsteps, but I started the physics program at Utah State and liked it," he says. His aptitude for math fueled his interest in theoretical physics. "I like the problem-solving side of physics, figuring out mathematical solutions, being creative. I like using my skills to find solutions."

The National Merit Scholar spent two years working with Physics Associate Professor **Mike Taylor**, who studies the dynamics of the upper atmosphere, including acoustic-gravity wave motions and their dissipation. "Dr. Taylor gave me a lot of opportunities to do research," David says. Mike even sent the physics major to Finland to photograph noctilucent clouds *(see cover)*. The "night-glowing clouds" are so high in the atmosphere they can usually only be viewed at dawn and dusk, at high latitudes, and where the atmospheric temperature is very low. "They're the last thing in the sky lit up by the sun." David presented his findings at a United States/Japanese conference in Jackson Hole, Wyoming. "It was fun giving a presentation for all these PhD scientists. I mostly showed pictures and explained our work." David credits Mike with helping him obtain his Goldwater Scholarship. "Mike Taylor deserves thanks. He gave me so many opportunities."

More recently, David has worked with **Farrell Edwards** and **Eric Held**, and shifted his focus to plasma physics and fusion research. The University Club Scholar and 2005 College Undergraduate Researcher of the Year has great respect for both scientists. "Dr. Edwards developed new equations for confined plasma," David says. "He came up with the unexpected result, in part, because he was new to the field—he didn't make assumptions." David believes the discovery could be important, and his beliefs are echoed by the prestigious physics journal, *Physical Review Letters,* which accepted Farrell's article for publication. David played a role in the discovery, conducting research into static electric fields in plasma, trying to find out if the system is stable.

"Scientists have not yet been able to create a fusion reaction that produces usable energy, but fusion reaction would be a great energy source," David says. "It's renewable and fairly clean, and there would be no greenhouse gases." David is leaning towards further fusion studies for his graduate work. He believes scientists will unlock the potential of fusion reaction in the next half century, and hopes to be a part of the solution to the world's energy needs as a research professor or in industry. "I would love to figure out cool, new things."

As for his soon-to-be alma mater, "I had a great experience here. My professors are supportive and encouraging." Stay tuned to this up-and-coming physicist. ■

DAVID HATCH COMES FROM A SOLID LINE OF USU ALUMNI. "I PLANNED TO GO TO UTAH STATE MY WHOLE LIFE," HE SAYS. "IT'S A FAMILY THING."

PUTTING FAT ON THE TASTE MAP...

Continued from page 5

implications of what we've found and how we might be able to trick the body into thinking it's had fat when it hasn't. Down the road, knowing which molecules activate our receptor cells may help develop a fat substitute that will satisfy consumers. That could help us get our average 40% fat diet down to 20 or 30% so we might see a decrease in heart disease, diabetes, and other obesity-related problems."

Story by Lynette Harris
Reprinted from *Utah Science*

2005 VALEDICTORIAN

HEADED FOR TEACHING CAREER

Valedictorian **Jeffrey David Luke** led the procession for the College of Science at USU's first winter graduation ceremony, held in December 2004.

Since high school, Jeff has known that he wanted to teach. Although a career counselor tried to persuade the National Merit Scholar to focus his talents elsewhere, Jeff's passion for learning led him back to the classroom, hoping to inspire others.

He graduated summa cum laude in Composite Teaching Biological Sciences, with a minor in Chemistry Teaching, and served as an ambassador for the College of Education and Human Services. While navigating a challenging major, he tutored USU athletes in biology and assisted the track and cross-country coaching staff at Logan High School. His love of sports came from playing basketball and soccer in high school, along with running cross-country and track. The Spanish-speaking student also taught migrant children in Idaho for two summers.

Jeff is currently completing an internship at Riverton High School, where he teaches five biology classes, co-teaches a chemistry class, and serves as an assistant track coach. He plans to teach at the high school level while working on a master's, and return to school for a doctorate. Ultimately, he wants to share his love of biology as a university professor.

Jeff especially appreciates the support of his wife and son, his family and friends, and numerous professors. "I never doubt the decision that Utah State was the right school for me," he says.

"Graduation was great because I saw a lot of friends that I got to know really well through my classes," says Jeff, who was escorted up the commencement aisle by mentor **Gregory Podgorski**, associate professor of biology. He had a hard time picking just one professor as an escort; he was influenced by many teachers throughout the university. "During my classes I watched my professors and took note of things they did that I wanted to do in my own classes in the future," he says. ■

Associate Professor of Biology Gregory Podgorski with Valedictorian Jeffrey David Luke

COMPUTER SCIENCE PICKS UP NEW PROGRAMS

The Computer Science Department, now almost 40 years old, can't sit on its laurels—the field is far too dynamic. In 1961, USU ordered one of the first computers delivered west of the Mississippi. The department is still on the leading edge, mentoring 400 majors and reinventing itself on a continual basis to stay in the forefront of the computer revolution.

The department began offering an undergraduate bioinformatics option in 2003 and expects to add a graduate program component in the fall of 2005. A new information technology option will serve undergraduate students who are interested in complementing their computer science background with business expertise.

"The last half of the 1900s gave us the half century of the computer," says Department Head **Don Cooley**. "A lot of people say the 21st century will be the century of biology."

Consequently, the department is poised to take advantage of the emerging field of bioinformatics—a merging of molecular biology, chemistry, statistics, and computer science. The new biology is paving the way for a revolution in nanotechnology, stem cell research, pharmaceutical research, and human genome research.

"THE LAST HALF OF THE 1900S GAVE US THE HALF CENTURY OF THE COMPUTER," SAYS DON COOLEY. "A LOT OF PEOPLE SAY THE 21ST CENTURY WILL BE THE CENTURY OF BIOLOGY."

That means computer scientists will have their work cut out for them. "Computationally, we're falling behind," Don says. "We've automated so much of the process of data collection that we have more information than we know what to do with. We now have to automate the analysis process."

The department's work in bioinformatics will complement their new computer science PhD program, initiated in 2002. The graduate program prepares PhD students for research careers in industry or academics.

The programs are supported, in part, by the Governor's Computer Science and Engineering Initiative. In an effort to lure high tech industries to Utah and increase the state's tax base—high tech jobs offer some of the state's highest wages—Utah has pumped money into computer science education. The computer science job market is one of the fastest growing sectors nationally and internationally. ■

YOUR SUPPORT MORE CRITICAL THAN EVER

More USU students are finding a home in the College of Science than ever before. In fact, the number of science majors has grown by 70% within the past ten years alone—with 1,500 undergraduates, 350 graduate students, and 115 faculty members now on board. The College also serves as a springboard for majors across campus, leading students into paths of scientific exploration and discovery, and giving them keys that will unlock career potential and lifelong learning.

The path of discovery begins at the undergraduate level at USU; nearly 30% of our undergraduate students take an active role in research projects, and many science undergraduates (including several in this issue) coauthor scientific articles for professional journals or give presentations at professional gatherings. Our students send more research experiments into space than any other university in the world. We turn out some of the top scholars in the nation, including last year's Rhodes Scholar **Lara Anderson,** and this year's two Goldwater Scholars. Our medical school acceptance rate is 15% higher than the national average, and our dental school acceptance is 25% higher. The College's public health graduates are gaining a national reputation for the rigorous scientific background they bring to the profession.

Our graduate and undergraduate students excel—because they are mentored by approachable, caring teachers and given opportunities to create and discover. They find their place among leading-edge innovators and thinkers—people like Jim MacMahon, who envisioned the world's first large-scale collaborative platform to address critical environmental issues. His team is spearheading a project that has brought thousands of scientists together—across fields and across regions. College of Science professors, working alongside others, have also launched one of the nation's premiere pilot projects: a National Science Foundation project that will boost the number of women in the sciences. The project is one of only ten in the nation.

This success doesn't come without a cost, and in our new budget-crisis economy, public institutions—even land-grant universities—are looking less and less like public institutions and more and more like private institutions. State tax monies in Utah only cover a third of our expenses. The rest? It comes from government grants, foundations—and from you. Alumni, friends, faculty, and staff play a critical role in keeping our College vital.

Our outreach is growing, our reputation is growing, even as state support is diminishing. We look to our friends to help fill the gap. The College of Science has enriched the lives and livelihoods of tens of thousands of individuals. We hope you are one of them. Please join us in our quest.

Heritage Society

The Heritage Society was established to recognize 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.

Tom K.* and Esther Archuleta
Dr. Howard L. Blood
Dr. Melvin C. Cannon
Ralph S. Christensen*
Dr. John W. and Norda F. Emmett
Keith W. and Beverly Fullmer
Dr. Marguerite Greaves*
C.T. and Jo Ann K. Griffiths
Ronney Dean and LuAnn Harris
Robert Q., Jr. and Luella F. Oaks
Dr. Grant M. Reeder*
Dr. Jay R. and Lorraine M. West

*Deceased

WHERE THERE'S A WILL, THERE IS A WAY TO GIVE ...

Almost everyone intends to write a will, but many of us never do. The most common reason isn't lack of money, knowledge, or opportunity. It's just a matter of time. Take the time to prepare your will. Regardless of your circumstances, a will helps you organize your affairs and remember those for whom you care most.

If you have already included the College of Science in your estate plans, or if you wish to receive complimentary estate and gift planning materials, please contact us.

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 Dean Don Fiesinger at (435) 797-2478 or don.feisinger@usu.edu.

NEW FACULTY ENRICH COLLEGE

David Brown
Mathematics & Statistics

Carol Dehler
Geology

Morgan Ernest
Biology

Kent Evans
Biology

David Brown's office in Lund Hall is filled with transformers—robotic figures that he developed a fascination for as a child. He got his first transformer toys as a 12-year-old, but obviously, he didn't get enough. "I'm making up for the shortcomings of my childhood," he says. The toys transform their shape from animals into tanks into robots into vehicles, much like David, who has transformed himself from body builder and avid weightlifter—he was Mr. Colorado 1994—to existentialist philosophy and math undergrad, to graduate student in mathematics, to assistant professor.

"I wanted to teach for a long time," David says. After working "8 to 5" for five years, he got tired of "going to work everyday to make someone else a bunch of money." Seeking a vocation with more intrinsic meaning, and seeing the scarcity of jobs in philosophy, David gravitated toward math. He enrolled in the mathematics graduate program at the University of Colorado at Denver, where he started teaching two classes immediately. David was drawn to the classroom. "I started teaching and never looked back," he says. "Teaching is what turns my crank. I love it."

David teaches calculus, introduction to algebraic structures, and graph theory. He boosts department research in discrete mathematics, with his current research focused on applied graph theory within DNA modeling. "The problems I work on typically arise from real-world problems," he says, "but I focus on the theoretical end of things. Sometimes it's best to keep the real world separate from the theoretical world because the nuances of the real-world problem could disguise useful structures." His days are spent exploring the properties of probe interval graphs—"In the business, we like to call them 'PIGs,'" he says, relishing the amusing acronym.

Born, raised, and educated in Denver, David is a newcomer to Cache Valley. He enjoys the camaraderie among faculty and students in the Mathematics and Statistics Department, and finds people personable and friendly. "They made me feel welcome," he says. You can see David lifting weights at the gym most days, or you can visit him in his office, where he listens to techno-electronic trance music as he scratches out long equations on his white board. He also likes biking, literature, movies, and philosophy—especially Camus, Nietzsche, and Sartre. "I read before bed in order to avoid having to dream about math!"

Carol Dehler grew up near the beach in Coronado, California, spending her days outside picking up rocks and shells. She's still picking up rocks, although in a more official capacity, as a half-time assistant professor in the Geology Department. Her appointment follows five years as an on-campus instructor and research associate—enough time to gather the collection of rocks that line her office windows and shelves. Carol also did a stint teaching at Idaho State University in Pocatello.

After high school, she says, "I got a bee in my bonnet and moved to Santa Barbara, where I took my first geology class." Historical geology hooked her, and she's been clambering around outcrops ever since. "I loved geology courses because so many were held outside." After receiving a bachelor's from Humboldt State, she moved to Flagstaff, where she picked up a master's from Northern Arizona University and met her husband, USU geologist **Joel Pederson.** She obtained a PhD in Earth and Planetary Sciences from the University of New Mexico.

Her graduate research took her to the Grand Canyon, where she camped in the middle of an ancient world filled with very old rocks, trying to understand how they formed. "The rocks there are young by Earth's standards but old by fossil standards," she says. "Our team of scientists is trying to answer questions about global climate changes that occurred 750 million years ago, and were possibly the most severe in Earth's history. We want to understand the relationship between these climate changes and the evolution of animals. There's a beautiful fossil record in these rocks that predates animal evolution and preserves single-celled organisms—the most complex living things at the time." In that

Peg Howland
Mathematics & Statistics

Brynja Kohler
Mathematics & Statistics

Katarina Stroffekova
Biology

microscopic world, her team found single cells representing the oldest carnivores on Earth, with similarities to living organisms today. Carol's most recent work has been focused closer to home, in Utah's Uinta Mountains.

"My life, in a nutshell, is that I'm very fortunate," Carol says. "I love teaching. The students are great. People are very collegial in the Geology Department. I live in a beautiful valley, on a beautiful campus. And as a geologist, I feel lucky to be close to so many world-class rocks. I can walk ten minutes with my students and see great rock outcrops."

Carol commutes by bus from her home in Richmond, practices yoga, and likes to cross-country ski and hike. She and Joel have two dogs, with llamas and chickens "next on the list." She relishes international travel, where "we hit all the art museums. I want to learn about art." She attended the Sundance Film Festival in January, and likes listening to music. "I don't have anything to complain about except that I've gotten so attached to Cache Valley—it's hard to see the continual loss of open space and the air quality problems. I plan to make time to work on these issues."

Morgan Ernest grew up as a tomboy, exploring the backwoods of northern Virginia. "I would leave in the morning, check-in with my mom at noon, and come back at dinner," she says. A light bulb went on in the seventh grade, when she saw her first biology film. "As I watched biologists studying bears in Maine, I was stunned. I never realized you could get paid to be outdoors!" She took every biology course in the curriculum and signed up for the ecology program upon enrolling at the University of Arizona. "I love being outdoors, working with nature. Our mothers told us not to play in the dirt. Ecology provides a socially acceptable avenue for getting your hands dirty."

As an undergraduate, she participated in an NSF-funded summer research project, working with rodents. "I loved it," she says. She continued to work with small mammals—rodents in particular—for her PhD research at the University of New Mexico and for her postdoc research at Texas Tech University. "There are lots of questions you can ask with small mammal communities, and it's easier to get data. It's easier to find large numbers of rodents, as opposed to larger mammals. Plus, rodents are very cute," she laughs, gesturing toward the toy rodent collection in her office. Morgan is currently working on a long-term research project in Arizona, but will soon explore research possibilities in Utah. "There are diverse areas here, with species endemic to the Great Basin," she says.

She gained a new appreciation for teaching when she taught community ecology and biogeography as a graduate student. "Good teaching is more challenging than I imagined." She learned how much of an investment it required, and looks forward to her first courses at Utah State.

Recently married, Morgan returned from an Italian honeymoon, where she indulged her love of art history—anything from early Renaissance to the mid-50s—and joined the Biology Department winter semester. Her love of hiking makes Cache Valley an ideal place to live. "Obviously, this is one of the most beautiful settings for a university. The mountains are stunning." She is enjoying the peaceful, laid-back pace after living in Albuquerque. "I've had great support from the administrators and my colleagues. I'm looking forward to getting my life out of boxes, and getting settled in."

Kent Evans' interest in plant pathology came about naturally, having grown up in a family of wheat farmers. "My father grew up a farmer, and all my aunts and uncles were wheat farmers," he says. Kent became sensitive to the economic losses that producers often encounter due to plant diseases. After graduation in plant pathology from Oklahoma State University, he worked at the University of Minnesota on a project that focused on Fusarium head blight of wheat and barley. The disease devastated the economy and culture of the Midwest in the earlier part of the 20th

century. "Farmers lost their farms, bankers went bankrupt, farming communities were devastated," Kent says. "It was a $5 billion disaster." The disease has reemerged in the past decade as one of the most severe diseases of cereal grains.

"Plant diseases affect all of us," Kent says. "Producers are often faced with using chemicals to control plant diseases, but some plant pathogens produce their own toxins, which can harm us as much or more than pesticide residues. My aim is to provide people with information that helps them understand the advantages and disadvantages of how we manage our food supply." Kent, who serves as an Extension specialist, helps homeowners, growers, and producers better understand how to manage plant diseases specific to the region. He works with vegetables, fruit, cereal crops, and ornamentals, and a whole host of new and emerging pathogens keep him busy.

"Biological organisms are always in flux," Kent says. "Populations shift, climates shift, and people change behaviors. It used to take hundreds of years for a pathogen to move around the globe; now it takes only days." As it turned out, Kent was thrust into action his second day on the job, attending a meeting in a neighboring state threatened by sudden oak death.

He inherited his desire to serve from his father, who worked with one of the first U.S. Agency for International Development projects—in Ethiopia, where Kent was born. His parents were in Africa for 12 years—the best years of their lives, Kent says.

Kent is looking forward to the best years of his own life, as he begins his career at Utah State. "I came to a great university," Kent says. "It's a smaller university, but very high quality. Many departments are known regionally, nationally, and internationally for their expertise." He especially appreciates the Biology Department. "There is a degree of professionalism in this department that I really appreciate. New faculty are mentored, with an evaluation process that keeps them on track. It's very well organized. I'm happy to be here."

Peg Howland is an alum of the corporate world, where she modeled computer performance and captured software metrics for computer companies in the Twin Cities. "I applied what I had learned in math to problems in computing," she says. "I liked it initially, but the day-to-day job didn't have enough mathematics, and I missed academics." As a new faculty member at USU, she's in her element—continuing the research she began as a graduate student and teaching numerical analysis and calculus. "I like helping students in my office. You can see the cloud lift when they understand something new. It's immediately gratifying."

Born in Lafayette, Indiana, Peg was attracted to math as a teenager. "My favorite high school teacher taught math," she says. Encouraged by her teacher and high quantitative scores, she studied mathematics at Purdue and eventually obtained a PhD in numerical linear algebra from the University of Minnesota.

Her research is focused on dimension reduction. "There are a lot of existing algorithms for document classification and face recognition, but the one my PhD advisor and I developed works in conjunction with the most commonly used algorithms, so there's great potential." Using computers for face recognition will be increasingly important in security activities.

Throughout her academic and corporate career, Peg has been overly aware of the shortage of women in mathematics. She was often the only woman in her classes, and then the only female in her department. During graduate school she co-organized Women in Computer Science. "We invited speakers, and there was little problem with attendance. Gender topics were hot." The group sponsored a workshop that illuminated perceptions of women in predominantly male fields. (Studies show that an author's gender influences readers' perceptions of research results, while other research demonstrates that women with equally impressive grades have less confidence in their abilities than men.) "We discussed what we could do to change our own perceptions. The place to start is with ourselves." Peg hopes to become involved with the NSF ADVANCE project at USU once she gets her feet on the ground. "There's a pool of talented women. I would like to help mentor them," especially in math.

"As someone from Minnesota," she says, "Utah is fine by me. I like the small town flavor of Logan. It's more manageable than a city." Peg crafts needlepoint pillows in her spare time. She served as an usher at the Guthrie Theater, a premier regional repertory theater in Minneapolis, and will probably be found near the front row at upcoming folk and classical concerts.

Brynja Kohler (pronounced "Brinya") was born in Cambridge, Massachusetts, where her father taught at Harvard and her mother helped children make puppets in the local schools. After growing up in Connecticut, Germany, the Netherlands, and California, she joined Teach for America, a domestic version of the Peace Corps that places volunteer teachers in inner-city schools. She loved teaching so much that her one-year contract in Los Angeles grew into a five-year stint. "I feel passionate about helping students understand," she says. "I want them to 'get it' and to achieve." It's a trait she learned from her parents. "My mother encouraged me in mathematics, and my father supported me in learning and understanding math and science,"Brynja says. "He encouraged me to become an educator."

After five years of teaching, surfing, and backpacking in Yosemite National Park, Brynja left California and made her way to New York University to enter graduate school in mathematics. She later received a PhD from the math/biology program at the University of Utah. "I wasn't as interested in pure math as an undergrad, but

when I found the practical applications I started to think of math as a career," she says. "It's fate that I ended up doing research in mathematical biology. When I taught in LA I tried to take math classes at a local school to further my education, but they didn't offer advanced math, so I took biology instead."

The two interests—math and biology—fused and led to an interest in human physiology. "There is a huge body of mathematical knowledge to describe how neurons send electrical signals," Brynja says. "You can write math equations that describe how muscles work. Ultimately, the goal is to further medical innovation, to better understand the human physiological system, and how to intervene or correct neurological disorders, such as Parkinson's disease."

"I'm glad I ended up here," she says. "People have been encouraging and helpful, and there are great mentors at USU in math/biology research and math education—for example, **Jim Cangelosi,** who helped pioneer field-based math education."

Brynja has family roots in Heber Valley, Utah, and is busy exploring Utah's mountains and deserts with her new husband, Dave, and their 11-year-old son, Spencer. She's also joined her husband in his human rights activism in Salt Lake City, and he's joined her in her love of travel, visiting Germany in December.

Katarina Stroffekova grew up in Czechoslovakia—now Slovakia—where she developed an early interest in biology. "I've always liked animals, and I liked to work in the labs in high school. I became interested in how the human body works, and systematic questions like why we have high or low blood pressure."

In Slovakia, Katarina says, high schools are quite demanding, similar to undergraduate college programs in the United States. Every student studies geometry, algebra, botany, biology, chemistry, physics, and zoology, along with the humanities. Because Slovakian academic institutions don't offer bachelor's degrees, students are required to commit to a graduate degree at a young age, and before the Iron Curtain fell in 1989, career preparation in the Soviet Block was compartmentalized, making the choice even more portentous. Students could attend universities, which focused on teaching—or academies and institutes, which focused on research.

Katerina opted for a research track, specializing in molecular physiology and genetics at the Slovak Academy of Sciences. She initially focused on artificial models for cell membranes for her master's, but wanted to work on more tangible, living systems for her PhD research; so she gravitated toward the life sciences and medical research, especially the physiology of the skeletal and heart muscles. "I needed to have a real-world outcome for what I do," she says. "If you can understand how cells in the heart or muscles work, you can understand how certain diseases can be circumvented or treated." She hopes to find a practical application for her research into protein mutation in skeletal muscles. These mutations result in muscular dystrophy, heart attacks, strokes, and epilepsy.

After postdoc stints at the University of Cincinnati and Colorado State University in Fort Collins, Katarina chose to remain in the United States, coming to USU's Biology Department with her husband and 18-year-old daughter. "Logan reminds me of home," Katarina says. "In my experience in this country, Utah is non-typical. People live here a long time. It's almost like European society, where grandmas live next door to sons, and generations put down roots in one place for life." She says she missed that in other places she lived in the States. Cache Valley is like Slovakia in other ways, too. "Slovakia is 75% mountains, and the weather is similar," she says.

Katarina likes to garden, rock climb, backpack, swim in lakes and rivers, ski, and browse at the Farmers Market on Saturday mornings. She has a passion for classical and folk music, attends the opera and theater whenever she can, and reads historical fiction, biographies, and science fiction. Katarina spent much of the winter skijoring in the mountains with her two huskies, who love the snow as much as she does. ■

AWARDS & RECOGNITION

Biology

Timothy Gilbertson was named vice chair of the Health and Scientific Advisory Board for the Brita Water Research Institute of Pleasanton, California. His term began in October 2004.

Jay Karren received a Meritorious Award from the Utah Mosquito Abatement Association for providing valuable services to mosquito abatement districts throughout Utah.

Joseph K.-K. Li is serving as executive director of the Society of Chinese Bioscientists in America. He was recently featured in the *The Scientist* (August 2004) in an article discussing the West's interest in developing greater scientific ties with China.

Charles Miller, **Anne Anderson**, **Ronald Sims**, and **Joanne Hughes** were notified that the U.S. Department of Energy's Joint Genome Institute will sequence the genomes of five mycobacterial isolates with bioremediation abilities. These mycobacterium isolates break down high molecular weight polycyclic aromatic hydrocarbons to harmless molecules of water and carbon dioxide. This bacterial genome sequencing effort—a collaboration between the Biology and Biological and Irrigation Engineering Departments—will begin in 2005.

Dennis Welker was named the 2004 Outstanding New Faculty Advisor by the Utah State University Advising and Transfer Services. The award recognizes faculty advisors who have been in their position for five years or less. Dennis was appointed director of Undergraduate Studies in July 2003. They will also nominate him for a National Academic Advising Award.

Chemistry & Biochemistry

Ann Aust has accepted a position as associate vice president for the Research Office at USU. She will continue as a faculty member with the Department of Chemistry & Biochemistry.

Stephen Bialkowski spent July 2004 working with scientists at the Environmental Molecular and Sciences Laboratory of Battelle Pacific Northwest National Laboratory in Washington. The team is working to design organophosphate pesticide detection using photo thermal and surface acoustic wave spectrometry.

Scott Ensign will sequence the genome of an environmentally important bacterium for the U.S. Department of Energy. "The bacterium turns our industrial waste and pollutants into good things that cleanse the environment," says Scott.

Mathematics & Statistics

Larry Cannon and **Bob Heal's** Web site, http://matti.usu.edu/nlvm/nav/index.html, was included in the July 2004 *Digital Dozen,* a list of exemplary Web sites for educators selected by the Eisenhower National Clearinghouse (ENC). The list is published each month at ENC Online (enc.org).

Richard Cutler and **Vance Grange** (School of Accountancy) and their coauthors received an award that included a cash prize of $1,000 from the Certified Financial Planner's Board for their paper titled, *Factors Associated with Success on the CFP Certification Examination,* published in Volume 12 of the Financial Service Review.

GOING THE EXTRA MILE

In November, Biology Department Administrative Assistant **Liz Allred** received a Diversity Award at USU's 11th Annual Diversity Awards for her volunteer work serving the international community on campus and throughout Cache Valley.

KEEPING IN TOUCH

1930s

Madison H. Thomas (BS 1938, Chemistry), Salt Lake City, Utah. Madison received an MD from Columbia University in 1943 and an MS from the University of Michigan in 1949. He has authored books on functional ability in the workplace and has lectured at regional, national, and international organizations. He has received many awards, including the *Governor's Certificate of Appreciation* and the *Utah Medical Association Distinguished Service Award.*

1950s

Gordon J. Ewing (BS 1954 and MS 1956, Chemistry), Las Cruces, New Mexico. Gordon received a PhD in 1960 from Penn State. He retired in 1993 from the Chemistry Department at New Mexico State University.

Robert Gibbons (BS 1959, premed Biology), Denver, Colorado. Robert went on to complete an MD at the University of Utah. He now practices at the Exempla St. Joseph Hospital in Denver. He has served as a fellow and treasurer of the American College of Physicians, and as a clinical professor of medicine at the University of Colorado.

1970s

Mitch Mason (BS 1974, premed Zoology), Long Beach, California. Mitch received master's degrees in clinical psychology (1977) and social work (1989) from California State University. He is the administrative team manager for the Bureau of Finance with the Los Angeles County Department of Children and Family Services, the country's largest public child protective service and child welfare agency. They provide services to 50,000 children and families each year. Mitch has also taught at California State University, Long Beach.

1990s

Chad Carman (BS 1995, Biology), Mount Clemens, Michigan. Chad received a Doctor of Osteopathy in 2001 from the University of Health Sciences-College of Osteopathic Medicine (UHS-COM). He is currently finishing his residency in emergency medicine in Detroit, Michigan, and will be moving to Las Vegas, Nevada, to practice. Chad would be happy to talk with students who are interested in a Doctor of Osteopathy degree. They can reach him at carmanchad@hotmail.com.

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ALUMNET

Dear College of Science Alumni and Friends,

We'd like to hear from you! We hope you'll take a moment to drop us a line. No postage is required. You simply fold this sheet on the dotted line, tape it shut, and drop it in the mail. You can also e-mail information to colette.yates@usu.edu or fax us at (435) 797-3378.

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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, projects, 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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