



Insights

Spring 1996

College of Science

Alumni Newsletter

Vol. 4 Issue 2

MacMahon's Musings

The College received great news during the legislative session that just finished. We were granted \$1.259 million to develop the blueprints for the replacement of the current Widtsoe Hall with a new building on the same spot. Unfortunately, the Governor vetoed all capital facilities funding, but we expect Widtsoe to be approved in special session on April 17. As I have talked to a number of our graduates across the country, many of them stated their surprise that Widtsoe was not demolished a long time ago. I hear tales of problems with that building that go back 20 years.

If you have not followed this story, we have been working on obtaining funds for Widtsoe for over five years. Two years ago we received some funds for planning—site selection, suitability for renovation vs. replacement, etc. The architects and the State agreed that the building could not be renovated. We then applied for blueprint funds but were turned down last year. This year we made a concerted effort, involving everyone from the President to our County Aggie Alumni Committees and it paid off. While we must apply again next year for construction funds, this is still an enormous victory and I am going to savor it for a few weeks before we lay out our construction funding campaign.

Associated with this initiative is the development of plans for a science learning center that would be situated next to the new Widtsoe and just south of the Taggart Student Center. This



Dean James A.
MacMahon

MUSINGS

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Robotic Vehicles to Explore Waste Sites

In an exciting and innovative collaborative project being conducted by the Departments of Computer Science and Electrical and Computer Engineering, Dr. Nicholas Flann and Dr. Robert Gunderson are creating prototypes of small, mobile, fully autonomous robotic vehicles to investigate nuclear waste sites. Gunderson and Flann, along with several graduate students, are creating these prototypes to save people from being contaminated. This fascinating project recently received funding for three years from the Department of Energy.

THE DESIGN

Flann and his students not only have to write the computer code, but must create efficient program design techniques that will allow these machines to maneuver along a planned path to reach a certain area on the waste site. Gunderson's group works with the vehicle's engineering aspects. These vehicles, about the size of small briefcases, have six independently maneuverable wheels.



Robotic prototype undergoes testing.

THE METHOD

The majority of the programming is done in LISP, a very efficient computer programming language, often used in artificial intelligence. The program will be able to create its initial plan which will describe where to go and how to get there, by using satellite or aerial photos. As a vehicle makes its way along the most efficient path to its destination, it will encounter two types of anomalies:

1. An unexpected obstacle that will cause the the vehicle to update its path incrementally, and then it will go around the obstacle or backtrack, and
2. A situation that is much easier than the vehicle originally thought, in which case the vehicle will proceed in the quickest direction, and again update its information.

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ROBOTICS

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Development News

Recent gifts to the Insect Collection at Utah State University from individuals, corporations, and foundations include the following:

American Brine Shrimp

Keith Tilley, President

John Earnest and Ruth Eleanor Bamberger
Memorial Foundation

Donald W. Davis

Emeritus Professor

FMC Corporation

Agricultural Chemical Group

Wilford J. Hanson

*Retired Curator of the Insect Collection
and Emeritus Professor*

Whitworth Pest Control, Inc.

Terry Whitworth, President

ROBOTICS

THE TASKS

Dr. Flann refers to what the vehicle sees as "the world model." As the world model changes, so does the computer's perception and program of the world. Though the vehicle is connected by radio to a main computer, the final product will be completely autonomous. The vehicle's duties will include general reconnaissance, sample gathering, collection or dispersal of materials, or simply reaching a specified point or region of the hazardous site safely and efficiently. In addition, these vehicles must be inexpensive to build because they must be dispensable (the nuclear waste will contaminate them).

THE IDEA AND THE APPLICATIONS

Flann developed much of this idea while working on a PhD degree at Oregon State. He and Gunderson decided to combine their research to create this particular project. Flann would like to apply similar path-mapping techniques to wheelchairs whose users often have a difficult time operating them. For instance, the chair could compute the most efficient way to travel from one end of campus to another,

taking into consideration large crowds, snowbanks, road crossings, and other obstacles.

Other research conducted by Flann includes the optimization of ecological surveys in the Shoshone Forest. In this project, the program identifies survey sites in the forest that will yield the most information about the forest ecosystem while minimizing the cost. To determine the best sites, the program will often consider over 100 million possibilities. The program could potentially save the Forest Service thousands of dollars if applied nationally. Currently, humans conduct the surveys, but Gunderson and Flann have adapted the same methods for use by robotic vehicles surveying waste sites.

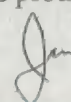
NASA and other organizations are also experimenting with this type of technology, and this advanced research interests Caterpillar (the construction equipment company) who plans to closely follow the project for the next three years. This exciting technology offers myriad possibilities to the scientific and commercial communities. These researchers are on the cutting edge of scientific development and Utah State University proudly supports them.

MUSINGS

building would involve a variety of design and equipment features that would set it apart from a typical classroom facility, thus the name learning center. It would incorporate all the modern advances that are available to present science to undergraduate students in ways that many of us have envisioned only in our dreams. This project rests on finding a donor who has the resources to finance such an undertaking. We hope that one will emerge soon so the two buildings can be planned and constructed in an integrated manner.

If we obtain funds for both buildings, completions would be in three years or so. Believe me, I will invite all of you to attend a gala dedication of these outstanding facilities.

The Widtsoe project has been a high priority because we believe the current building is not safe and we want a safe learning environment for all of our students. The learning center is a priority because we want to do an ever better job of teaching the outstanding students who come here to learn. I am very proud of the College of Science faculty and their emphasis on increasing the quality of education we offer to students. We are committed to getting better and better at educating students through both improved teaching and research. We want you to be as proud of your academic heritage as we are of you.



College Developing New Research Center

The College of Science is developing a new research center to fulfill the goal of chemistry and physics faculty interested in surface-related phenomena. All solids and liquids are condensed phases and must have a surface or interface. Surface science involves the study of these condensed phase interfaces. At the surface science research center, faculty and graduate students can study various aspects of material surfaces and interfaces.

About nine months ago, a group of six faculty members agreed to combine their research and talents. The group included chemistry professors Greg M. Swain and Michael Wright, and physics professors J.R. Dennison, Mark Riffe, David M. Goodstein, and Wilford Hansen.

Dean Jim MacMahon and the Department of Physics allocated space in the Science Engineering Research Building to provide a common laboratory facility. Although the researchers work on separate projects in their own fields, they share equipment and instrumentation used in studying surfaces.

Speaking of the group, Swain said, "We're like the root of a tree, and we're trying to grow." The group focuses on three main goals. First, they aim to recruit students who want to study surfaces, and so far, students have responded favorably. This year, two new chemistry graduate

students and four physics graduate students joined them. Second, the program seeks to secure extramural funding from agencies such as the National Science Foundation and the Department of Energy. Finally, they hope to gain industrial support with the group's expertise and technology.

Swain said strengthening the ties between academia and industry is necessary. "I don't think the sciences which require a lot of money for research will survive if they don't have some industrial support."

Historically, USU has had few researchers with interest in surface science, so the university does not yet have all the necessary equipment. The group is collecting the bits and pieces of equipment to construct operation instrumentation for surface analysis from which they can research and obtain data.

The Department of Defense provided funding for the center's chemistry instrumentation; however, it will be another six months before the physics faculty will have its equipment operational.

"It's a slow process to start a center," said Swain, "but if you work hard, and have good ideas, like I think we do, you'll be successful. Maybe down the line, we can start thinking about a research center that has a name."

1995-96 College of Science Awards and Honors

Valedictorian

Robert Viron Lane

Scholar of the Year

J' Dee Wilson

Adviser of the Year

Richard J. Mueller

Teacher of the Year

Kathryn Turner

Researcher of the Year

Keith A. Mott

Graduate Student
Researcher of the Year

*Aditya Khindavia
and Ernestine A. Lee*

Graduate Student
Teacher of the Year

Ann Marie Harris

Young Women Explore Science Career Options

"What do you want to be when you grow up?" For many of today's young women, the answer to that question is changing from "a nurse," "a teacher," or "a secretary," to "a biologist," "a physicist," or even "an astronaut." As young women gain increased exposure to the scientific world, their career options broaden, and that is the primary goal of the Expanding Your Horizons (EYH) Conference held each year on the USU campus. Last November, about 300 junior high and high school young women and 65 parents attended USU's ninth annual EYH conference. Sue Morgan, EYH coordinator and USU Geology Department lecturer, said this program informs students of science-related careers and the necessary educational background.

The national program began in the '70s in response to statistical studies that showed young women taking fewer math and science courses than their male peers. A recent study of Utah high school seniors, published in *The Salt Lake Tribune* in September 1995, showed top-level math and science classes, once dominated by males, now have an equal number of females. Katherine Kapos, writer for the *Tribune*, said, "The statistics are fruits of a decade of work by educators, counselors, and women's groups who complained that young women were not being encouraged to take the higher-level math and science courses."

Now, through programs such as EYH, young women see examples of what they can become with hard work during and after their high school years. All of the speakers and workshop presenters at EYH were women who are successful role models. The keynote speaker, Lynda France Jeppesen, an adjunct professor at Westminster College and the University of Phoenix in Salt Lake City, spoke to the

young women and their parents about the power of attitude. "She was really 'with it,'" said Suzie Larsen, a student attending from Mt. Logan Middle School.

Larsen, who has attended EYH for two years, said "being there has helped me to understand how exciting math and science can really be, especially

after seeing what people like [Jeppesen] have done. I want to be an astronaut. I want to go into space and work with spaceships, stars, and planets. I want to see what most people don't get to see, except on TV." For young women

like Larsen, EYH provides a road map for making their dreams come true. For other young women who know little about math and science careers, attending EYH can pique their interest. At the conference, the young women visited booths presented by various university departments and colleges. They also participated in diverse hands-on activities, including dissecting a squid. "You



Participants learn that computer skills are essential to a successful science career.

got inside and pulled out what's in there. It was very slimy but very neat," said Larsen.

For the parents, female biology undergraduates Sara Thornell-South, Jennifer Abbruzzese, and Tracy Shiozawa provided a panel discussion. Parents' questions ranged from "How do women in science work in a career and have a family?" to "How do you isolate a gene?" Not only did parents ask questions, they also toured a biology laboratory and saw DNA experiments. Thornell-South said most parents were interested in these experiments to know what their daughters would be doing, but a few wanted to know because "when they went to school, they didn't even know what DNA was."

Thornell-South does not think women should avoid historically male-dominated careers because even the male domination is changing. She recently interviewed for graduate school at Johns Hopkins University, where, of the 40 interviewees, 25 were women. She sees more women entering the science field as a result of programs, such as EYH, that encourage female involvement in science.

Dr. David Peak, Physics Department assistant head, believes more women are entering the field because "it's not regarded immediately as something that can't be done."



Professor Lynda France Jeppesen spoke about the power of attitude.

OPTIONS

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Science/HASS Adviser Mary Leavitt Receives Award



Mary Leavitt
Science/HASS
Adviser

Mary E. Leavitt, creator and director of the Science/HASS Advising Center and the Undeclared Majors Program, received the 1995 Outstanding Adviser Certificate of Merit at a recent national conference in Nashville, Tennessee.

Leavitt has worked at USU for 16 years, spending the first 10 in the Affirmative Action office. Before coming to USU, Leavitt lived in Indiana and completed a BA degree in sociology at Indiana University, then she came to Logan to complete a master's degree in

sociology. USU's Affirmative Action office immediately hired her, and she eventually became director.

Then, six years ago, Leavitt sought to fill a void she saw in the student advising system and created the Science/HASS Advising Center and Undeclared Majors Program. As the director, she not only advises students but also oversees peer advisers and the center's finances.

The center's staff offers a variety of perspectives. The four full-time advisers have degrees that include philosophy, psychology, environmental science, and sociology. Leavitt is proud of this variety and believes it makes students more comfortable knowing there are advisers in many fields.

Leavitt dedicates herself to her job and her students. "I like this job, I mean, I *really* like this job," said Leavitt.

She must—she often works overtime. She seems to have boundless energy, but she apparently does get tired: "Sometimes you have a lot of people—use a lot of creative energy."

She needs her creative energy to help frustrated students explore their options. She watches how they react to different scenarios and helps them redirect their goals (often different from their parents' goals for them) to something each student will truly enjoy. Leavitt believes people who enjoy their jobs have better advancement opportunities. Giving pep talks that offer new life choices to students who feel trapped and then hearing their sighs of relief, make every minute of overtime worth it, "otherwise I wouldn't do it."

Leavitt receives many letters from grateful students as well as written recognition from other faculty and administrators at USU.

Student letters were a major factor in Leavitt's winning the 1995 Outstanding Adviser award. Out of thousands considered, Leavitt was 1 of only 27 chosen in this national competition.

Mary Leavitt epitomizes the ideal adviser. She truly cares about the students she advises and believes she learns something new from them every day.

Through Leavitt, thousands

of students have recognized their potential. The faculty, administration, and especially students at USU applaud Leavitt for this hard-earned honor.

"... It was Mrs. Leavitt's assertive advising program that prompted me to come into her office and talk with her. From the moment I walked into her office, I noticed that she really did care about what happened to my academic career."

~USU student

OPTIONS

He said, in the past, the only women one saw at a physics conference were making coffee, but "that's not true anymore." Peak suggests the change comes, in part, from "a growing awareness by male faculty members that women can be scientists." Now, the average starting class of graduate students in physics and mathematics is 15 percent female. Although the percentages have increased, much room for improvement remains. Programs such as Expanding Your Horizons continue to encourage young women to pursue careers in the sciences, and, someday, more of them will see what most people only get to watch on TV.



Young women at Expanding Your Horizons learn to use powerful microscopes.

The College of Science Honors Outstanding Alumni

Walter H. Gardner



Walter and Barbara Gardner

One might expect a soil physicist to be interested in water flow science—but writing, editing, and the atomic bomb? These, however, are the interests of USU alumnus Walter H. Gardner. Holding BS (1939) and MS (1947) degrees in physics and a PhD (1950) degree in soil physics, Gardner has lived an eventful life, mixing his many interests into a successful career and family life.

Gardner began his educational pursuits at Utah State, earning a BS degree in physics.

His father, Willard Gardner, taught in the Department of Physics at USU for many years. The younger Gardner enjoyed his involvement with the student newspaper, *Student Life*. "I was the news editor as a freshman, then served as associate editor during my sophomore year. I enjoyed this work and nearly changed my major to journalism," said Gardner.

After graduation, Gardner spent a year as a research fellow at Central Scientific Company in Chicago then began graduate work at Cornell University in New York. His education was interrupted, however, when he was called to active duty as an administrative officer in the U. S. Air Corps in June 1941. Gardner later became a flight navigator and taught navigation at Mater Field, California, and Eglin Field in Florida. He eventually became the deputy commander and engineering officer for the U. S. Air Corps' first guided missile squadron.

Gardner left active duty in 1946 and returned to Logan. "I was anxious to be back in the West, and the professors I wanted to study with at Cornell were no longer there." While in graduate school, Gardner married Barbara Brown, a fellow USU student. They have five children: Jeanne G. Minert, Woods Cross, Utah; Marolyn G. Mortensen, Rexburg, Idaho; Janet G. Roach, Provo, Utah; Laurie G. Boyce, Kennewick, Washington; and Willard B. Gardner, Pullman, Washington.

When Gardner finished graduate work, he was hired at Washington State University in Pullman, Washington, where he spent his professional career. "I guess I was lucky since it was the only job I applied for!" said Gardner. His research interests centered on the physics of water flow under unsaturated conditions above the water table, and in 1964-65 he was able to study for a year in The Netherlands as a Guggenheim Fellow. His wife and five children accompanied him to Europe: "Our children were put into

Dutch schools and greatly benefited from the experience," said Gardner. He and his family also spent a sabbatical year in Vienna from 1971 to 1972, where he served as a consultant to the International Atomic Energy Agency.

In 1972, Gardner became coauthor of a book revision, *Soil Physics*. He likely is better known for his 1960 time-lapse motion picture film, *Water Movement in Soil*, which illustrates the very different way water moves in unsaturated soil compared to movement below the water table. More than a thousand copies of this film are used in teaching by soil scientists and used by golf course superintendents worldwide.

Throughout his career, Gardner held many professional positions including president of the Western Society of Soil Science in 1967, editor-in chief of what is now the *Journal of the Soil Science Society of America* (SSSA) from 1966-69, president of SSSA in 1983, and president of the *American Association for the Advancement of Science, Pacific Division*, in 1985. He also served for 20 years as a member of the editorial board for the international scientific journal *Geoderma*.

Since his retirement from Washington State University in 1982, Gardner and his wife moved to Washington, Utah, a small community adjacent to St. George, where they enjoy the hot, dry climate. Even in retirement, Gardner continues to mix his diverse interests with historical studies and writing to supplement some of his previously published materials. The College of Science is pleased to count Walter H. Gardner among its alumni.

Madison H. Thomas



Madison H. Thomas

Madison H. Thomas considers himself just a normal fellow, but for being a normal fellow he has had some pretty remarkable experiences throughout his lifetime. Thomas grew up in Logan, son of W. Preston Thomas (who initiated the agricultural economics degree at USU) and attended Utah State, majoring in chemistry. "There were many wonderful things at Utah State during my years there," said Thomas. He particularly remembers his

experience with the ROTC. "Back then, everyone had to be in ROTC for their first two years. . . . But it was hard to get into ROTC for the final two years—they were highly selective."

As regimental commander for the "whole shooting match" during his senior year, Thomas was responsible for the military ball and for drilling the regiment on the Quad. "There was something incredible about 800 uniformed men

on the Quad—it gave us a sense that we're all in this together," Thomas said. "I made wonderful, wonderful friends in that context." Thomas also served as freshman class president, as president of Pi Kappa Alpha fraternity, and on the student council for three years, most of the time as budget chairman.

After graduating with a BS degree in 1938, Thomas served one year active duty with the coast artillery at Fort McArthur, California, then entered Columbia University in New York City, where he earned an MD degree (1943).

After interning at Cornell-New York Hospital, Thomas spent nearly three years during World War II on active duty in the medical corps. He continued in the Army Reserve and retired as a full colonel with 42 years experience. Following the war, Thomas completed a three-year residency in Ann Arbor, Michigan, and earned an MS degree in neurology from the University of Michigan.

In 1949, Thomas came to Salt Lake City to establish a private medical practice at the LDS Hospital, where he continues to see patients. Along with his practice, Thomas also taught at the University of Utah, where he initiated the neurology program. At the time he began practicing medicine in Salt Lake City, he was the only board-certified neurologist between Denver and San Francisco, but, at last count, Utah alone had 62 members of the Academy of Neurology.

Once his internship was complete, Thomas renewed a childhood acquaintance with Marian Peterson, and they were soon married. Peterson is the daughter of E. G. Peterson, a former president of Utah State University. The Thomases have two sons, three daughters, and thirteen grandchildren, whom they greatly enjoy.

Thomas was involved in many professional and service organizations. He is now a neurology consultant for the Utah Medical Assistant Program and, since 1979, has been a member of the Utah State Driver's License Medical Advisory Board. He recently received the Governor's Certificate of Appreciation for his work with the Industrial Commission, and as chairman of a Utah Medical Association task force, Thomas helped set guidelines for workers based on functional abilities.

Thomas was also instrumental in creating the Epilepsy Foundation of America. In 1950, he encouraged medical advisers of three competing epilepsy organizations to form a single group. Of that experience, Thomas said, "It is a fascinating thing to see ordinary people who have come together with good ideas prevail over professionals in the field. It was a wonderful experience to be a part of."

Thomas spent more than 30 years as either president, secretary, or board member of the Western Institute on Epilepsy, work he enjoyed because "I was out in the grassroots, providing essential information." Throughout his years of service, Thomas covered more than 100,000 miles.

In his work as a consultant to the Utah and Wyoming State Hospitals, Thomas often performed court-ordered evaluations. One particularly interesting experience came when Thomas spent a couple of hours alone with death-row inmate Gary Gilmore.

Along with service to the community, Thomas also served his church as a mission president in Bristol, England, from 1982-85. Madison H. Thomas may be an ordinary man, but his extraordinary gifts and accomplishments have greatly enhanced the lives of his patients, colleagues, family, and friends.

Edward E. Burgoyne

Edward E. Burgoyne has written a textbook, held office in many professional organizations, and received three patents, yet, when asked about the highlights of his life, he recalls trips with his wife and children. "I was born and raised in Montpelier, Idaho, and my wife was from Dingle, Idaho, so we took a trip through Utah and Idaho every summer," said Burgoyne. He also visited every state in the continental United States except for North Dakota as a member of the Army Air Corps during World War II. "And it was all by train," said Burgoyne with a sigh.



Edward E. Burgoyne

Burgoyne graduated from Utah State University with a BS degree in chemistry in 1941. "I was president of the Chemistry Club during my senior year and I really enjoyed working with the other students and the faculty." He remembers working in the storeroom and grading papers to earn a little extra money. He also enjoyed football games and attending concerts in the Logan Tabernacle.

Burgoyne joined the Army Air Corps soon after graduation and served as a weather officer in the Southwest Pacific Theater. He remained active in the Reserve and eventually became a lieutenant colonel before his retirement in 1978. After the war, Burgoyne returned to school to earn MS and PhD degrees in chemistry from the University of Wisconsin at Madison. It was here that he met his future wife, Mary Ida Ream. Although she was from Dingle, just eight miles from Burgoyne's home in Montpelier, they did not meet until they were both in Wisconsin.

Burgoyne completed graduate work in 1949 and worked as a research chemist with Phillips Petroleum from 1949-1951.

ALUMNI

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College of Science faculty and staff enjoy the College coffee break on a cold winter morning.



*Carol Sharp, Susan Nelson, and
Associate Dean Tony Bringhurst.*



*Development Director Katherine Angelos
and Physics Department Head John Raitt.*



*Mathematics and Statistics Department
Head Jerry Ridenhour and new Physics
Assistant Department Head David Peak.*



*Peter Reuben, Greg Podgorski,
Dean MacMahon, and Joseph Li.*



*Beverly Ridenhour and Associate Dean
Bringhurst.*



*Beverly Ridenhour, James Shaver,
and Jerry Ridenhour.*

New Faculty Join the College of Science

Physics welcomes new assistant department head



Dr. David Peak

In January of this year, Dr. David Peak accepted the position of Physics Department assistant head. Peak came to USU one and one-half years ago when his wife, Terry, accepted a teaching position in the Sociology Department. He said, "She came out here with a tenure-track position, and I came out here with a suitcase." Fortunately the Physics Department offered him a visiting faculty appointment that

"turned into something with some longevity to it."

Before coming to USU, Peak spent 20 years at Union College, a small liberal arts school with 2,000 students in upstate New York. There he worked his way to full professor and held an endowed professorship. He is a founding member of the Council on Undergraduate Research and served on several boards of trustees. Having held several administrative positions, including chairman of the Union Physics Department, he has experience in budgeting matters, curriculum development, and faculty relations. He said he is treading on "fairly familiar turf" as assistant department head but in a completely different setting with new challenges. "The sort of stuff I could do in my sleep at Union, I will have to think a little about here."

Peak received a BS degree in physics in 1965 from State University College at New Paltz, New York. In 1969, he received a PhD in physics from the State University of New York at Albany (SUNYA). As an instructor of physics at SUNYA, he was recognized as the Outstanding Teacher of the Year for the Physics Department three years in a row. The faculty senate of SUNYA also recognized him as the University Outstanding Teacher. He has directed, on the average, three undergraduate research projects per year during his career.

Thirteen of his students have given presentations at the annual, interdisciplinary National Conference of Undergraduate Research (NCUR). Whether in New York or at USU, students have been and remain one of Peak's top priorities. He helps raise money each year for the NCUR.

At USU Peak teaches the introductory physics sequence and a class in fractals and chaos, and he is developing one of USU's pilot courses in integrated science. Most of his

research has involved undergraduate students, and a number of his papers have student coauthors. His work at Union has been recognized with the American Physical Society's 1996 Prize for Research Done by a Faculty Member at an Undergraduate Institution. At USU he is working with students on several experiments that will fly aboard the shuttle mission scheduled for 16 May 1996 as part of NASA's Get Away Special program.

Peak's research focuses on two areas. One concerns the structure of complex materials, in particular granular systems, such as powders and sandpiles. Despite the fact that sandpiles have been intriguing people for many years, an adequate description of their behavior still eludes scientists. In part, this is because granular systems are intermediate between liquid and solid. Peak hopes to better understand these economically important materials through experimentation and to develop a theoretical explanation for their properties.

His other area of research interest deals with chaos—the idea that some things in nature that appear to behave randomly, or erratically, "are not random at all, but governed by rigid deterministic rules." Examples of chaos may include the weather, atrial fibrillation, and the stock market. When studied long enough, chaos reveals patterns in what appears to be irregularity. When such patterns are observed, "there may be an opportunity to intervene and

stabilize the behavior, ridding it of chaos." Peak's interest in chaos has led him to write a book, *Chaos Under Control: The Art and Science of Complexity*. Peak hopes to develop new techniques to control irregular chaotic behavior.

When Peak finished a PhD in 1969, "It was one of the all-time worst employment years for physics in the history of science." He wondered if he should have followed his high school desire to become an artist. Ironically, his counselors suggested he go into

science because there were not enough jobs in art. He persevered, however, through the rough years to find success in science.

Peak still enjoys all aspects of art: "I continue to think of myself as a potential artist who just hasn't started yet." He and his wife enjoy the outdoors, hiking, and running. They also like to travel and have seen much of the world, their favorite place being Australia.

"The sort of stuff I could do in my sleep at Union, I will have to think a little about here."

Plant cell biologist joins Biology Department



Dr. Daryll DeWald

While playing baseball at a California high school, Daryll DeWald hoped he would be recruited by UCLA or USC. He said, however, after they rejected him, "that disappointment translated into a very positive occurrence for me." The time he would have spent on a baseball field has been well spent in the biology field. Dr. DeWald took his place with the Biology Department faculty in January of this year as a plant cell biologist. Al-

though he is not running all over a baseball diamond, he said, "Certainly, our field is one of the most active fields of cell biology."

Dr. DeWald received his bachelor's degree from the University of Wyoming in Biochemistry in 1983. He then moved to Kalamazoo, Michigan, and worked for the Upjohn pharmaceutical company. During his five years there, he cultivated an intense interest in integrating basic and applied research, and had the opportunity to contribute to the discovery and development of antibiotics and anti-tumor therapeutics. One day his unit director took him aside and said, "This is not what you're going to do with your life. We can always reward you with money, but we can't reward you with an independent research lab." Motivated by the desire to do independent academic research and to teach, he shed the "golden handcuffs" of industry to obtain a PhD.

He and his wife Rebecca returned to Texas, his birthplace, where he attended Texas A&M "and as rapidly as possible" received his PhD in Biochemistry in 1993. At Texas, while finishing his dissertation in a plant cell biology lab, he applied for and was given a plant biology post doctoral fellowship from the National Science Foundation. The grant was originally for two years, and, based on performance, DeWald was awarded a third year.

DeWald took this grant with him to UC San Diego where worked as a post doctoral fellow at a Howard Hughes Medical Institute. At Howard Hughes he researched in a yeast genetics cell biology lab enabling him to bring to USU a mix of both plant and yeast cell biology. After two and one-half years at Howard Hughes, he and his family made the move to North Logan in December of last year. When asked why he was going to USU, he said, "The fit is good . . . I like teaching and the research situation is great for me."

Dr. DeWald feels that teaching and research work well together for him. "I know some people whose research is considerably different from their teaching. But because I'm a cell biologist, it allows me to expound in the classroom . . .

because I'm immersed in it . . . I'm more in touch with what really is going on."

Although he teaches a 500-level course from the most up-to-date textbook, he said, "even it can't cover what has happened in the past couple of years . . . [but] I can comment on what this person [in the textbook] has done over the last few years." His lab also helps him when he may need a refresher course on what he is teaching. "[In the lab] I can go back over it, learn it, and then present it."

DeWald said his goal is not to maximize the information but help the students understand where it all comes from.

He wants them to understand that the textbook "wasn't just some compilation of abstract disjointed fact, or proposals, but the result of decades, sometimes, of research that's finally been demonstrated via the scientific process . . . I really want to stimulate for them an interest in the field."

Dr. DeWald's research interests focus on the mechanisms that control protein transport in a cell. Precise regulation of protein transport is an essential feature of cells in all organisms, and incorrect protein

"I know some people whose research is considerably different from their teaching. But because I'm a cell biologist, it allows me to expound in the classroom . . . because I'm immersed in it . . . I'm more in touch with what really is going on."

transport in human cells can result in diseases and death. He studies the activity of two specific enzymes that act as a "molecular switch" in organisms as diverse as yeast and humans. These enzymes form a molecular complex which acts as one of the directors of protein distribution within plant cells, and has an important role in how plants develop.

He hopes to eventually apply his findings to altering crop plants or to genetically engineering plants as "biofactories." He has published several works including 18 research articles, 3 review articles, and 2 book chapters.

In what little spare time he has, he loves to be in the outdoors cross-country skiing and fly fishing. He makes his own fishing rods and has built several for other people. He loves playing with his three children, Derek, Laura, and Diana, and if anyone is looking for a good baseball player, Dr. DeWald was still heavily involved in the sport until the last couple of years. With a little practice, he could be back on the field.

Takemoto's Research Could Help AIDS Victims

What began a decade ago as research on the effects of bacteria on agriculture has culminated in a study that could lead to treating indirect effects of the AIDS virus.

Dr. Jon Takemoto, a microbiologist who specializes in cell membranes, has studied the effects of bacteria on plant species for the past ten years, "But it's only been recently that we've developed the idea that we have a medically, potentially important anti-fungal agent," said Takemoto. Though the research still applies to agriculture, USU scientists and collaborators in Washington state, Rome, and Japan are working together to develop anti-fungal agents to be used for human benefit.

All human beings have several kinds of fungus inside their bodies, but people with immunodeficiencies caused by aging, organ transplants, or viruses such as the AIDS virus can contract illnesses from these normally benign fungi. Currently, two types of drugs combat these fungi: first, a highly effective group of drugs that has drastic side

USU scientists and collaborators in Washington state, Rome, and Japan are working together to develop anti-fungal agents to be used for human benefit.

effects; second, azoles, which are a less toxic and much less effective group of drugs. Fungi, like disease-causing bacteria, can become resistant to a drug after extended use. Azoles are so widely used for AIDS patients and on agricultural products that they are becoming less and less powerful.

With grants from the National Science Foundation (NSF) and the Eli Lilly and Co. pharmaceutical company, Takemoto, Dr. David Hole of USU's Plants, Soils, and Biometeorology Department, and Dr. Sherman Thompson, a plant pathologist, are working together to form a new type of drug. Basing their research on *syringomycins* (naturally occurring fungi inhibitors from plant bacteria), these men study how to apply similar mechanisms in the creation of a fungi-inhibiting drug for human use.

Takemoto has been at USU for 21 years. He received both BS and PhD degrees from UCLA. This ongoing research being conducted by Takemoto and his colleagues not only contributes to the evolution of agricultural science but helps satisfy the dire need in the medical field to catch

up with increasingly resistant fungi and bacteria. Such research aims at reducing the effects of these opportunistic pathogens by creating a new group of drugs.

Fortunately, people like Takemoto are working to make our lives easier and safer to live. In addition to this research having an impact on the fungal infections associated with the AIDS virus, the creation of non-toxic but powerful drugs will lead to a variety of other medical and pharmaceutical advances.

ALUMNI

He then accepted a position as assistant professor at Arizona State University in Tempe, became a professor at ASU in 1959, and retired in 1983. "I had a really great time there. It is a wonderful thing to earn a living and even better if you love it also. I greatly enjoyed teaching." In 1978, his department recognized his dedication with an award for Distinction in Teaching.

Burgoyne wrote a textbook on organic chemistry, published by McGraw-Hill in 1979, for a course required for many non-chemistry majors. This book was subsequently translated into three other languages: Japanese, Spanish, and Italian. Burgoyne was also active in research and holds three patents on processes for getting higher octane from petroleum.

Along with his classroom and research activities, Burgoyne had many professional associations. He was instrumental in organizing the ASU chapters of Sigma Xi and Phi Kappa Phi, the Southern Arizona and Central Arizona sections of the American Chemical Society, and the Arizona Academy of Science. He was also a Fellow in the American Association for the Advancement of Science. Burgoyne held a variety of leadership positions within these many organizations. In recognition of his achievements, Burgoyne has been listed in *Who's Who in American Men of Science* since 1960, *Who's Who in America* since 1974, and this year he will be in *Who's Who in the World*.

Since retirement, Burgoyne has continued to be busy. He and Mary served a mission for the LDS Church from 1984-1985 in San Francisco as proselyting missionaries. "It was a great experience. We met people from all over the world: Lebanon, Jordan, China, Japan, Poland. We loved the people."

For the past 10 years, Burgoyne has spent two days a week as a temple worker for his church. The Burgoynes had a wonderful life together and raised a family of four children before Mary's passing last summer. Burgoyne continues to prize time with his four children and twenty grandchildren. Edward E. Burgoyne's excellence in both his professional and personal lives typifies the outstanding alumni of the College of Science.

Outstanding Students

Geology



Paul Jensen

The Geology Department selected Paul Jensen as its Outstanding Student. Jensen will receive a BS degree in geology this summer after a month of field camp.

Though born in Utah, Jensen grew up in Tucson, Arizona. After high school, he spent four years working and serving an LDS mission. He has had his own floor covering business for the past five years while going to school.

Jensen, his wife, Rhonda, and their two young sons, Dallen and Andrew, will most likely move to either Alaska or Arizona, where he can study ore deposits and obtain

a master's degree. Rhonda plans to finish a degree in family life this spring.

Jensen maintains a 3.63 GPA—quite an accomplishment, considering his many commitments. Skiing and soccer relieve stress for this student, father, and husband; however, having a six-month-old baby leaves little time for these hobbies.

Jensen recognizes his wife's many sacrifices, and thanks his professors in the Geology Department for this honor.

Jensen's philosophy, "No matter what happens, make it good," portrays his positive outlook as a tool for his success.

Mathematics and Statistics



Windy Hutchings

Windy Hutchings will graduate with a BS degree in statistics and actuarial science this spring. From Centerville, Utah, Hutchings has lived in northern Utah most of her life, but after graduation, she plans to work for Aetna in Hartford, Connecticut.

Outstanding athletic accomplishments in high school led Hutchings to a two-year running career at USU. She decided not to run this year so she could focus on training for marathons. Hutchings has already run in two St. George Marathons and plans to run the Boston Marathon this year. Her goal is to

one day compete in an Ironman competition, one of the most grueling athletic events ever created.

Hutchings belongs to the Science Council, Math Club, Mortar Board, and Golden Key and Blue Key Honor Societies. These activities and her athletic accomplishments have helped Windy to become a well-rounded, outstanding student, with a 3.9 GPA.

Hutchings especially thanks Department Head Jerry Ridenhour, and the Department of Mathematics and Statistics for this honor.

Physics



Tumkur "Raghu" Raghuram

Tumkur "Raghu" Raghuram came to the United States from Bangalore, India, for a new cultural experience and to attend college. Raghu has a BS degree in physics and just completed a first master's degree in physics and a second master's degree in computer science.

At USU he has been a teaching assistant, a research assistant, and the vice president of the Indian Student Association. He currently maintains a 3.2 GPA, and his research focuses on space physics, specifically optical contamination on space crafts.

After winter quarter, Raghu went to work in a physics-related career for Omitron, in Greenbelt, Maryland. His long-

term goal is to return to India to do social work. "I am not terribly ambitious, but I have goals I will achieve, and one of them is to be happy."

Raghu has tested, supervised, and directed many of the projects for the Get Away Special (GAS) Program, space research experiments developed in the Physics Department for inclusion in space shuttle missions.

Raghu's hobbies include mountain biking, skiing, and operating HAM radios. He would like to especially thank Jan Sojka and Gil Moore for the opportunities they provided him in the Physics Department and with the GAS Program.

Alumnet Responses

Jeannette Morrison Bishop (BS 1993, computer science; BM 1995, music) recently moved to California so her husband could work on a PhD degree at UC Santa Barbara. She is enjoying the opportunity to stay home with her young daughter and become acquainted with her new community.

Carl H. Blank (MS 1957) received MPH and PhD degrees from the University of North Carolina, Chapel Hill. During his career, he worked for the Centers for Disease Control, and he retired as director of the Wyoming Public Health Laboratory in September 1995.

Grant L. Christian (MS 1961, premed, zoology) graduated in 1965 from Yale Medical School. He has a private practice in Bountiful, Utah, and is an associate professor at the University of Utah Medical School. He and his wife, the former Geniel McConkie (BS 1959; MS 1960), have five children.

John Goodrich, (BS 1986, biology) received a Doctor of Dental Surgery from Creighton in 1991. He is happily self-employed as well as happily married with four children, ages 10, 8, 5, and 3. All four children are/will be home schooled. Mrs. Goodrich is the main school teacher, however, Dr. Goodrich also actively teaches. The family is active in the community as well as in their church.

David J. Higgins (BS 1965, applied statistics) went on to Pepperdine University where he received an MBA degree in 1976. He worked as an operations research analyst out of college, joined Digital Equipment Corp. in the late 1960s, and is now president of Integrated Mining Software Corporation. Higgins and his wife, Cecile, have been married for 32 years, and they have two children, who both graduated from college, have children of their own, and work in the computer industry.

Kelly L. Johnson (MS 1984, computer science) worked for the Corporation of the President of the Church of Jesus Christ of Latter-day Saints until 1991, when he began working for WordPerfect Corporation. He has been involved with UNIX, OS2, and WordPerfect for Windows and is currently a team leader. He is married to Sharon Stratford (BA 1983, MSS 1985) and they have four children.

Lee Jones (MS 1979; PhD 1986, biology) is currently the executive director for College Board Programs at Educational Testing Service (ETS). After teaching biology for four years at Middlebury College, Mercer University, and Emory University, he began work at ETS as the coordinator of the advanced placement (AP) biology program with responsibility for developing the annual AP biology exam. Since that time he has worked on developing the science assessment for the U. S. Department of Education's National Assessment and now coordinates all work that ETS performs for the college board, including the development of the SAT, achievement tests, AP, and associated Admissions/Financial Aid programs. He still has a cat that he picked up at a Millville farm in 1982.

Tariq Abdulrahman Kergaye (BS 1961, math; BS 1962, civil engineering) also received a diploma in traffic engineering from the University of Utah. He is currently a professional engineering licenser, possibly the first Middle Easterner to work for the Utah Department of Transportation. He also helps refugees from northern Iraq and Kurdistan.

Denni M. Millard (MS 1995, statistics) is an SAS programmer with Triology Consulting Corporation and lives in Kalamazoo, Michigan.

Craig V. Nelson (BS 1982, MS 1986, geology) received an MBA degree from the Eccles School of Business at the University of Utah in 1991. Since June 1995, he has been a Geosciences manager at Dames and Moore in Salt Lake City, where his primary responsibilities include client development and project management. Nelson's personal focus continues to be in the area of geologic hazards, and he is currently the project manager for the geotechnical evaluation of the I-15 corridor reconstruction and widening in Salt Lake County. He and his family live in the Avenues area of Salt Lake City, where they are in the continual process of renovating their historic home.

Reed S. Nelson (BS 1939, chemistry) graduated from Ohio State University in 1942 in Manufacturing of Acids and Explosives. He also graduated from a three-year course in Management Techniques from the University of Utah. Nelson was a supervisor at Kennecott Copper Co. (KCC) in Salt Lake City and spent World War II working in explosive plants. From 1943 until retirement in 1982, he worked in building and operating sulfuric acid plants for American Smelting and Kennecott Copper, including assignments in New Mexico, Arizona, California, Utah, and Mexico. This was a period when smelters were converting their waste gasses to sulfuric acid. Nelson retired from KCC in 1982, then accepted employment in the Philippines where they were building their first copper smelter. After three and a half years living near the equator and seeing a very successful operating plant that produces 1000 tons of copper per day, Nelson finally retired. His wife, Marjorie Yeates Nelson, spent 16 years as a member of the LDS Relief Society General Board, and the Nelsons have 4 children and 20 grandchildren.

Joseph Russin (MS 1980, biology) is currently an assistant professor of biology at Lane Community College (LCC) in Oregon. After graduating, he worked on the California Condor Recovery Team for the U. S. Fish and Wildlife Service for a year, then taught community college and high school biology in the Bay area until 1990. He then moved to Eugene, Oregon, and has been teaching general, field, vertebrate, and bird biology at LCC ever since. He and his wife, a photography instructor, live on five acres outside of Eugene, where they have two goats and a rabbit.

Phillip Sabey (BS 1970, chemistry) has worked for Kennecott Copper and Kennecott Exploration and currently

works for Brush Wellman, where he serves as Manager of Technology for Utah operations. He married Debra Bingham in 1972, and they have three children.

Steven G. Smith (BS 1985, computer science and applied statistics) earned MS (1987) and PhD (1991) degrees from the University of Washington. He now works as a statistician for the national Marine Fisheries service, where he is presently working on problems with Pacific salmon species in the Columbia and Snake Rivers in the Pacific Northwest (Oregon, Washington, and Idaho). Smith helped develop methods for estimating survival rates of juvenile salmon implanted with electronic tags that uniquely identify individual fish. He is married and has a son, Lucas, born in 1993.

Davie G. "Paul" Snyder (BS 1976, biology) is program manager for the Bremerton-Kitsap County, Washington, Health District. He writes, "Thanks to the ecology classes and Mr. Linford in biology I've found a niche! I supervise a program in the Environmental Health Department for Kitsap County—population around 120,000—just a ferry ride away from Seattle. Not bad for just a BS degree!"

Kenneth S. Todd, Jr., (PhD 1967, zoology) retired as professor and head of the Department of Pathobiology at the University of Illinois-Urbana/Champaign. He is now an adjunct professor in the Department of Microbiology at Montana State University, where he teaches medical microbiology.

John H. Woffinden, Jr., (BS 1969, geology, mathematics) is test director for research and development at Dugway Proving Ground, near Tooele, Utah, which is providing the Department of Defense (DoD) with its first fundamental, scientifically defensible understanding of the chemical and physical processes that occur when unneeded or unserviceable conventional energetic materials (e.g., propellants, explosives, and pyrotechnics) are disposed of by open burning and open detonation (OB/OD). DoD will use the results from this current project to modernize OB/OD technology to maximize the conversion of the conventional energetic materials to harmless compounds while reducing substantially the noise, heat, shrapnel, blast wave, and pollutants released by OB/OD activities.

Insights, the newsletter of the Utah State University College of Science, is published twice a year. Its purpose is to inform alumni and friends of current events, projects, and changes happening within the college. The newsletter also provides a forum for alumni to follow one another's careers and professional development. This issue of *Insights* was under the direction of Paula Hogan Larsen, intern coordinator and

editor, and Colette Yates, project coordinator and editor. Contributors include English Department interns Jennifer Nelson and Audrie Turner and Dean James MacMahon. Special thanks to Gene Underwood, Sue Morgan, Nicholas Flann, and USU Photo Services for the photographs, to Kandy Baumgardner, and to Linda Keith of Editorial Services.

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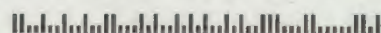
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A L U M N I E T

Dear College of Science Alumni and Friends,

We hope you have enjoyed reading about recent activities, changes, and research within the College of Science, as well as catching up on some of your former classmates. We always enjoy hearing from you and hope you will take a moment to complete and mail this alumni information form. Please note the postage-paid format—simply cut off this last page of the newsletter, fold along the lines marked on page 15, tape it shut, and drop it in the mail.

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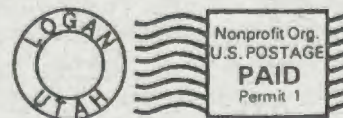
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