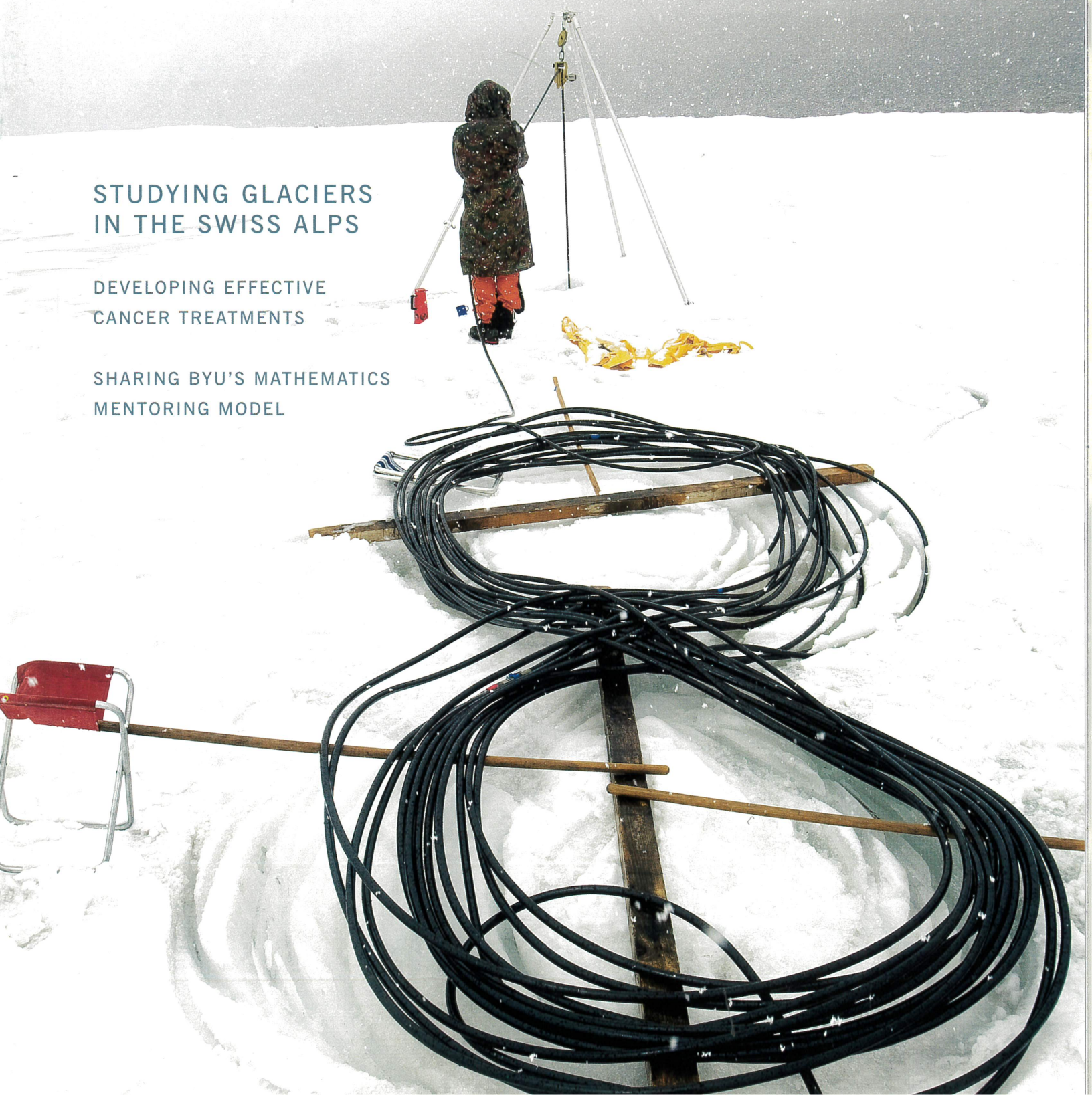
FRONTIERS

BYU COLLEGE OF PHYSICAL & MATHEMATICAL SCIENCES • FALL 2007



STUDYING GLACIERS IN THE SWISS ALPS

DEVELOPING EFFECTIVE CANCER TREATMENTS

SHARING BYU'S MATHEMATICS MENTORING MODEL

DEAN'S MESSAGE

THOSE OF YOU WHO READ THE LAST ISSUE OF *FRONTIERS* ARE AWARE THAT OUR FORMER DEAN, EARL WOOLLEY, RETIRED FROM BYU AFTER A 37-YEAR CAREER. I was asked to accept an appointment as the new dean of our college, and I recognize some big shoes to fill. Dean Woolley announced in his last message that he and his wife were submitting papers to serve a mission. Those of you who know the Woolleys will be interested to know that they have received a call to serve in the Czech Republic. They will be leaving not long after you receive this issue of *Frontiers*.

By way of introduction, I came into the dean's office after serving as chair of the Department of Physics and Astronomy for the past four years. My area of research training is in acoustics, where I have studied and formed advanced methods of noise and vibration control and developed a new area of energy-based acoustic measurements. I came to BYU in 1995 and have had a wonderful time during these past 12 years.

However, *Frontiers* is neither about me nor even directly about other faculty members. Our primary focus is to highlight our students and some of the remarkable things they are accomplishing during their time here at BYU. We maintain a strong commitment to undergraduate mentoring and endeavor to help our students learn science and mathematics by doing them rather than just learning about them. This objective is supported as we carefully hire new faculty members, wisely use university resources, and support high expectations for all in the college. We also seek your help in making this happen whether it be through providing employment or internship opportunities for our students, contributing financially, or sharing innovative ideas on how we might improve the educational experience of our students.

This issue of *Frontiers* covers several diverse topics in the college. One featured area is our Cancer Research Center, which has provided our students with exciting research opportunities for a number of years. We also highlight two new Geological Sciences Department faculty members who bring new energy and expertise to the department and who are also strong mentors for our women students. Finally, the Mathematics Department has been working on developing innovative undergraduate mentoring approaches that have been garnering national attention. Faculty in the department recently received a National Science Foundation grant to establish a Center for Undergraduate Research in Mathematics that aims to help mathematics professors at other U.S. colleges and universities learn to be effective mentors for undergraduate research projects, to provide funds to professors at BYU to establish undergraduate research groups, and to prepare undergraduate students to succeed in graduate studies in mathematics.

Exciting things continue to develop here in our college, and we invite you to sit back, relax, and enjoy reading of some of these recent events here in the College of Physical and Mathematical Sciences.

—Scott D. Sommerfeldt

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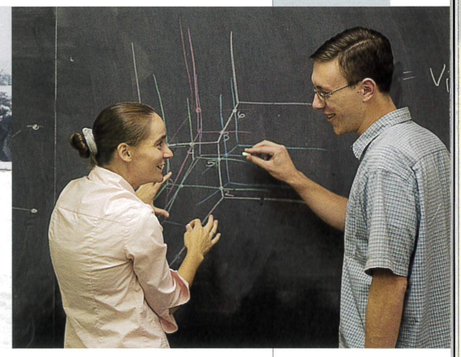

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CURING CANCER

Through Research and Education

CANCER IS A PROFOUNDLY COMPLEX CHALLENGE. YET THE CANCER RESEARCH CENTER (CRC) AT BRIGHAM YOUNG UNIVERSITY HAS A SINGULARLY CLEAR FOCUS: TO FIND A CURE THROUGH RESEARCH AND EDUCATION. Says Dr. Dan Simmons, chemistry professor and director of the center, "Our ultimate goal is to have cancer patients told by their doctor, 'You know, we have something for this.' If you make it possible to give just one patient that kind of news, that's the achievement of a lifetime. Think of what you have accomplished for another human being. To give them hope for a healthy life—that's what we're trying to do."

The CRC draws its focus from a mandate President Harold B. Lee gave in 1971 at Dallin H. Oaks' inauguration as president of BYU. "We would hope," President Lee said, "that you would give to the students of this institution the vision of the possibility that the Eyring Science Center could make a significant contribution to the discovery of a cure for cancer." Since the 1970s BYU's Cancer Research Center has attracted students and professors from the colleges of Physical and Mathematical Sciences, Life Sciences, Health and Human Performance, and Engineering and Technology. Its members, diverse in interest and training but united in purpose, combine their knowledge and determination to understand, prevent, and ultimately cure cancer.

Since BYU does not have a medical school, the CRC focuses not on clinical research but on gaining a better understanding of cancer and developing increasingly effective treatments. For example, the center hosts a weekly workshop, where faculty members lecture on diverse topics ranging from medicinal chemistry to the role of diet and lifestyle in preventing cancer. Students receive funding through the center to work with supervising faculty in researching various aspects of cancer. The CRC also sponsors the BYU Cancer Awareness Group, which performs service and hosts the annual Rex Lee Run, honoring former BYU president Rex E. Lee and raising money for cancer research at the university.

Faculty members who have vast experience with a given aspect of cancer research supervise six key areas of study at the CRC: cancer drugs and diagnostic discovery, cancer genetics, cancer epidemiology, cancer biochemistry, cancer immunology, and bioinformatics. The broad range of topics the students and faculty examine underscores the center's belief that, while its focus is clear, its approaches to research must be as diverse as cancer itself. "An important fact is that cancer is not one disease," Dr. Simmons says. "It's a collection of diseases that behave very differently from each other. It's unlikely there will be one treatment that will effectively treat all types of cancer." This acknowledgment fuels the myriad of projects students undertake at the CRC. "We're not hammering a single nail," says Dr. Simmons. "We fund studies on decreasing medications' side effects, more effective drug delivery, cancer prevention, and synthesizing derivatives of drugs."

> "We won't be satisfied until every cancer patient can receive a treatment that's significantly better than coping with the disease."
>
> –Dr. Dan Simmons

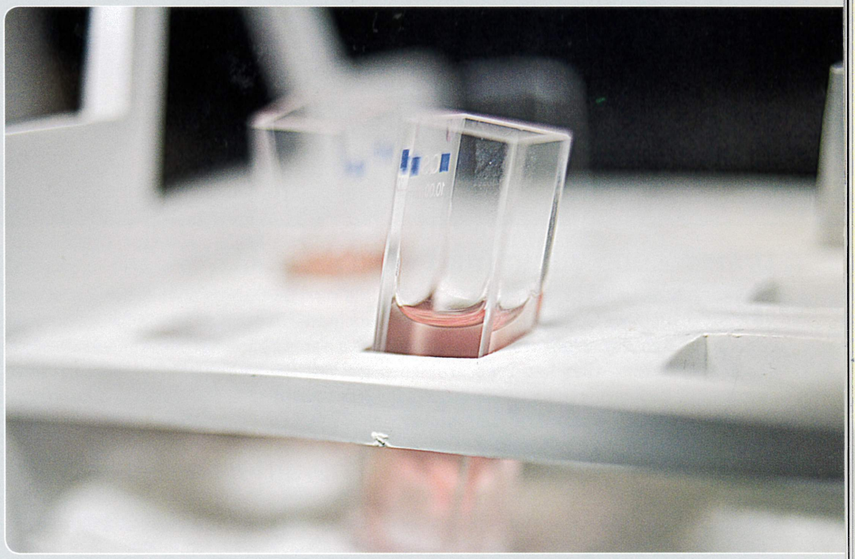
Students learn extensively about the available cancer drugs as well as the devastating side effects current treatments can incur. Although chemotherapeutics may have generally favorable results, scientists like Dr. Simmons are constantly researching ways to eliminate some of the treatment's more problematic effects. "Certainly, huge advances have been made," he says, "but we're nowhere near satisfied. We won't be satisfied until we reach our goal and every cancer patient can receive a treatment that's going to be significantly better than coping with the disease."

That goal, given cancer's complexity, seems daunting. But Dr. Simmons is optimistic that students at BYU are up to the challenge, and he acknowledges them as the university's greatest resource. "We have high-caliber students with high-caliber feelings and ideas that lead them to want to contribute to mankind. Our responsibility is to develop the intellects of these students."

Rachel Bailey, a graduate student in physiology and developmental biology, believes this philosophy is one of the center's strengths. She says, "The CRC not only has provided funding, which has been a great benefit for my summer research this year, but also has given me a broader picture of cancer research, especially in terms of treatment and the different elements of cancer."

Bailey studies apoptosis, or cell death. Since the cells she studies are cancer lined, they've already gone through the processes that cause cancer. With several of her fellow students and faculty at the CRC, she studies how normal cells are converted into cancerous tumors. She credits the center for allowing her to explore topics in a way she doesn't think would have been possible on her own. "It's been a good experience for me," she says, "because we've gotten an in-depth view of topics that are skimmed over in some of our classes. I've really appreciated this deep analysis."

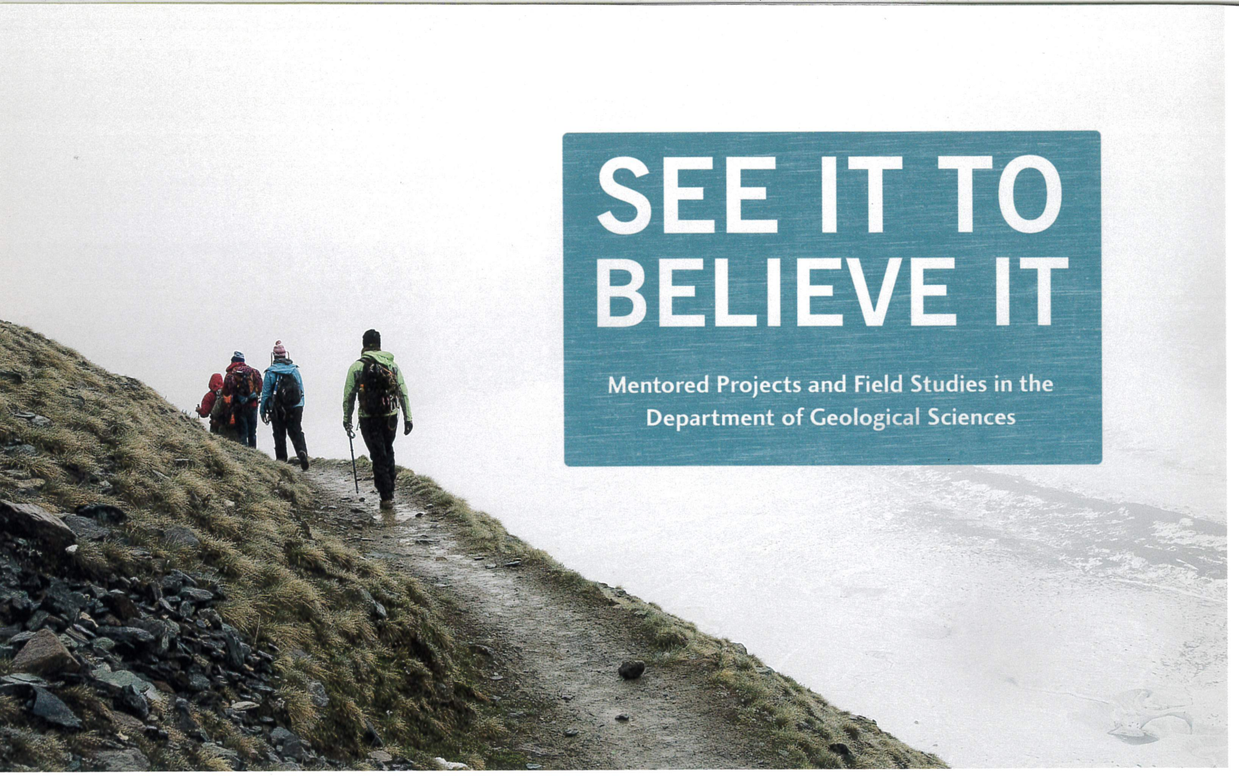
Erin Olson is also working toward her MS in physiology and biology. Like Bailey, she commits cells to cell death and then studies the changes within the membrane as they undergo apoptosis. The CRC, she says, gives her a sense of how her research ties into the work her peers are doing worldwide. "We're able to learn more about the different types of cancer and to feel like a part of the global effort to study and prevent it." And she's realized that she's an integral part of the collective fight against the disease. "We see how much our studies help with the big picture," she says. "We get to know and interchange ideas with people in the cancer field."



Other students at the CRC see their work as having an invaluable influence on their future. Lance Keyes, who is considering a career in cancer research, says he couldn't make the decision without the exposure to the field he's having now. "This has helped me realize how cancer research is executed and how progress and specific contributions are made."

Aaron Knowlton, a biochemistry major, says that the CRC forces him to think about cancer research in new ways. "The CRC experience has given me a lot of ideas of ways to treat cancer, maybe even unconventional ways. As we talk, certain ideas come to my mind like, 'Maybe we could treat cancer by targeting this protein or this enzyme.' It's thought stimulating," he says.

That kind of innovation, says Dr. Simmons, is the key to what the CRC is trying to achieve. As he acknowledges the colossal, devastating effects of cancer, he emphasizes again his belief that the work of the CRC is cause for great determination and hope, not despair. He says, "Cancer is something we must overcome. That's why we have this focus at BYU, and we think it's a worthy goal. We're going to continue to do the best we can with what we have." ■



SEE IT TO BELIEVE IT

Mentored Projects and Field Studies in the Department of Geological Sciences

PROFESSORS SUMMER RUPPER AND JANI RADEBAUGH WERE THRILLED TO GIVE A GROUP OF GEOLOGY STUDENTS THE CHANCE TO SEE SOMETHING THEY HAD LONG STUDIED BUT NEVER ENCOUNTERED—A LARGE GLACIER, ENSCONCED IN THE ROCKY CLUTCHES OF THE SWISS ALPS. But as the group of students, alumni, and faculty approached the glacier, a storm broke. "It was snowing hard on us, and it was cold and wet. I was really worried," Rupper recalls. "I was thinking, 'Oh no, they're going to be bummed and miserable, and they're not going to like it.' And then I turned around and saw huge grins plastered on their faces. They were just excited to experience something new, and this was a great opportunity to do it."

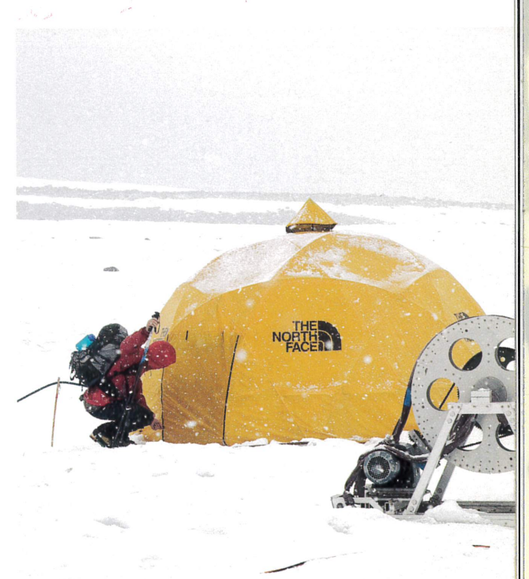
Rupper and Radebaugh are both new faculty in the Department of Geological Sciences at BYU. As the first female professors in the department, they bring fresh energy and new perspectives, due largely to their passion for geology and their interest in helping students. This field trip, where students and alumni studied the volcanoes in Italy and the glaciers of the Swiss Alps, is just one example of these professors' commitment to their students' academic experiences. "We wanted to give the students and alumni the opportunity to witness the complex features of an active glacial environment," Radebaugh says. Although her work as a planetary scientist doesn't relate directly to glaciers, she had experience with them when she traveled to Antarctica to look for meteorites in 2005. Like Rupper, Radebaugh was impressed with her students' enthusiasm and tenacity. She says, "Even though things went wrong on the trip, there wasn't a complainer in the bunch. They're just good kids."

> The difference between seeing a textbook photograph and standing on a glacier is impossible to describe.

As the first glaciologist in the Department of Geological Sciences, Rupper took advantage of the opportunity to teach students about glaciers in an environment that would be difficult to forget. Rachelle Hart, a master's student, says that talking about geological features like glaciers has never had the impact this geology lesson had. "I hiked out to it and stood on it. I was able to learn about the glacier on the glacier." Jonathan Major, an undergraduate majoring in geology, says the difference between seeing a textbook photograph and standing on a glacier is impossible to describe. "There's nothing like walking on a glacier," he says. "It was something I'd heard about all my life, but I could actually experience it. I could see the huge crevasses and hear the creaking and groaning of the ice."

Both Hart and Major expect that this field trip and their participation in mentored projects will affect their futures as geologists. Major is working with Dr. Rupper on a mentored project involving glacier modeling, a process that analyzes different atmospheric variables like precipitation and humidity. By studying patterns across the European Alps, they can determine how a glacier will respond to changes in climate. Fortunately, this project aligns with one of Dr. Rupper's areas of expertise. As part of her PhD dissertation, she developed a physics-based model that analyzes a number of climate variables and can then predict and explain changes in glaciers. Major is using this model to focus on the Alps as a regional picture of climate dynamics and glaciology. He expects to explain present glacial activity in the European Alps, determine the climates that supported glaciers when they were most abundant about 21,000 years ago, and provide reasonable predictions for future glacier scope if certain climate trends continue.

Hart will also continue the mentored project she worked on during her trip to the Swiss Alps, and, like Major, she's looking forward to seeing the project through to the end and reporting on it at the Spring Research Conference. Hart is studying the isotopes in the exposed strata on the Gornergrat glacier in Switzerland. If she discovers major isotopic differences in ice layers that show temperature variations from year to year, she may be able to help design a more efficient way to sample atmospheric isotope data. This project has given Hart the chance to become actively involved in research from beginning to end. She says, "Instead of reading about what someone else did, we brought home samples from the Swiss Alps, which we ourselves will analyze and interpret." This opportunity not only has benefited Hart as a graduate student but also may shape her plans for the future. She says, "I loved being on a glacier even more than I thought I would. Now I am really considering a PhD in glaciology. I am currently teaching, and I love it, but I've set my sights a little higher since Italy and Switzerland."

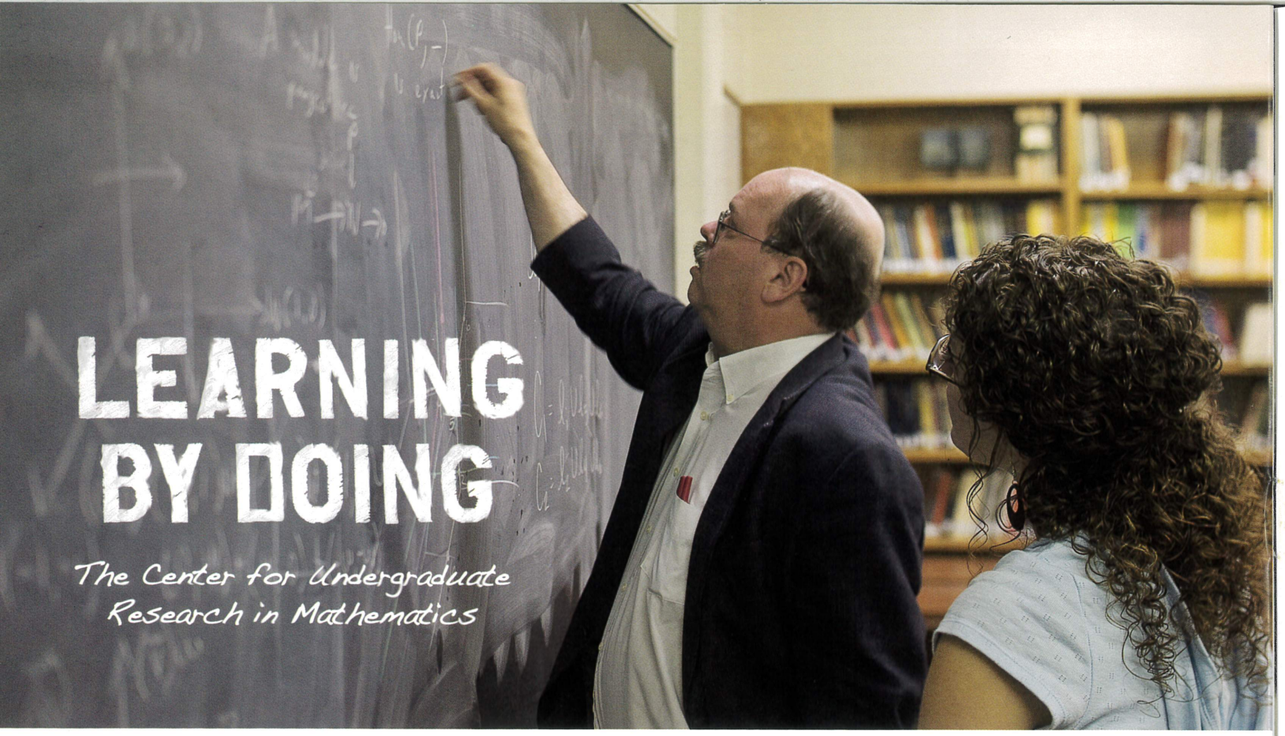


> "I loved being on a glacier. Now I am really considering a PhD in glaciology."
>
> –Rachelle Hart

Dr. Radebaugh isn't surprised that these geology students responded so positively to the field trip and the opportunity to work on mentored projects. "My student researchers show great initiative to think creatively and find programs that will help them advance their research," she says. One of these researchers, Chris Spencer, is working with Dr. Radebaugh to study the morphology of the dunes on Saturn's moon Titan, the dunes' relationship to the global climate, and their composition compared to Earth's dunes. Radebaugh received her PhD in planetary science and studies the solar system with colleagues at BYU and other universities. Involving students in her research gives them a rare in-depth look at a specific area of geological science. "Working with Dr. Radebaugh has given me a broader view of the geological world," says Spencer. "Most students focus their efforts on Earth-bound geology, rarely venturing beyond the atmosphere. Dr. Radebaugh has shown me that my study can reach to the depths of the solar system."

Radebaugh and Rupper want their students to view geology as a field that encompasses a wide spectrum of interrelated phenomena. They teach them to study different aspects of the geological sciences and see how they relate to and influence one another. Students often become involved in several mentored projects and work on a thesis project that studies a research question that is different from others they've considered. "A lot of students join in on these projects because they want to learn a lot more than one specialized geological focus," Rupper says. And the students formulate questions that fuel their diverse studies. "These students are enthusiastic and intelligent, and they ask many questions. They want to answer the why and not just the what. That answer can sometimes be tricky. Often, it forces us to realize that we don't understand some of the things we observe. Our students seem to have this innate ability to pick that out, which is great because it's the beginning of new projects, new ideas, and new research. It helps them understand how research comes about and how to formulate a question or a hypothesis and run with it."

Rupper, Radebaugh, and their students look forward to asking more questions, conducting more research, and taking part in more field trips. They believe in learning geology by experiencing it. As Dr. Rupper says, "The world is our playground." ■



LEARNING BY DOING

The Center for Undergraduate Research in Mathematics

AT MOST UNIVERSITIES IT'S RARE FOR UNDERGRADUATES TO MAKE SIGNIFICANT CONTRIBUTIONS TO MATHEMATICS RESEARCH. However, BYU's Mathematics Department makes undergraduate research one of its priorities, and the students who benefit from these mentored research opportunities are not only grateful but also impressed. "[The department] has worked hard to establish a good undergraduate mentoring program," says Nathan Grigg, who graduated with his BS in mathematics in August and will begin a PhD program at the University of Washington this fall. "It's sometimes very hard for an undergraduate to contribute to math research, because it often requires a lot of background. It takes a certain creativity to find problems that are accessible to undergraduates and yet interesting to the mathematics community."

Many people outside of mathematics wouldn't think that creativity is an essential component of the field's research, but Dr. Michael Dorff, director of BYU's Center for Undergraduate Research in Mathematics (CURM), insists that it is. He says, "I know this is going to sound a little strange, but a lot of mathematicians think of math as something beautiful, a creative process. Undergraduate research, in my opinion, helps students begin to see the beauty." Grigg agrees that people have to become engaged in math before they can begin to understand or appreciate it. Although he has always succeeded in his mathematics courses, his work as a research assistant to faculty mentor Dr. Tyler Jarvis has helped him view mathematics in a new light. "I would say that I have learned as much or more in my job as I have in class here at BYU," he says, "not because classes don't teach what they should teach, but because you learn math best by actually doing it."

> "The program we're doing here at BYU's Department of Mathematics is phenomenal, and the results that we achieve are always very positive."
>
> –Dr. Michael Dorff

For the past few years, Grigg and several other undergraduate and graduate students have worked collectively and individually on research projects they have chosen with Dr. Jarvis' help. This vertically integrated mentoring approach is one of the methods that makes BYU's mentoring model effective, and Dr. Dorff has decided that BYU should share its model with other universities. "The reviews have always come back that the program we're doing here at BYU's Department of Mathematics is phenomenal, and the results that we achieve working with undergraduates are always very positive," he says. "And so the idea came to try to take this model and share it with the mathematics departments of other universities throughout the United States."

Dorff applied for a National Science Foundation (NSF) grant to begin the Center for Undergraduate Research in Mathematics at BYU. When his proposal was accepted, CURM became the only NSF-funded program of its kind. The four-year grant enables BYU to train 15 faculty members from mathematics departments around the United States in how to implement BYU's mathematics mentoring model with undergraduates at their own institutions. The faculty members visit BYU twice a year. In their first visit they learn about the mentoring program and the techniques Dorff believes will help the model to be effective at their universities. Two semesters later the faculty members return with their students, who are ready to present at BYU's Spring Research Conference. These faculty-mentoring experiences also prepare students to write a detailed research paper and to progress to graduate school.

"A major goal of this mentoring model is to get students to go to graduate school," Dorff says. "It's a great experience for the students; it reflects well on their undergraduate institutions; and there's a national need for more students to study science, technology, math, and engineering." He cites the National SMART Grant, which President Bush recently created to encourage undergraduate students to study mathematics, as evidence of our nation's need for competent mathematicians to enter the workforce and compete with professionals around the world. Dorff is confident that undergraduate mentoring at BYU has been one of the primary factors in a high percentage of mathematics majors choosing to pursue graduate studies and goes so far as to call it proof of "the tremendous success of BYU's mentoring model."

Natalie Wilde is another student who has benefited from this model, and she feels it has uniquely prepared her for graduate school. She received her BS in mathematics in August and will begin working toward her master's degree this fall at BYU. For the past year and a half, she has been working in Dr. Jarvis' Tropical Algebraic Geometry Research Group and has joined with other graduate and undergraduate students to put her hard-earned mathematics knowledge to the test. Although she acknowledges the research is challenging, she describes her mentoring experiences as "incredibly helpful and encouraging." She has presented her research at regional Mathematical Association of America (MAA) meetings and at BYU's Spring Research Conference and feels like she's been "challenged without feeling totally overwhelmed." Now that CURM is influencing mathematics research at universities around the United States, Wilde says, "I plan on earning my PhD from another university, and it would be wonderful if it used BYU's mentoring model."

At the workshop Dorff conducts with visiting faculty members, he shares a few crucial elements of BYU's success in undergraduate mentoring. He encourages faculty members to mentor students in groups rather than one-on-one, recognizing that students learn from bouncing ideas off each other, thereby creating a more efficient and effective mentoring experience. He teaches faculty members how to develop good research problems for students, start a mentoring group, and keep students working and motivated during the academic year. He dispels common myths undergraduates have about graduate school: (1) it's only for A+ students; (2) only really challenging mathematics problems remain to be solved; and (3) they can't afford it. He informs faculty about the numerous scholarships and fellowships that make it feasible for any hardworking student to attend graduate school and study mathematics. CURM is still in its first year, but its future looks bright. This year the program had 70 applications for 15 spots. Since the Mathematics Department has had little time to publicize the program, the overwhelming interest in CURM has been generated almost entirely by word of mouth. Dr. Dorff feels confident that the high quality of BYU's students and the resounding success of BYU's mentoring model will continue to attract attention. "There is so much interest in the program," he says. "And the students we've mentored over the past few years here at BYU have already demonstrated the remarkable success of undergraduate mentoring. It's an honor to BYU that we've been awarded this center because it demonstrates that NSF feels we have the track record and expertise to train other professors to mentor. It's bringing a lot of people to campus who have never been here before and are impressed with what they see." The bright, ambitious students coming from the BYU Mathematics Department have long borne positive witness to its innovative mentoring approaches. Now CURM has made it possible for BYU to benefit not just its own students but communities of undergraduates across the nation. ■

Students find the mentoring experience is "incredibly helpful and encouraging."

FEATURED DONORS

Stephen and Marianna Richardson

FOR STEVE RICHARDSON, PRINCIPAL RESEARCHER AND MANAGER OF THE MACHINE TRANSLATION GROUP AT MICROSOFT RESEARCH, LANGUAGE AND COMPUTING HAVE BLENDED IRRESISTIBLY FOR OVER THREE DECADES. As a young BYU student in the 1970s he took an honors seminar in computational linguistics—the modeling of human languages with computers. From 1975 to 1980, while pursuing his baccalaureate, he worked in the BYU Translation Sciences Institute, which had as one of its goals the computer-aided translation of talks by General Authorities into other languages. His second semester on campus, Steve took his first computer science course before leaving to serve a mission. On returning from his mission, he took another computer science class, and from that point he knew what he wanted to do.

During his senior year Steve met an English literature and art history major named Marianna Edwards, and they were married following graduation. They stayed in Provo while Steve finished a master's degree that combined linguistics and computer science. Then they headed to New York, where Steve worked as an assistant programmer with IBM. Later an opportunity opened up in IBM's research division for someone versed in both computer science and linguistics; Steve took the position, which was located just north of New York City. He earned a PhD from City University of New York in his "spare time."

After five years in New York, he was transferred to the IBM Development Lab in Maryland to work on a natural language grammar checker. While there, Marianna earned a master's degree in special education and at about the same time had the eighth of their 12 children. Shortly after, Microsoft decided to inaugurate a research division and went looking for talented computer scientists. Steve became one of the first three researchers hired by Microsoft, and in 1991 Steve and Marianna moved their family to Washington.

Education has always been a high priority for the Richardsons. In Washington Marianna completed her EdD at Seattle Pacific University. She has maintained active involvement in education, ranging from work with local schools to teaching at BYU Education Week. Steve and Marianna were the organizing force behind establishing the Microsoft Endowment to fund student mentorships in the BYU Department of Computer Science.

At Microsoft Steve has continued his work on translation software for human languages. He says, "My student work at the BYU Translation Sciences Institute shaped the path toward my current work. It feels as if I have come full circle from my student days to what I am doing now." He adds that one of the reasons the work is so rewarding is because the ability for computer software to translate natural language has implications for the Church as well as for the rest of the world. He is now working on the task of delivering the products that have been developed to those who can use them.

Steve has some advice for today's students of science and mathematics: "Get advanced education and look for opportunities to become cross disciplinary. It is important to be very good in your field, but you will likely need to communicate and work competently with people in other fields. Be conversant in more than just your narrow technical area of expertise."

This is good advice from someone who has been there and done that. ■

CLASS NOTES

Computer Science Students Create Opportunities for Fellow Students

Quinn Taylor, Jonathan Hammer, and Kevin Perry, three graduate students in the Computer Science Department, completed internships at Apple this year. In itself that is not unusual, but Apple was so impressed with their performance that the company decided to recruit on BYU's campus for the first time. Apple representatives were on campus for two days in September interviewing computer science majors. The personal examples, quality of work, and character exhibited by these three young men has turned into a great opportunity for many of our students.

Note: Other departments share similar stories where the exemplary performance of one or two graduates in key companies opens doors for other BYU students.

Statistics Professor Receives H. O. Hartley Award

Dr. Shane Reese, associate professor of statistics, received the 2007 H. O. Hartley Award from the Department of Statistics at Texas A&M University. This award is given for distinguished service to the discipline of statistics and is named in honor of Professor H. O. Hartley, who founded the Institute of Statistics in 1962. Hartley was a pioneer and leader in the development of the theory and real-world applications of statistics. He was also an avid proponent of good statistical practices and, through his teaching, lectures, and national and international service, significantly advanced the understanding and use of statistics across a myriad of other disciplines. Professor Reese joined the BYU Department of Statistics in 2001 and has been the recipient of the BYU Young Scholar Award.

IDeA Labs Undergraduate Initiates Exchange with Control Group at Cambridge University

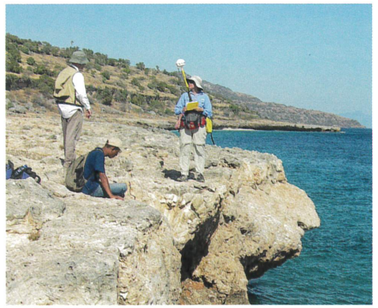
Russ Howes, a mathematics major and undergraduate researcher in BYU's Information and Decision Algorithms Laboratories (IDeA Labs), recently returned from a five-week visit to Cambridge University, where he worked with one of the world's premier research groups in control systems. His work explores network reconstruction algorithms for biological systems, which allow biologists to design the experiments needed to understand the complex mesh of protein signaling pathways in a cellular system. As is typical for the research in IDeA Labs, Russ's project is interdisciplinary. Although a mathematics major, he is conducting biology-focused research as part of an honors thesis advised by Professor Sean Warnick of the Computer Science Department.

"The research environment at Cambridge was great, and there were opportunities to meet so many leaders in the field," Russ explained.

His research and visit were funded by a variety of sources, including the National Science Foundation, various industrial partners that work directly with IDeA Labs, and BYU's Honors Program and Office for Research and Creative Activities. "I am grateful to all the people and organizations that have contributed financially to IDeA Labs, allowing us to create opportunities like this for students," said Warnick. IDeA Labs is an interdisciplinary research group involving the departments of Computer Science, Mathematics, Statistics, and various other decision-focused disciplines. Researchers in IDeA Labs explore processes for making effective decisions in complex and uncertain environments. The group is lead by Professor Warnick and Professor Jeff Humpherys in mathematics.

Geology Student in Top 20

The Geological Society of America Committee on Research Grants has announced the recipients of the 2007 graduate research awards, and BYU student Nicole Cox not only is among them but also has received special recognition. Nicole is among 20 of the 246 awarded graduates receiving Outstanding Mention. Her proposal is titled "Quaternary sea-level and tectonic uplift patterns revealed from emergent coral terraces of Timor-Leste," and its objective is to quantify uplift rates, define deformational mechanisms, and produce a plausible seismic assessment for this earthquake-prone region of the earth. Her research is supervised by Professor Ron Harris of the Department of Geological Sciences.



Chemistry Students Receive Recognition

Daniel and Laura Nielsen, undergraduate students in the Department of Chemistry and Biochemistry, were awarded Undergraduate Travel Awards by the Organic Division of the American Chemical Society. These awards enabled them to attend the 40th National Organic Chemistry Symposium, held at Duke University in June 2007. Daniel and Laura each made presentations on their research of the synthesis of hasubanan alkaloids, which are potential painkillers. With over 900 organic chemists in attendance, this is the premier scientific meeting that focuses on organic chemistry.

Student Raising Profile of Mathematics Education

Chris Johnson, a graduate student in the Department of Mathematics Education, is making a name for herself as well as for the BYU mathematics education program. Her work has focused on the role of linguistic invention in the building of mathematical meaning and understanding and on mathematical discourse as an indicator of authentic mathematical activity. As an undergraduate she presented a paper at the 27th annual conference of the North American chapter of the International Group for the Psychology of Mathematics Education. She will present results from her thesis at the 29th annual conference of the same group next month. Chris has already had a paper accepted in the International Journal of Science and Mathematics Education.

ON SEPTEMBER 28, 2007, THE NEW ROYDEN G. DERRICK PLANETARIUM IN THE EYRING SCIENCE CENTER WAS DEDICATED BY ELDER RICHARD G. SCOTT OF THE QUORUM OF THE TWELVE. If you have been receiving *Frontiers* for a couple of years, then you have read previously about the planetarium, with its acoustically treated 39-foot dome, comfortable reclining seating, and new star projector. Elder Derrick, an emeritus member of the Seventy, and his wife, Allie, attended the dedication along with Elders Merrill J. Bateman, W. Rolfe Kerr, and John K. Carmack.

The planetarium stands as a monument to our donors in three ways. First, the new facility replaces the Summerhays Planetarium, which was built because of the generosity of donors and served well for nearly four decades. Second, much of the funding and the vision for the new facility came from generous donors whose specific interests included a new planetarium at BYU. Finally, the planetarium will continue to provide mentoring opportunities, funded in large part by donations to the college annual fund, for generations of astronomy students like Tabitha Bush. The above photo shows Tabitha making a presentation during the dedication ceremonies, backed by a stunning mural that was itself a mentoring project for an art student. In addition, of course, the planetarium adds an exciting dimension to our astronomy classes and has been used by other colleges on campus as well.

We do not intend to build more than one planetarium on the BYU campus, but we do hope to provide a mentored learning experience for every student in our college who wants to participate. This is our top academic priority. Thanks to our alumni and friends, we continue getting closer to that goal. Throughout the pages of *Frontiers* you can read about how mentoring is making a difference in the education of our students. I invite you to visit our college Web site (cpms.byu.edu) or to contact Brent Hall (800-525-8074 or brent_hall@byu.edu) to learn more about how you can help students have this experience. Please join with us in helping our students reach for the stars.

—Scott D. Sommerfeldt, Dean