fall 2004

BIO

COLLEGE OF BIOLOGICAL SCIENCES

UNIVERSITY OF MINNESOTA

The EVOLUTION of Biology Education

Whether learning takes place in the great outdoors or in the laboratory, educators are seeking ways to keep the biology curriculum current and meaningful. A College of Biological Sciences task force shares ideas on how to teach an ever-changing subject. See story on page 9.

FUNDAMENTALS OF FAT • NITROGEN IN LAKES • MUSHROOMS AND MEDICINE

Robert Elde, Dean

FROM THE DEAN

Education at a Public Research University

Most people know that the University of Minnesota is a public research university, which sets it apart from state colleges and private liberal arts colleges. But what does that really mean?

At face value, it means our that our faculty brings in $500 million a year in federal research grants to carry out research on human health, the environment, renewable energy, and food, among other areas. They also contribute intellectual property and train a highly skilled and creative workforce for industries such as health care, agribusiness, and biotechnology. The University's research enterprise is the fuel that powers the state's economy.

It also means that we provide a different set of educational opportunities, particularly for students interested in the sciences. They take classes from faculty who conduct federally sponsored research and write textbooks. They work with real scientists in real labs on research that addresses problems such as cancer and diabetes, global warming, and dependence on foreign oil. These opportunities are not typically available at MnSCU and private colleges.

When Nobel Laureate and alumnus Ed Lewis (B.S. '39) passed away in July, I was reminded that undergraduate research has a long tradition at the University of Minnesota. Lewis came here from Pennsylvania as an undergraduate to do research on fruit fly genetics with Professor Clarence Oliver, a former student of genetics pioneer Thomas Hunt Morgan. Oliver provided space for Lewis in his own laboratory and freedom to conduct research outside of his scheduled classes. Lewis said his experience at the U was pivotal to his development as a scientist.

Today, the National Research Council recommends that undergraduate students begin research as early as possible in their education. And as we undergo a review of our own curriculum we are stressing the value of learning by doing. You can read more about this in our cover story, "The Evolution of Biology Education," which begins on page 9.

I particularly enjoyed reading a student's perspective on biology education from recent CBS graduate Chuck Hernick (B.S. Ecology, Evolution, and Behavior, 2003.) He says, "Science is a dynamic field. What you get from lectures and textbooks is history, which gives you the language to be a scientist. But science is problem solving. The only way you can really learn how to be a scientist is by doing research. Most of what I know about biology I learned from working in a research lab."

That's another thing that distinguishes a large, public research university: the quality of our students. The educational opportunities we provide bring the best and brightest students to our doorstep. It's a privilege to welcome these talented young people and to guide their transformation into scientists.

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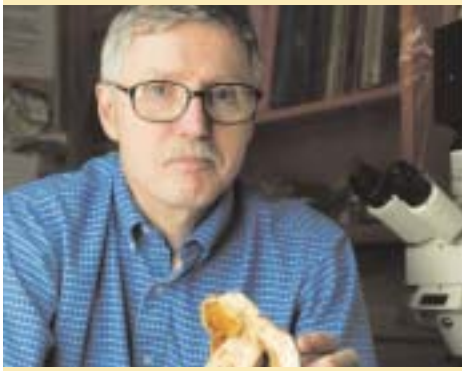

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On the Cover Sun sets at the Lake Itasca Biological Station and Laboratories where incoming freshmen attend the annual "Nature of Life" program. *Photo by Jonathan Chapman*

BIO is published two times a year by the University of Minnesota College of Biological Sciences for alumni, faculty, staff, and friends of the College. It is available in alternative formats upon request; please call 612-624-0774 or fax 612-624-2785.

Leaders Named to Steer Renewable Energy Initiative

The University of Minnesota's Initiative for Renewable Energy and the Environment (IREE), funded with $20 million from the state and Xcel Energy, has named 24 leaders from the business, nonprofit, government, and higher education sectors to serve as its advisory council.

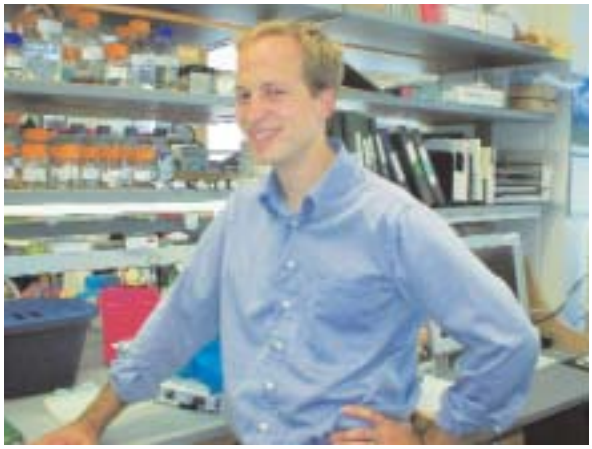
The advisory council will determine strategy and priorities for developing renewable fuel sources—such as biomass, hydrogen, wind, and solar energy—based on Minnesota's resources and needs.

"They are a very diverse group of individuals who bring different perspectives on renewable energy to the table," said Robert Elde, IREE chair and dean of the College of Biological Sciences. "They share a commitment to helping us bring renewable energy to Minnesota and to sustaining IREE for the long haul." Members of the advisory council range from 3M and Cargill executives to heads of large state growers' associations to leaders of smaller rural and environmental organizations.

IREE was created to address the urgent need to reduce dependence on nonrenewable, fossil fuel-based energy sources, and to sustain global ecosystems. For details about the advisory council, research projects, and other information about IREE, go to www1.umn.edu/iree/. ■

CBS Researcher Discovers HIV Search and Destroy Protein

A human protein that mutates the AIDS virus (HIV) and holds potential for keeping the disease at bay has been discovered and its function described by a team led by Reuben Harris, assistant professor of biochemistry, molecular biology, and biophysics. The new protein, called APOBEC3F, and one described previously called APOBEC3G can directly mutate HIV. Such proteins, called retroviral restrictors, may contribute to HIV resistance in some people. Harris and colleagues at the university reported the discovery in the June 24 issue of the journal *Current Biology*.



Reuben Harris' research team has discovered a protein that may contribute to HIV resistance.

HIV mounts its own defense against proteins in the APOBEC family. But APOBEC3F seems especially adept at getting around this defense. "APOBECs are a 'search and destroy' defense," Harris explains. "It's different from the defense found in some HIV-resistant people, in which the outer surfaces of their cells no longer offer footholds for the virus to attach and begin the process of infection." ■

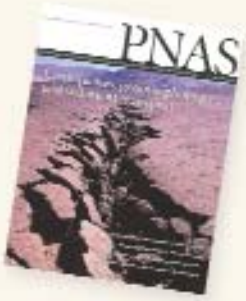
RESEARCH GRANTS & AWARDS

Steve Gantt (Plant Biology) and colleagues Kate VandenBosch (Plant Biology), Carroll Vance (Agronomy and Plant Genetics), Ernie Retzel (Microbiology), Debby Samac (Plant Pathology) at the University of Minnesota and Maria Harrison at the Boyce Thompson Institute in New York have received $2.1 million from the National Science Foundation (NSF) Plant Genome program for a four-year study entitled "Use of Interfering RNAs to Identify Gene Function in *Medicago truncatula*." They will silence the expression of about 1,500 individual genes in transgenic roots and examine the roots for altered development and symbiotic associations.

Fumi Katagiri (Plant Biology) received funding from the U.S. Department of Agriculture and the Natural Resources Institute for a project entitled "Efficient Discovery of Plant Regulatory Genes by Exploitation of Natural Variation." The project, which was funded for three years for a total award of $400,000, has longterm implications for crop improvement, Katagiri says, "Naturally occurring genetic variation is a great genetic resource for crop improvement."

Jeff Simon (Genetics, Cell Biology, and Development) received $1.2 million from the National Institutes of Health (NIH), for a four-year continuation of an ongoing project entitled "Transcriptional Repression by Polycomb Group Products." The project aims to study chromatin mechanisms that control gene expression and development in

Tilman Presents New Theory of Species Diversity



David Tilman, Regents Professor and McKnight Presidential Chair in Ecology, presented a new theory of species diversity and abundance within ecosystems in the July 27 issue of *Proceedings of the National Academy of Sciences.* The theory was inspired, in part, by data he gathered over the past two decades at the Cedar Creek Natural History Area. Through his new stochastic niche theory, Tilman offers an explanation for the patterns seen during the assembly of species into ecosystems, including what controls the number of species and their abundances, and why some ecosystems are more readily invaded by exotic species than others. The article suggests that stochastic niche theory offers a resolution to the controversy between whether it is "neutral" or "niche" processes that determine the diversity and composition of ecosystems. A biography of Tilman was published in the same issue. The two articles recognize his inauguration into the National Academy of Sciences. ■

U Explores Partnership with Norway

"The Environmental Impact of Agriculture and Energy Use" was the focus of a research and technology seminar connecting the University of Minnesota and the Agricultural University of Norway. It took place in Staur, Norway, in August. The conference was the first in a joint effort to find the ways in which the U.S. and Norway can capitalize on the each other's strengths, specifically in the areas of genomics and biomass/bioenergy. Bob Elde and Kate VandenBosch represented the College of Biological Sciences. Faculty from the College of Agriculture, Food and Environmental Sciences, the Institute of Technology, the College of Veterinary Medicine, the College of Natural Resources, and the Medical School also attended. ■

Drosophila. One rationale for the research is to better understand basic molecular mechanisms that contribute to prostate and breast cancers.

Steve Ekker (Genetics, Cell Biology, and Development) received renewed funding from NIH for his research, "Systematic Vertebrate Functional Genomics." This grant supports a collaborative effort at several universities with Ekker as the principal investigator.

Carolyn Silflow (Plant Biology) has obtained a four-year, $730,000 award from NSF for a project entitled "Segregation and Positioning of Basal Bodies." This is a "gene discovery" project to identify and elucidate the function of genes involved in positioning of basal bodies in *Chlamydomonas*.

Kate VandenBosch (Plant Biology) received a three-year $360,000 grant from the U.S. Department of Energy. The project is entitled "Nodulation Genes of *Medicago truncatula* Governing Early Responses to Rhizobia." This project complements genomic analysis projects in Medicago by focusing on particular genetic loci.

Akhouri A. Sinha (Genetics, Cell Biology, and Development) received $471,421 from the U.S. Department of Defense for "Prediction of Aggressive Human Prostate Cancer by Cathespin B."

Nathan Springer (Plant Biology) received $327,757 from NSF for "Assessment of the Use of Oligonucleotide Microarrays for Single Nucleotide Polymorphism Mutation Detection in Maize." ■

MEET THE NEW FACULTY

Mark Borrello, (Ecology, Evolution, and Behavior) is a historian of biology with a particular interest in evolutionary theory, genetics, behavior, and the environment. His work explores the varied interpretations and applications of evolutionary theory from the late 19th century to the present.


Mark Borrello

Helene Muller-Landau (Ecology, Evolution, and Behavior) has research interests that include plant community ecology, especially of tropical forests; ecological and evolutionary theory; and anthropogenic influences on plant community structure and dynamics.


Helene Muller-Landau

Daniel Bond, (Microbiology and Biotechnology Institute) focuses his research on renewable energy. He helped create a battery that uses common bacteria to turn organic matter from the ocean floor into electricity.


Daniel Bond

University Enterprise Laboratories Renovation Gets Underway

Renovation of the University Enterprises Laboratories (UEL) incubator began this summer, after board members completed fundraising.

Contributors include Xcel Energy ($2 million), 3M ($1 million), Boston Scientific, Dorsey & Whitney, Ecolab, Guidant, Medtronic, and Surmodics ($500,000 each), the City of St. Paul ($6.75 million), and the University of Minnesota ($2 million).

UEL is a nonprofit, public-private partnership created to advance Minnesota's biotechnology industry by providing lab space and support services for biotech start-up companies. Offices move in this fall; laboratories in July, 2005.

Companies have started moving into the UEL incubator.

The facility is located within the St. Paul Bioscience Zone and between the University's Twin Cities campuses. It will also house the University's Office of Business Development and Carlson Venture Enterprises. ■

Freshmen get a head start with CBS "Nature of Life" program

The incoming freshmen class got a preview of life at CBS during the second annual "Nature of Life" program, which was held at Itasca Biological Station and Laboratories from July 18-30. Students attended one of four three-day sessions. Each session offered mini-courses on topics ranging from bog biology to molecular biology, opportunities for students to get to know each other, returning students, faculty, staff, and administrators and to learn "Hail Minnesota" and the "Minnesota Rouser," thanks to biochemistry professor John Anderson, who served as singing coach. ■

CBS Says Goodbye to Edward B. Lewis

The College of Biological Sciences lost a good friend and distinguished alumnus when Nobel Laureate Ed Lewis (B.S. '39) died in July in Pasadena, California, after a long battle with cancer. He was 86.

Lewis won a flute scholarship to Bucknell University, but after a year there, he gave up his scholarship and transferred to the University of Minnesota because Minnesota offered the opportunity to pursue genetics research. He received a B.S. in biostatistics from Minnesota.

With his 1950s experiments in fruit fly genetics, Lewis became the first to explain how genes control the development of organs during the early growth of an embryo. His work had particular usefulness in the study of children's cancers such as brain tumors and leukemia, which develop differently in children than in adults, says Bob Elde, dean of the College of Biological Sciences.

Lewis was a professor at Caltech, a smaller school with fewer hiring opportunities. So he helped Minnesota recruit young star scientists for its labs, among them Michael O'Connor (Genetics, Cell Biology, and Development) who is a Howard Hughes Medical Institute professor and holder of the Ordway Chair in Genetics. Lewis was a generous contributor to the college, and received an

PEOPLE

Kathy Ball, education specialist, has retired after more than 30 years with the College of Biological Sciences. Ball was instrumental in the development of courses including General Biology laboratory, General Botany lecture, and various seminars. She contributed to a summer workshop on botany for elementary school teachers and she developed and taught Kids' University courses in biology.

Robert Megard, professor of ecology, evolution, and behavior, retired in December after making numerous contributions to limnology. He joined the University of Minnesota as a research fellow in 1962 and became one of the first EEB faculty

Nobel Laureate

HAROLD SWEET

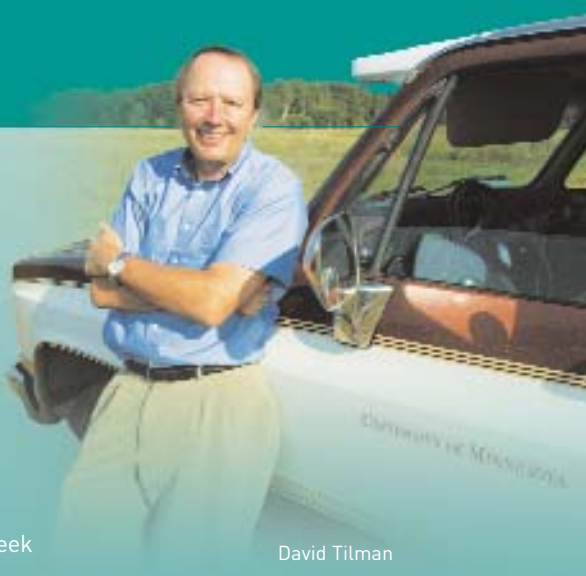
Edward B. Lewis

honorary doctor of science degree from the University in 1993, two years before he received the Nobel Prize in Physiology or Medicine. Known for his sense of humor, Lewis often dressed as a mutant fruit fly on Halloween.

"In science, given how competitive it has become, he stood out as a generous person," said Jeff Simon, associate professor in the Department of Genetics, Cell Biology, and Development. ■

members in 1967. He is recognized for his research on *Paleocladocera* of Iran, kinetics of oxygen generation in algae, and transmission of light through water columns. In recent years, he refined the understanding of fine-scale spatial distribution in zooplankton in lakes.

Judd Sheridan, associate dean for research and international programs, stepped down September 1, 2004. An associate dean since 1999, he will continue his research as a faculty member in the Department of Genetics, Cell Biology, and Development and oversee international programs part-time. ■



David Tilman

Improvements for Cedar Creek Natural History Area

David Tilman, Regents Professor and McKnight Presidential Professor of Ecology, is on a mission to make major improvements at Cedar Creek Natural History Area. He is leading a campaign to raise $4.1 million through grants, individual contributions, and funding from the state of Minnesota.

Cedar Creek Natural History Area is a 5,400-acre ecological research site near Isanti, with natural habitats that represent the entire state. The funds will allow Cedar Creek to restore 950 acres to savanna and prairie, create interpretive trails for year-round access for walkers and cross country skiers, and construct a 7,000-square-foot Science and Interpretive Center that will demonstrate cost effective technologies for energy efficiency, highlight how society can sustain the supply of vital services provided by ecosystems, and provide space essential for both outreach and research.

The Big Back Yard Showcases CBS Science

The Big Back Yard opened in June at the Science Museum of Minnesota with the help of the University of Minnesota.The Big Back Yard serves as the museum's "outdoor exhibit hall." It includes a miniature golf course, a hands-on demonstration of landscape processes, and a prairie maze. The Museum worked closely with CBS faculty to develop the prairie maze and biomass from that portion of the exhibit will be used by an adjacent heat and power plant.

The collaboration is part of a formal partnership between the University and the Science Museum which provides the University with a venue to communicate its research to the public and enhance the public's science literacy. The museum contributed $3 million and the University contributed $1 million to the exhibit.

Thomas S. Reid

In Memoriam: Thomas S. Reid

Thomas S. Reid (Ph.D.'43) died in May at age 92. During his 50-year career at 3M, he developed patented products that include Scotchgard™ stain repellent and the low-adhesion coating that makes it possible to unwind and dispense Scotch tape. Reid gave a substantial gift to CBS to establish the Thomas Reid Graduate Fellowship in Biochemistry, Molecular Biology, and Biophysics. He received the University's Outstanding Achievement Award in 1988.

Figuring Out Fat

Behind the bulge, there's a lot of activity.

TIM RUMMELHOFF

David Bernlohr and Ann Hertzel are part of a research group gaining a new understanding of fat and how it behaves in the body.

"Humans evolved under conditions of nutrient limitation. Now, with industrialization, we live in an environment of nutrient excess, and our bodies don't know how to respond."

—David Bernlohr

When scientists start talking about what molecules do inside cells, listeners' eyes often start to glaze over. But when David Bernlohr, head of the Department of Biochemistry, Molecular Biology, and Biophysics, mentions his sub-cellular research, people prick up their ears instead.

Bernlohr studies adipocytes, the cells that suck fat from our bloodstream and stash it away in our hips, stomachs, and thighs. In today's overweight world, plenty of folks would like to know how these cells do what they do—and how we can keep them from doing it so darn well.

Adipocytes were literally lifesavers for past generations, helping keep our ancestors from starving by providing a backup energy source when food was scarce. But in a food-saturated environment, their fat-hoarding tends to cause trouble instead. Thanks to their diligence, two-thirds of Americans are overweight. Moreover, obesity directly leads to other diseases such as type II diabetes, hypertension, and cardiovascular disease, making it the nation's number one health issue.

"Humans evolved under conditions of nutrient limitation," says Bernlohr. "Now, with industrialization, we live in an environment of nutrient excess, and our bodies don't know how to respond."

Up until 10 years ago or so, the prevailing view was that adipocytes were little more than expandable containers where our bodies stocked up supplies for hard times. "Over the last decade, that view has changed dramatically," Bernlohr says. In addition to collecting calories, he says, we now know that adipocytes "secrete a raft of hormones that regulates a number of processes" related to the fate of fat within our bodies. The more we learn about how they do this, Bernlohr says, the better able we will be to direct their activity so they help rather than harm us.

Bernlohr is currently working to understand how fats enter adipocytes, how they move once inside, and how they regulate genes that might influence the onset of obesity-related health problems. In one set of studies he's looking at the class of molecules, known as FATPs, that ferry fat across the cell membranes. He has cloned the gene that makes one such ferry. He has also discovered that a helper molecule known as Coenzyme A plays a key role in their ability to do so.

Within cells, Bernlohr is focusing on fatty acid binding proteins (FABPs), which shuttle fatty acids from one place to another. By studying animals that lack FABP genes, he's learning a lot about the role these proteins play in not only making fat cells fatter, but also in sending messages to other parts of the body that may result in obesity-related disease.

Bernlohr has not only been studying adipocytes, he also has applied what he's learned to develop an innovative eating regimen he calls the Northwoods Diet. "Miami has its South Beach, I figure we could have our Northwoods," he says. The plan allows carbohydrates in the morning (to get insulin flowing), but switches to proteins and fats in the afternoon, with no food at all after 7:30 p.m. Bernlohr has dropped 45 pounds following his own advice, and says others in his lab who have tried the plan have lost weight as well.

—Mary K. Hoff

Mushrooms and Medicine

What does deciphering the family tree of fungi have to do with cancer? Potentially plenty.

A gourmet food item that prevents cancer? In a world where it sometimes seems that anything that pleases the palate is automatically bad for you, that may sound too good to be true. But David McLaughlin, professor of plant biology and curator of fungi in the James Ford Bell Museum of Natural History, thinks otherwise. Following leads laid by folk wisdom and science, McLaughlin and Joel Slaton, assistant professor in the Medical School, have teamed together to test whether certain edible mushrooms boost the body's ability to fend off cancer.

The unusual collaboration began just over a year ago, when the College of Agricultural, Food, and Environmental Sciences' new Center for Plants and Human Health put out a call for proposals for projects linking plant biologists and medical researchers. McLaughlin suggested a study exploring claims that porcini, a mushroom found throughout much of the northern hemisphere, has anticancer effects. Center staff helped him connect with Slaton, who was already studying the anticancer attributes of another type of mushroom known as reishi.

Slaton agreed to test samples of porcini to see if they affect the growth of cancer cells in culture. McLaughlin, for his part, is working to clarify porcini's phylogeny—to identify relationships among the various branches in the fungus's family tree—to help enhance the usefulness of Slaton's efforts.

A key player in the systematics work is Bryn Dentinger, a graduate student in McLaughlin's lab. Dentinger became a fungus fanatic as a teen when his mother handed him a field guide one day and challenged him to identify the mushrooms growing in his yard. Now he's applying that fascination to help clarify relationships among porcini specimens.

"We talk about porcini as though it's one mushroom, when it's really about 30 species," Dentinger says. By collecting a variety of samples and sequencing key genes in each, he hopes to create a picture of the degree of relationship among them. The information he gathers will help Slaton and McLaughlin design their studies in a way that maximizes the reliability and usefulness of the results. It will also help the researchers figure out which types of porcini are most likely to have anticancer activity.

Dentinger's work is part of a National Science Foundation–funded effort by McLaughlin and mycologists at several other universities to clarify the phylogeny of all known fungi using structural and genetic information. That project, in turn, is part of a larger NSF undertaking called Assembling the Tree of Life, which aims to clarify relationships among all living things. The mycological studies should be helpful in another cooperative effort underway by McLaughlin and Slaton to identify anticancer activity of shiitake mushrooms. It will also provide valuable information for conservation biologists, ecologists, and others seeking to clarify how various fungi fit into the overall picture of life on this planet.

—Mary K. Hoff

TIM RUMMELHOFF

Mushrooms have more than culinary value. David McLaughlin is working with Medical School faculty to determine their potential for preventing cancer.

They have teamed together to test whether certain edible mushrooms boost the body's ability to fend off cancer.

Students Merima Helic, Rachelle Werth, and Rebecca Long work in the lab with Robin Wright, professor of genetics, cell biology, and development. Wright, who is also associate dean for faculty and academic affairs, has convened a faculty task force to review the CBS curriculum.

TIM RUMMELHOFF

The EVOLUTION of Biology Education

Curriculum task force members share ideas on how to teach an ever-changing subject.

Biology has advanced more in the last 20 years than in the previous 200, and the next 20 years promise to be just as fast-paced.

Given this rapid rate of progress, how can educators keep up and prepare their students for jobs that may not even exist yet?

Publishers help by updating textbooks with the latest discoveries. Yet the issue goes deeper than facts: biology itself is evolving. The volume of data generated by genomics and other areas is making biology a more quantitative science. And at the molecular level, boundaries between biology, chemistry, and physics are blurring.

The National Research Council launched a discussion on the subject with the January, 2003 publication of "BIO 2010: Transforming Undergraduate Education for Future Research Biologists," which was sponsored by the National Institutes of Health and Howard Hughes Medical Institute. In essence, "BIO 2010" says that biology education should emphasize math, physics, chemistry, and information sciences and integrate them into biology courses, train students in interdisciplinary groups, and get all students into research labs early on.

Last fall, Robin Wright, associate dean for faculty and academic affairs, convened a faculty task force to review CBS' curriculum. The group reviewed curricula at peer colleges, consulted with leaders in biology education, referred to scholarly analyses, and sought input from CBS students and faculty as well as people from other colleges and departments and University administrators. Agendas and minutes are posted at http://cbs.umn.edu/main/ctf/.

> "We're still adding ingredients to the batter. But I think we have all the ingredients to be truly outstanding—talented students and faculty, committed leadership."
>
> *—Robin Wright*

They agreed that their top priority is to consider creating different general biology courses for different groups of students: CBS undergraduates, students majoring in engineering, agriculture or health sciences, and those in non-science majors, such as liberal arts, education, and business. Currently, most students choose from the same general biology courses.

By the end of the school year, a subgroup drafted a proposal for a new year-long core biology course for CBS students to be offered during the sophomore rather than freshman year, after students have taken calculus, some chemistry, physics, and possibly some biochemistry. Currently, most students take a year of inorganic chemistry and a

TIM RUMMELHOFF

Dave Bernlohr

year of organic chemistry before taking biochemistry. But since biochemistry permeates much of biology, the task force hopes to offer it before the core biology course. The new core course, which would integrate lectures and labs, would require students to use facts to solve problems rather than simply memorize facts.

This year, the task force is continuing its work. While the group as a whole continues to develop the core course for biology majors, sub-groups will consider courses for other science students and for non-science majors.

Following are some perspectives on curriculum reform from task force members and others.

Robin Wright

Associate Dean for Faculty and Academic Affairs, Professor of Genetics, Cell Biology, and Development

Wright says she first saw problems with biology curriculum when surveys at the University of Washington, where she was a faculty member, showed that graduates weren't using what they learned in her classes, either professionally or personally.

It was a wake-up call that led her to question the way she and most of her colleagues teach biology—through lectures, textbooks, and tests, she says. "Like most teachers, I invest an enormous amount of time preparing for classes, and I want it to have a long-term value for students."

After some research, Wright concluded that critical thinking skills rather than facts would better prepare students to use biology. Her teaching changed dramatically, from lectures and tests to asking students to use facts to solve problems.

"It's much more fun, but much harder—for teachers and students," she says. "I knew I didn't have a choice if I wanted to make a difference in their lives. In biology, the facts will change. That's why it's important to teach students to think like scientists, so they can delve into the rich amount of information that's available, evaluate it, and make decisions."

As Wright further explored the issue, she discovered she was not alone. There was a growing wave of concern among biologists nationwide—from federal agencies to small liberal arts colleges—that undergraduate biology education needed reform.

Wright came to CBS in January, 2003 to seize an opportunity to advance that reform and perhaps even create a model curriculum. CBS is one of few schools in the U.S. devoted to biological sciences and the University of Minnesota is one of few large public universities that require all undergraduates to take biology. As associate dean for faculty and academic affairs, Wright is responsible for undergraduate education and the University's General Biology Program.

The process is taking longer than she had hoped, but she believes that her goal of creating an integrated, inquiry-based core curriculum is gaining support among faculty. "The cake is definitely not in the oven yet," Wright says. "We're still adding ingredients to the batter. But I think we have all the ingredients to be truly outstanding – talented students and faculty, committed leadership. I think we can make a multi-layer chocolate torte with raspberry filling, not just an ordinary cake. I hope I'm helping people to realize that."

Dave Bernlohr

Distinguished McKnight University Professor and Head of the Department of Biochemistry, Molecular Biology, and Biophysics

Although Dave Bernlohr helped develop the proposal for a new biology curriculum, he is quick to point out that it's a first draft and suggestions are welcome.

"There are different opinions among faculty about how much change is needed," he says. "Do we really need to overhaul the

"Everyone agrees magic happens when you create interdisciplinary teams."

curriculum or just tweak it? If it's not broken, should we fix it?"

"Everyone agrees magic happens when you create interdisciplinary teams," Bernlohr says. "But there are different schools of thought about how to generate that magic." Some people think the integrated approach advocated in "BIO 2010" may go too far.

Proponents of another approach, called "Ways of Knowing," contend that interdisciplinary research produces results because scientists from different disciplines learn differently and approach problems differently. If you train everyone together, you may risk losing this advantage.

"BIO 2010 launched a national discussion on how to educate the next generation of biologists. We're now looking at integrated education versus ways of knowing. It's really not clear at this point how to reconcile the two," Bernlohr says. He adds that there appears to be consensus on some aspects of the proposal, such as increasing math rigor and getting students involved in research earlier.

In the 1970s, Bernlohr was looking at the CBS curriculum from a student's point of view. He earned a B.S. degree in biochemistry at CBS in 1978. Even then, faculty and students recognized the value of laboratory-based learning. Bernlohr worked in the lab of Finn Wold, who was head of biochemistry.

"The best educational experiences I had occurred in his lab," Bernlohr recalls. "He provided students with outstanding opportunities to learn and think critically. As we think about curriculum reform today, experience-based education is still the key."

Claudia Neuhauser

Professor and Head of the Department of Ecology, Evolution, and Behavior, Director of Graduate Studies for EEB

Claudia Neuhauser took an unusual road to ecology, evolution, and behavior. After earning a Ph.D. in math at Cornell University, she spent a year at Princeton studying ecology. Then she served on faculties of math and biology departments at several universities, including USC, UW Madison, and UC Davis, before settling on the ecology, evolution, and behavior department at CBS.

She says the highest compliment a student can pay her at the end of a term is, 'You know, that really wasn't so bad.'

An applied mathematician, Neuhauser uses "spatial stochastic processes" (an area of probability) to create models that address questions in biodiversity and population genetics. As a mathematician and biologist, she brings an extremely valuable vantage point to CBS. Not surprisingly, she strongly supports integrating math into biology courses. She also thinks biology majors need to take a statistics course in addition to a year of calculus, currently the only math requirement for most CBS majors.

Neuhauser understands that biology students tend to think of math as something you have to swallow because it's good for you. With this in mind, she created a class called "Calculus for Biology and Medicine" and wrote a textbook with the same name to show students how to apply calculus in the life sciences. She says the highest compliment a student can pay her at the end of a term is, 'You know, that really wasn't so bad.'

Since she got her Ph.D. in math in 1990 and began dabbling in biology, Neuhauser has witnessed a sharp increase in the use of quantitative skills in life sciences. All areas of biology, not just genomics and proteomics, are generating streams of numerical data, she says. More and more biologists will use this data to construct models on computers.

"We need to prepare them for the opportunities this will create for them," she says. "A curriculum that lacks quantitative elements doesn't serve the students well. Required math classes aren't enough. We need to show them how to use math in biology.

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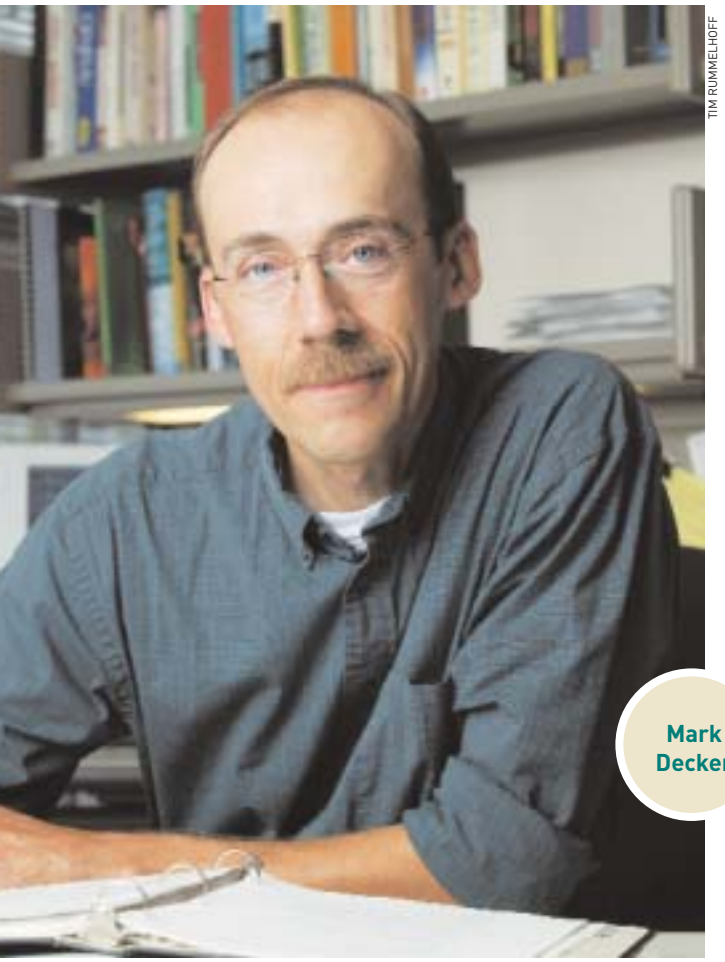
Claudia Neuhauser



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"The proposed class is an experiment, but that's okay," she adds. "If it works, good. If not, we go back to the drawing board, just like research."

Mark Decker

Associate Education Specialist
General Biology Program

Mark Decker is on the front lines of general biology education. As one of three full-time instructors in the University's General Biology Program, he helps teach the subject to approximately 4,000 majors and non-majors every year.

Currently, the General Biology Program offers a one-semester survey course and a two-semester sequence for majors. Both cover the gamut of biology from molecules to ecosystems and include lab sessions. CBS majors are required to take a full year of introductory biology. Those who enter with a qualifying score on the AP biology exam get credit for the one-semester survey course and take another semester of organismal biology. Others take the two-semester sequence. Non-majors may take the one-semester course or the first semester of the year-long course.

Decker supports creating separate classes for majors and non-majors, but hopes that both will continue to cover all of general biology. "All students, even biology majors, need to be exposed to the full spectrum of biology," he says, adding that lectures are the most efficient way to cover lots of material. "Inquiry-based modules are more effective but slower."

Decker also has some concern that "BIO 2010" is geared for research biologists, particularly in biomedical sciences. While this may work for many CBS students, many others will work in environmental sciences, health care, the biotechnology industry, education, and other areas.

And, Decker says that while he sees the wisdom of planning the new biology course for majors for the sophomore year he wonders what students will think. "It may be a grind for freshmen to spend a year on prerequisites," he says. "I don't know if the "Nature of Life" and "Breadth of Biology" courses would be enough to keep their interest."

He also sees an important opportunity to create a very different course for non-majors. It would focus on showing them the role of biology in their lives, from global warming to renewable energy to health care, and preparing them to be informed consumers and citizens.

Ultimately, Decker says, creating separate biology courses for majors and non-majors is best.

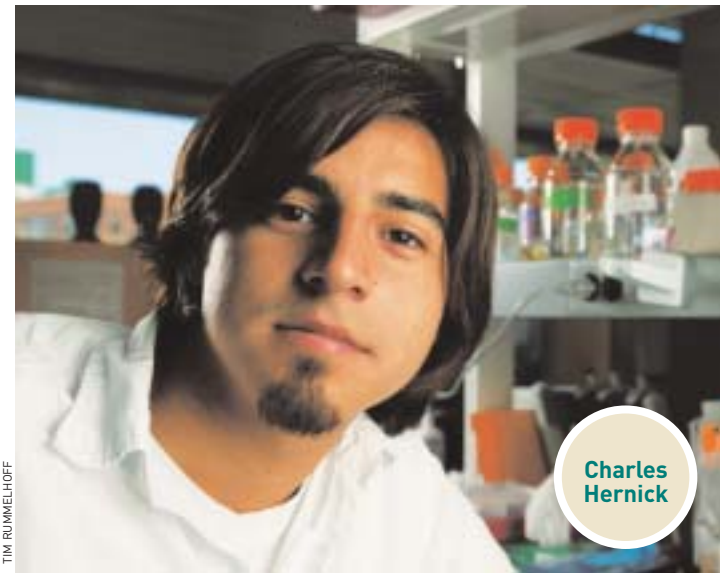
"But it's going to be messy," he says. "It will require lots of time, money, and trade-offs. Tension between the teaching model and breadth of content is inevitable."

Charles Hernick

Recent CBS graduate

A 2003 graduate with a B.S. degree in ecology, evolution, and behavior, Chuck Hernick worked as a junior scientist in a CBS plant genomics research lab in 2003-2004. He recently began a graduate program in international relations and environmental policy at Boston University.

Hernick says he's very happy with the education he got at CBS and thinks most students feel the same way. "I feel that I am better prepared for the future than friends who went to other schools says Hernick, who went to high school



TIM RUMMELHOFF

at the School of Environmental Studies in Apple Valley. But he does think it's important to use the lecture format judiciously, in combination with other ways of teaching biology.

> "It's very motivating to do research yourself. It makes the calculus, physics, and chemistry classes worthwhile."

"Science is a dynamic field. What you get from lectures and textbooks is history. This gives you the language to be a scientist, but science is problem solving. The only way you can really learn how to be a scientist is by doing independent research in a lab. I think most students share this feeling."

Hernick says the instructional labs that accompany lecture classes are helpful, but not nearly as valuable as solving real problems in a real research lab. "When you just duplicate an experiment in an instructional lab, you miss the critical thinking component," he says. "Most of what I know about biology I learned from working in a research lab."

He adds that while students will always need lectures, they're just not the best way to teach students how to be scientists. "It's very motivating to do research yourself," he says. "It makes the calculus, physics, and chemistry classes worthwhile."

Hernick agrees with the plan to offer the core biology course during the sophomore year, after students take calculus and chemistry. He also agrees with Neuhauser that biology students could use a course in statistics designed for them. "It's a practical skill that most biology students will need," he says.

John R. Jungck

CBS alumnus and Mead Chair of Sciences at Beloit College.

Robin Wright first learned about John Jungck while exploring undergraduate biology curriculum at the national level. Jungck is co-founder of BioQUEST, a national consortium dedicated to reforming biology curriculum and a contributor to "BIO 2010."

Then she met him at a Howard Hughes Medical Institute (HHMI) gathering for undergraduate education directors in Maryland and discovered that he was a CBS alumnus.

"When I told him I was moving to the College of Biological Sciences at the University of Minnesota, he told me he was a double alumnus. It made me feel very good about my decision because I knew a place that trained John Jungck simply had to be terrific," Wright says.

Jungck earned a B.S. degree in biochemistry from CBS in 1966 and an M.S. degree in genetics and microbiology in 1968. He became interested in undergraduate biology education at CBS when he shared an office with Donald Dean, a visiting professor who was involved with national science education organizations. Jungck helped Dean write a book on science education and talked to graduate students nationwide about teaching careers. After earning a doctorate at the University of Miami, Florida he joined the faculty of Beloit College in Wisconsin, where he is now Mead Chair of Sciences.

Jungck uses computer simulations, databases, and other tools (as well as toys) to create learning environments that give students a sense of what it's like to be a scientist working in a lab. Through BioQUEST he shares these materials and helps educators create their own. An expert in mathematical molecular evolution, he emphasizes the importance of math as a tool for future biologists.

This spring, Jungck returned to the University of Minnesota to receive an honorary doctorate for his contributions to undergraduate biology education. He says he was deeply honored and very proud to be an ambassador for his alma mater.

"While all the new facilities are remarkable, I was even more impressed with the

TIM RUMMELHOFF

John R. Jungck

leadership, the commitment to undergraduate biology education, and the friendliness of the academic community," he says. "

Jungck is also impressed that CBS encourages undergraduates to do independent research in faculty labs. He supports extending that opportunity to all students and faculty. The University's fundamental challenge, he says, is how to convert large lecture classes into interactive, collaborative, and investigative learning experiences.

"If the University of Minnesota can provide large numbers of students with these opportunities it could become a major national presence in undergraduate biology education. "

—Peggy Rinard

FIELD NOTES

For the Love of Lakes

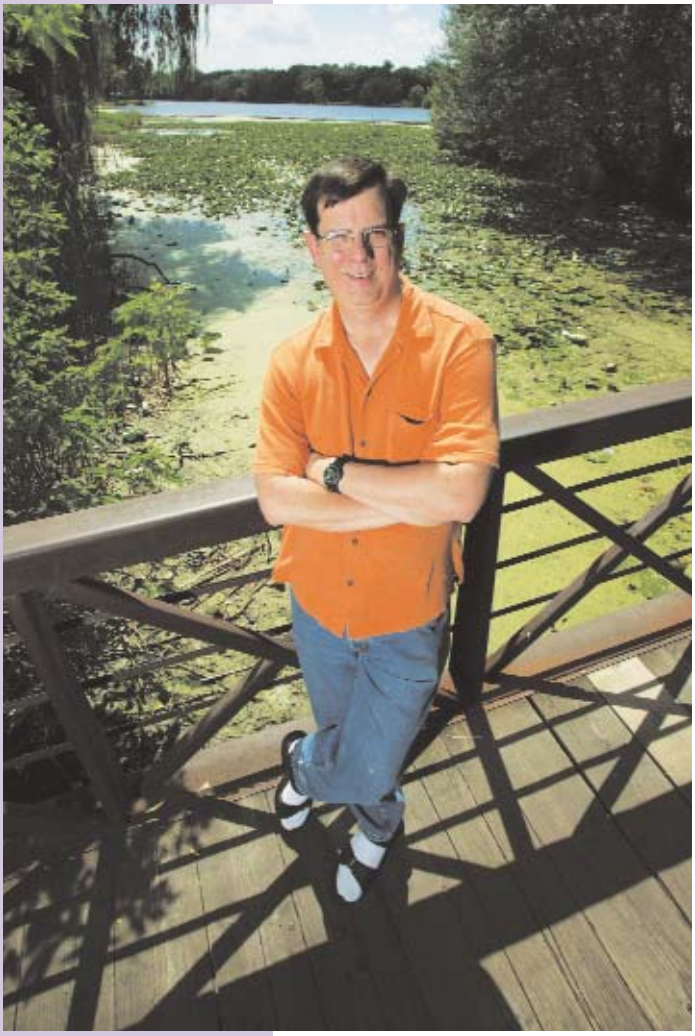
Nitrogen pollution is reaching even the pristine "big lake."

Lake Superior is like the canary in a coal mine, sending a strong signal about the condition of *all* the world's lakes.

—Bob Sterner

It's larger than the Czech Republic. It holds ten percent of the planet's fresh water. And, it's right in our back yard. Yet, says Professor Bob Sterner (Ecology, Evolution, and Behavior), "We know more about the large, remote lakes of Africa and Asia than we do about Lake Superior. It's a scandal that we don't know more about it."

That's one reason much of his current research focuses on Superior, yet what he's learning isn't such good news. Superior is "still fairly pristine by most measures," says Sterner. "Unlike the lower Great Lakes, there are no large urban centers around it and there is virtually no agriculture to provide chemical runoff." So, he was surprised when his research showed that nitrates are building up in the lake at an inexplicably fast rate. The nitrogen level has increased six-fold in the last 100 years, he says.



TIM RUMMELHOFF

Bob Sterner is studying the effects of rising nitrogen levels in Lake Superior.

If not from farms or factories, how is nitrogen reaching the lake? High temperature combustion in factories and cars releases certain forms of nitrogen that waft through the atmosphere and fall into Superior and other bodies of water when it rains or snows. As a result of human activities, the lake now receives an extra four million kilograms, or eight to ten million pounds, of this form of nitrogen per year.

Sterner stresses that Superior's nitrogen levels are still well below the EPA's limits for safe drinking water. Yet, nitrogen is a major cause of oxygen depletion in other bodies of water. The symptoms include blooms of algae (both toxic and non-toxic), declines in the health of fish and shellfish, loss of sea grass beds and coral reefs in oceans, and ecological changes in food webs. Now, with funding from the National Science Foundation, he's studying the "bio-geo-chemistry" that is taking place in Superior as a result of the increasing nitrogen levels.

Sterner became a limnologist because of his wide-ranging scientific interests. "It allows me a huge amount of freedom to study intriguing things, be they chemical, physical or biological, and I may utilize many different approaches to solving questions."

That perspective led to the publication of his book *Ecological Stoichiometry: The Biology of Elements from Molecules to the Biosphere* (Princeton University Press, 2002), coauthored by his long-time colleague from Arizona State University, James Elser. The book, about the balance of chemical elements in ecological interactions, has received high praise in the most prestigious journals such as *Nature* and *Science*. "I believe that this is one of the most important books written on ecology in the last 10 years," said a reviewer in *Ecology*. The book has been adopted as a textbook at some universities and, Sterner jokingly points out that it has reached the status of number 5,000 on Amazon.

Sterner's research and his book offer greater understanding of how human behavior affects the environment and he hopes we'll take some corrective action. "Lake Superior is like the canary in a coal mine, sending a strong signal about the condition of all the world's lakes. It's a treasure and we need to take care of it."

—Terri Peterson Smith

It Doesn't Seem Like Work

Truman Scholar lives life at breakneck speed.

Maya Babu spent a month this summer in India seeing some sights, catching up with relatives, and even garnering advice on staying active from her 97-year-old grandfather. There was but one pitfall to her journey: she couldn't keep busy enough. "I would have liked to have been working on a laptop, working on grant proposals," says Babu. "It was hard for me to just sit and know I couldn't be doing something."

"Doing something" for Babu has meant extensive community work—enough to fill a resumé many times over. But it's that commitment to public service, along with her leadership potential and communication skills, that helped earn her a distinguished honor.

Babu was one of 77 students nationally chosen as 2004 Truman Scholars. Each scholar receives $26,000—$2,000 for the student's senior year and $24,000 for graduate study. That's sure to come in handy for Babu, who has ambitious plans beyond her undergraduate years. The dual-degree (neuroscience and psychology) honors student from Eagan plans to pursue both medical and law degrees in preparation for a career in mental health policy.

Much of Babu's passion, as well as her interest in neuroscience, stems from her long-term involvement with America's Promise, the national organization dedicated to supporting youth. She has been a part of two trips to the juvenile detention center in Red Wing, Minn., to promote peacemaking and conflict resolution. It was there she discovered that juvenile offenders "were very similar to me, and that the difference was that something along our paths made us diverge." She also learned that 50 to 75 percent of juvenile offenders suffer from mental illness and half of those also have a substance abuse problem.

Since there is "so much yet to be discovered about the brain," Babu decided to study neuroscience, and she tacked on psychology "because it has more of the social aspect of mental health and substance abuse." Within the field of mental health policy, she plans to focus on youth in corrections and women's mental health.

Babu is now back in her comfort zone of computers, grant proposals, and breakneck pace. Late in the summer, she was teaching debate at a camp at Yale University and finishing the launch of a new scholarly publication called *The Bridge*. It focuses on "exploring—through case studies, research articles, and reflections—community work, youth work, and community mobilization," she says. And she's on the America's Promise board of directors with the likes of Alma Powell (wife of Colin), Cal Ripken, Jr., Tim Russert, and Jean Case.

How does she keep up? "I don't feel like it's work a lot of the time," Babu says. "I really feel like I'm spoiled. It's fun for me; I get to hang out with some really great people."

—Rick Moore

Editor's note: Maya was recently named one of Glamour Magazine's "Top Ten College Women" of 2004. She and her fellow honorees will be featured in the October, 2004 issue of the magazine.

DOUG KNUTSON

Truman Scholar Maya Babu plans to pursue both medical and law degrees.

"Doing something" for Babu has meant extensive community work—enough to fill a resumé many times over.

ALUMNI PROFILE

Bacchus and Biotech

Making every year a great year for wine.

Steven Lund is helping put a high-tech spin on an ancient industry.

"When you know what's going on inside the plants, you can use that knowledge to improve wine production."

—Steven Lund

Steven Lund (M.S. in plant biology, '90; Ph.D., '95) is no wine snob but what he knows about the genomics and biochemistry of wine grapes would make Robert Mondavi's head spin.

So, while he swirls the wine in his glass, he's not just enjoying the color, aroma, and flavor, but rather, he's thinking about the genetic mechanisms controlling those qualities during berry ripening.

In 2002, Lund joined the University of British Columbia's Wine Research Centre in Vancouver as an assistant professor in the faculty of agricultural sciences. Before his current position, Lund worked as a post-doctoral research fellow at the University of Florida and then as a senior staff scientist with Genesis Research and Development in New Zealand. There aren't a lot of genomics experts in the field of viticulture compared to other crops such as maize and tomato. That's why UBC recruited someone from outside the industry to work at the Wine Research Centre.

Canada may not be the first place that comes to mind when one thinks of wine. However, the country has two major wine-making regions—the Okanagan Valley in British Columbia and the Niagara area in the east—and Canada is fostering this research to assist its growing wine industry.

The Centre recently received a $3.1 million funding award from Genome Canada, an organization that provides financial resources for genomics and proteomics research, for an integrated genomics project in grape berries, on which Lund is project leader for Canada. They will conduct the research in collaboration with researchers at the University of Madrid and other Spanish universities with funding from Genome Spain. So, one of the world's oldest wine producing countries is collaborating with one of the newest.

Vineyards have always been at the mercy of soil conditions, climate, and disease. When Mother Nature works in the growers' favor, however, the result is a "great year" for the wine. Now, genomics may assist in this centuries-old process by minimizing the need for luck and guesswork in the growing process. Says Lund, "Growers do their best, but it's like typing into a computer and not knowing what goes on in the hard drive. They don't know why things turn out the way they do. When you know what's going on inside the plants, you can use that knowledge to improve wine production."

Lund stresses that this work is not aimed at commercializing genetically modified grapevines and wines. "Genomics doesn't mean GMOs," he says. Instead, it allows growers to understand how the plants operate. They may respond in the way they breed the plants and the way they treat the plants in the vineyard.

For example, growers may more selectively grow grapes with more concentrated flavor, or a particular skin thickness and seed size. They may also learn when the genes that initiate ripening and control quality "switch on." At that point they may, for example, withhold water from the plants to intensify flavor before harvesting.

While Lund's work involves extremely complex science, the results will be simple to understand—more consistent "great years" and better wine in our glasses.

—Terri Peterson Smith

Class Notes

John Jungck (M.S. in Genetics and Microbiology, 1968) received the University of Minnesota's honorary doctor of science degree at the College of Biological Sciences Commencement ceremony for the Class of 2004. He is currently Mead Chair of Sciences and Professor of Biology at Beloit College in Wisconsin.

Paul Kalina (B.S. in Biology, 1983) and his family moved back to Minnesota this past spring after living in Arizona.

Mary Jo Lockbaum (B.S. in Biology, 1990) joined Corporate Express at the company's North American headquarters in Broomfield, Colorado. Mary Jo oversees environmental initiatives such as environmentally friendly office product sales, energy conservation, and alternative fuel implementation.

Paul Savereide (Ph. D. in Cell and Developmental Biology and J.D. in 1991) left Cargill, Inc. and is now working for Patterson, Thuente, Skaar and Christensen, P.A. in Minneapolis.

Stacy Sjoberg (B.S. in Microbiology, 1993) moved to Iowa City to begin a fellowship in ophthalmology at the University of Iowa.

Cynthia Mattan (M.S. in Microbial Engineering, 1998) and **Benjamin Stading** (B.S. in Ecology, Evolution, and Behavior, 2003) were among 80 students chosen to begin the doctor of veterinary medicine program at the University of Wisconsin – Madison.

Kelly Pawlenty (B.S. in Biology, 1998) received her doctor of veterinary medicine degree from the University of Minnesota College of Veterinary Medicine in May. Kelly will be practicing small animal medicine, surgery, and dentistry at Apache Animal Hospital in Minneapolis.

Leiha Johnson (B.S. in Genetics and Cell Biology, 1999) is in her third year of teaching science in Tracy, California. Leiha recently received the "Teacher of Character" award for the Sacramento area. She enjoys teaching biology, physics, art, and senior seminar.

Tara Kirby (Ph.D. in Biochemistry, Molecular Biology, and Biophysics, 2002) started her post-doctoral fellowship at the National Institutes of Health in November, 2003. She works with Dr. Susan Buchanan on X-ray crystallography of bacterial outer membrane iron transporters.

Arman H. Nadershahi (M.S. in Biology and J.D., 2002) is practicing patent law in Los Angeles and is the executive director for the Biotech Education Center, Inc. which is a nonprofit organization dedicated to teaching college students about various aspects of biotechnology.

Dan Wepplo (B.S. in Biochemistry, 2004) is a research assistant in the Department of Cell Biology in the Center for Integrative Molecular Biosciences at Scripps Research Institute in La Jolla, California. His move to the west coast has allowed him to take advantage of the warm climate and become a proficient surfer.

Send your news to Emily Johnston, ejohnsto@cbs.umn.edu.

—Emily Johnston

Fall Fest

Join College of Biological Sciences alumni, faculty, staff, students, and friends at *Fall Fest 2004: Connecting U.* On Sunday, October 17 we'll gather on the St. Paul campus for a day filled with fun activities for all ages. This event is free and open to the public. You'll be able to tour the new Cargill building, learn how researchers can generate electricity from mud and how they can turn microbial cells into chemical factories. Attendees may also enjoy the Harvest Bowl Brunch for 50 cents, tour the large and small animal hospitals and the Raptor Center, and enjoy wagon rides around campus. For more information on Fall Fest visit www.umn.edu/fallfest/index.html

CBS Needs You

Volunteers are needed to help support alumni programs that benefit students such as the Mentor Program, Speakers Bureau, and Career Network. Time commitment varies and depends on the program. If you have not volunteered for a CBS program this year, please consider giving some of your time to our current students. You can volunteer online at www.cbs.umn.edu/volunteer or by calling Emily at 612-624-4770.

BSAS Has a New President

Jane Johnson is the new Biological Sciences Alumni Society board president. She received her degree in biology from CBS in 1976 and a degree in nursing from the University of Wisconsin-Madison in 1986. She is now in the Transcultural Nursing and Community Health masters program at Augsburg, which she hopes to complete in May 2005. Johnson currently serves as the care coordinator at HealthPartners Medical Group & Clinics where her primary focus is working with Somali, Oromo, Latino, and Vietnamese patients. She is also a nursing supervisor for First Minnesota Care, Inc., an agency that provides personal care assistance for elderly and disabled people in their homes.

Her vision for the Alumni Society is to identify more opportunities for alumni to connect with undergraduate students, to continue to refine and strengthen the mentor program, to explore alumni participation in the "Nature of Life" course for freshmen, and provide alumni input in relation to the curriculum review that's currently taking place. She urges alumni to contact her at alumni@cbs.umn.edu.

Ames Sheldon Joins CBS

Ames Sheldon joined the College of Biological Sciences in July as director of development. In this role, she will work closely with the U of M Foundation and CBS executive staff to strategically position the college for acquiring major gifts and building prospects for future donor relationships with individuals and corporations. Most recently, she served in a similar role for the Minnesota Historical Society.

The College of Biological Sciences gratefully acknowledges the following donors, who have generously provided support for student scholarships and fellowships, research, and a variety of special initiatives during fiscal year 2004. Every gift makes a difference.

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Neil E. and Gail W. Olszewski
Jennifer Horn Ommen
Sam Onoda
Henry W. Park
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Robert B. Petersen **M**
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Richard E. and Elaine E. Phillips
Gerald W. and Kathleen F. Probst
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Frank W. Putnam
Marco Rabinovitz **M**
Paul E. Ramstad
Charles B. Reif **M**
Robert M. Resnick
Moira L. M. Richards **M**
Peggy J. Rinard
Rivertown Animal Hospital


CBS Year-end Picnic

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Bruce A. and Carol S. Rorem
Scott C. and Kathleen A. Rowe **M**
Doris S. Rubenstein **M**
Mary V. Santelmann and George A. King
Paul D. and Tamara J. Saunders **M**
Paul J. Savaryn **M**
Sidna M. Scheital
Lolly J. Schiffman
Robert D. Schmid
Mark A. Schoenbeck
Mark T. and Jean E. Schroepfer
Fang-Miin Sheen
Robert and Elsie Shoemaker
Gary B. Silberstein **M**
Thomas C. Skalbeck **M**
Jennifer L. St Sauver
John G. Steiert **M**
Shelley A. Steva
Lawrence G. Strate **M**
Melvin P. and Dorothy B. Stulberg
Douglas and Selene Swanson
Jean E. Takekawa
Jeffrey E. Tam
Steven W. and Jeanne M. Tanamachi
Rasa M. Tautvydas
Brent and Amy Theisen **M**
Robert E. Thompson
Mark A. Tomai
Peter M. Torgerson **M**
David J. and Mary Tosteson
Cheng-Hsien Tsai **M**
Mark J. and Ann E. Vellek
Gregory A. Viglianti
Joseph S. Villa **M**
Thomas A. Vogelpohl **M**
Terence C. Wagenknecht **M**
William R. Wallauer
Agnes M. Walz
Kenneth F. Walz
A. Vincent Weber
William P. Wenstrom
Janice A. Westerling
Robert C. Wild
Linda L. Williams
Janice M. and Curtis M. Wilson **M**
Jeanette A. Wiltse
Michael P. Winegar
Winnebago United Fund
Jimmy D. Winter **M**
May C. Yang
Adrienne Zihlman

$0 - $99

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Almaz Abebe
Gregory J. Abler
Craig N. Adelmann **M**
Richard D. Allen **M**
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American Express Foundation
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Dawn C. A. Anderson **M**
Lorraine B. Anderson **M**
Paula J. and Thomas Andrzejewski
Patrick J. Antonelli
Carolyn W. Arndt
Atofina Chemicals Inc. Foundation
Laura M. Auron **M**
Carolyn L. Bagne **M**
Leonard J. Banaszak **M**


Freshmen at Itasca Station

Margaret Johnson Barch
Jill M. and Stephen D. Barry
Barbara Ann Barzen
Leah R. Becicka
Kellie A. Benzow
Cynthia L. Bergsbaken
Paul C. Billings
Kalli-Ann L. Binkowski
Marie Blanchard
David Scott Blehert
Simba L. Blood
Janet S. Boe and Thomson P. Soule
Gennie Bolling
Tara R. Bonde
Steven R. Boyer **M**
Terrie L. and John E. Brandt
Rebecca A. Brenner
Gwenda L. Brewer
Louanne S. Brooks **M**
Kirk M. and Ione V. Brown
Maclean R. Brown Jr. **M**
Lakshmi R. Buddhavarapu
Diane E. Bundlie **M**
Monika R. and Keith D. Burau **M**
Gregory A. Burtman

BOLD Membership in University of Minnesota Presidents Club

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David D. Carlson
Debra L. Carlson
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Bradley E. Carter **M**
Kelly J. Casperson
Winston Cavert and Carol Witte **M**
Shin-Lin Chen
John J. Cierzan
Thomas W. Collins
Henry M. and Claudia B. Colvin
Jean Conklin
Janene M. Connelly **M**
Timothy W. Conner
Lisa A. and Jeffrey J. Coombe
Jane M. Cowan-Kassick

TIM RUMMELHOFF

Commencement, 2004: Claudia Neuhauser, Judd Sheridan, David Biesboer

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Paul E. Cunnien
Robert G. Currie
Kevin W. Custer
Marc B. Daniels
Stephanie Jo Decker and Jeffrey S. Johnson **M**
David and Wendy Devin **M**
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Anthony G. Dodge **M**
James F. and Carole Drake Jr. **M**
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Milta Rabell Dudek
Mark E. and Susan Edstrom **M**
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John A. Eelkema
David J. Elliason
Mary Kay Elnes
Judy A. Enenstein
Natalie R. Enzmann

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Bruce A. and Susan H. Fall
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David L. Flaten
Cynthia K. Folland
Kin C. Fong
Jesse Ford
Carroll G. Forester
Laurie Zempel Forsythe
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Robert A. Fox
Greg D. Fransen **M**
Carl E. Frasch
William R. Fraser
Frank B. Freedman
Molly Freeman
Sherilyn C. Fritz
Preston S. and Renetta J. Gable **M**
Gwendolyn Markus Gallant **M**
Mukul C. and Aparna Ganguli **M**
Sarah C. Gantert **M**
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Karl A. Geidans
Robert J. Geraghty **M**
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Stuart F. Goldstein
Barbara A. Goodspeed
Robert A. Gorkin Jr.
Maryann E. Green
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Amy R. Groszbach **M**
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Jo Ellen M. Gundeck-Fahey
Lisa J. Gunderson **M**
Samuel I. Gunderson
Luca Gunther
Kelly Z. Hadsall **M**
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David A. Hanych **M**
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Richard E. Herman
Donald R. Hickman **M**

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Jennifer J. Hymes
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Johnson and Johnson
Miles F. Johnson
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Pamela K. Kaufman **M**
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M. Dean Knighton
Wolfgang Knoepfler
Arlo S. Knoll **M**
Julie A. Knott
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Steven R. Larson **M**

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Duane and Phyllis LeTourneau **M**
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Stephen and Heather Lines **M**
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John W. Lyrenmann
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Madeleine and Rodney Marquardt
Michael B. Martinez
Harriet G. Mason
John E. Mazuski
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Rachelle P. Menanteau
Christopher D. Mentz
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Joseph B. Miller
James R. Moldenhauer **M**
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Moon High School Honors Biology Classes
J. William Munger
Sarah A. Nakib
Patricia J. Neal
Deborah A. Nelson **M**
Douglas A. Nelson

TIM RUMMELHOFF

M membership in the University of Minnesota Alumni Association/Biological Sciences Alumni Society

Omer Larson, Robert McKinnell, and Thomas Collins, zoology grad students at the U in the late 1950s, enjoyed a reunion this summer. All are now retired -- Larson from University of North Dakota, Grand Forks; McKinnell from CBS; and Collins from Moorehead State. McKinnell salvaged the sign when Zoology became part of Ecology, Evolution, and Behavior in 1976.

Timothy R. Nelson **M**
Jennifer K. Nevison **M**
Kevin R. Nickelson
Kevin J. Niemi **M**
Mazal Nissim-Gralnek
Rodney C. and Carol A. Nord
Richard H. Northrup
Beth Nelson Null **M**
Robert M. and Carolyn J. O'Brien **M**
Kirk M. and Alice S. Odden **M**
Amy Oganeku
Ann M. Olson
Dawn M. Olson
Douglas J. and Mary T. Olson **M**
Erin C. Olson
Kristine D. Olson **M**
Lance D. and Trudy L. Olson **M**
Leslie K. Olufson
Thomas G. Osimitz
Christine and David Ostendorf
Gretchen L. Oswald **M**
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Jay R. Parlet
Jean G. Parodi
Thomas M. Pattison
G. R. Paulu and J. Quast Paulu
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Karen S. Pawlowski
William R. Peglow **M**
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Dale W. Perman
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Lisa B. Rachwal
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Kent M. Reed **M**
Theresa R. Reik
John J. Reiners Jr.
Joshua R. Rhein
Timothy I. Richardson
William P. and Charlotte M. Ridley
Gerald Rilling
Donna S. Robbins
Timothy H. Robinson
Michael B. Robinson
Robert D. and Lori G. Roettger
Louise A. Rollins-Smith
Paul Rooprai
H. Gerritt Rosenthal
Kyle M. Ruesch **M**
Leonard L. Saari
Chris and Brittany J. Sabol **M**
Michael Salvati
Marcy C. Salzer
Thien N. Sam
Thomas E. Sauber **M**
Scott Saunders
Michael J. Scanlan
Meegan M. Schaeffer
Mika A. Scharber
Susan V. Schauer
Alison E. Schini
John W. Schmalz
Christine C. Schoenbauer
Christopher L. and Janet L. Schottel
Richard F. Schroeder
Martin W. and Rhoda J. Schularick
Steven J. Schuur **M**
Marcia K. Schuyler **M**
Lisa M. Schweizer **M**
Tina Seeland **M**
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Michelle I. and Dale Setterholm
Lisa L. Shafer
Michael J. and Debra J. Shane **M**
Robert A. Sharrock
Bianca Williamson Shaw and Joe Shaw
Laura A. Sikkink **M**
Gregg D. Simonson
Sara M. Simpson
Satinder K. Singh
Lesli R. Smith
Lynda K. Smith
Val and Marilyn Smith **M**
Arnold W. Sodergren
James V. Soldin II **M**
Lindsay M. Sovil
Sandra L. Spier
St. Jude Medical Inc.
Jan E. Steier
Kenneth L. Stein **M**
Bret M. Steiner **M**
Cynthia A. Steinke
Linda Stenzel
Shelley A. Steva **M**
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Jeffrey M. Stewart
May T. Stewart
Michael K. Stock
Jay A. Stoerker
Steven M. Stone
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John T. Stout
Gary A. Strand
Jami R. Stromberg
Constance S. Stueland
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Robert S. Veit **M**
Scott Q. and Brigitte Vidas **M**
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Mary F. and C. Stewart Walker
Patricia M. Walsh and Dale Hoover
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Jane M. Wattrus
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Eileen M. Welna **M**
Jane I. Wenger **M**
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C. Robert Wikel
Brian W. Woo
Sara Woodard
Jessica Jane Wormley **M**
Daniel S. Wovcha
Elizabeth A. Wroblewski
Judith L. Wulff
Brent L. Wyrick
Zhaohui Xu
Jerry F. Zelesnikar
Jill L. Zullo
Thomas H. Zytkovicz

CBS Year-end Picnic, Senior Class photo

BOLD Membership in University of Minnesota Presidents Club

CBS Calendar

Annual Awards and Recognition Dinner
October 7, 2004
5:30 - 8:30 p.m.
McNamara Alumni Center, Minneapolis

Fall Fest
October 17, 2004
11:00 – 5:00
St. Paul Campus
www.umn.edu/fallfest/index.html

UMAA Homecoming Breakfast and Parade
October 23, 2004
Breakfast: 7:30-10 a.m.
Parade: 9:30 a.m.
Sports Pavilion (adjacent to Williams Arena), University Avenue
Food tickets will be sold at the door: $6 for UMAA members; $8 for non-members; $3 for kids, ages 3-10.

The Gophers will play Illinois later on Saturday at the Metrodome, time TBD. Go to http://www.alumni.umn.edu/ for Homecoming details.

Vote for the U!
November 2, 2004
Your local polling place

For information about any of these events, contact: Emily Johnston, (612) 624-4770 or ejohnsto@cbs.umn.edu

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To make a gift, use the envelope inside BIO, go to www.giving.umn.edu, or contact Ames Sheldon, CBS Development Director, at 612-624-9460 or sheldo57@umn.edu.

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UNIVERSITY OF MINNESOTA

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