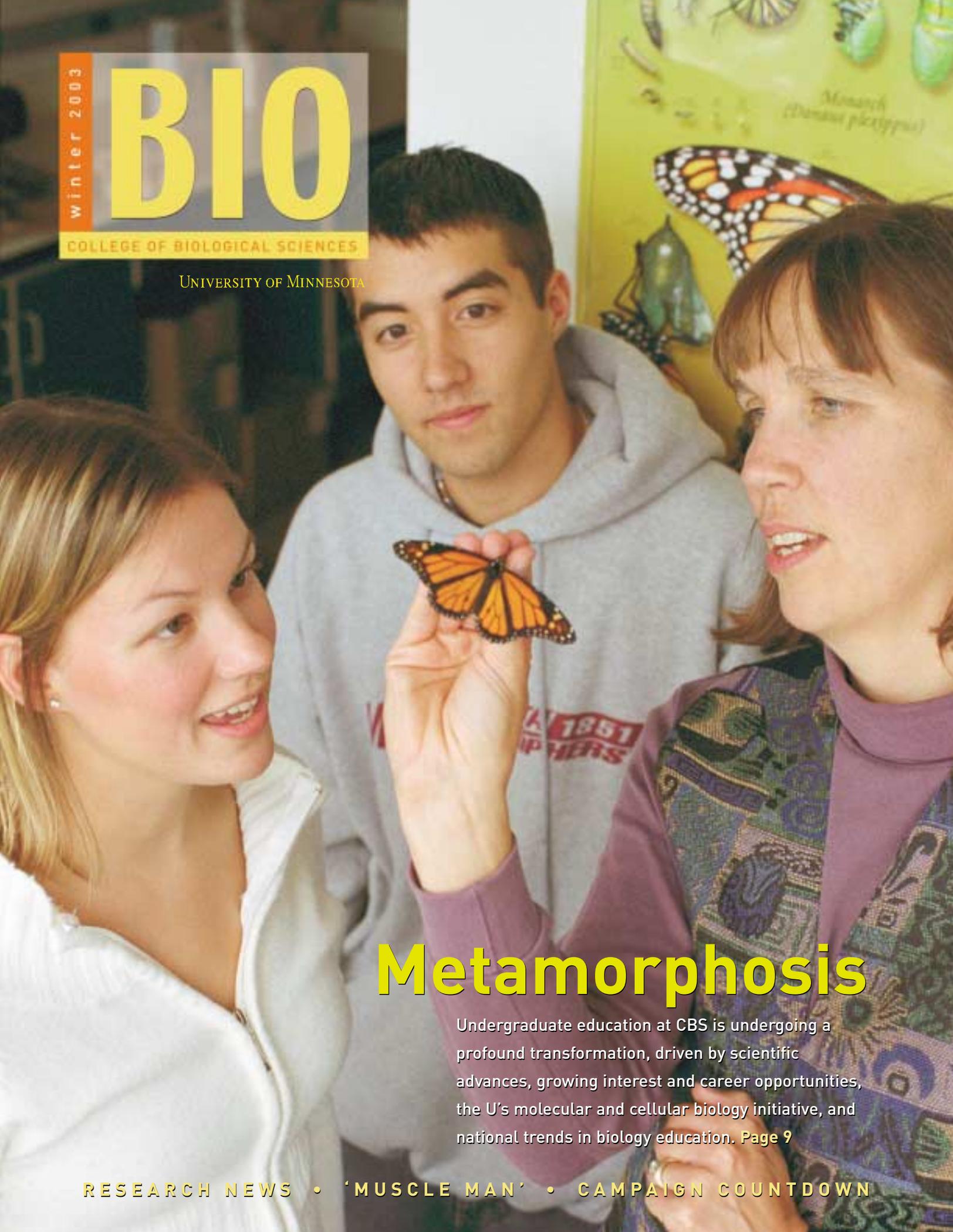


winter 2003

# BIO

COLLEGE OF BIOLOGICAL SCIENCES

UNIVERSITY OF MINNESOTA



## Metamorphosis

Undergraduate education at CBS is undergoing a profound transformation, driven by scientific advances, growing interest and career opportunities, the U's molecular and cellular biology initiative, and national trends in biology education. Page 9

RESEARCH NEWS • 'MUSCLE MAN' • CAMPAIGN COUNTDOWN

## FROM THE DEAN



Robert Elde, dean

### On the front line of science education

As part of a large, public research university, the College of Biological Sciences' primary role is to advance the boundaries of knowledge and train the next generation of scientists. But there's another—perhaps equally important—role that supports that goal: training biology teachers for Minnesota's and the nation's secondary schools.

These teachers are vital to our success because they inspire and prepare middle and high school students to pursue science careers. The fact that our students, most of whom are from Minnesota schools, con-

tinue to be more qualified every year is a tribute to these dedicated individuals on the front line of science education.

Aspiring to be a science teacher at a secondary school may not seem like a lofty goal. But many alumni have found teaching a very stimulating and rewarding career. And as the amount of scientific knowledge continues to expand, it becomes more challenging as well.

Kalli Binkowski (B.S. '95), profiled on page 15, had planned to pursue a career in genetics research. But after teaching an undergraduate class while working on her Ph.D., she became hooked on teaching. Now a teacher at the Spring Lake Park high school she once attended, she is very satisfied with her decision. "Having the chance to light a spark in a young person's mind is very gratifying," she says.

We want teachers like Kalli to know how much we appreciate their efforts. This fall we asked our freshmen to nominate high school science teachers who played a key role in their decision to major in biology. And at our annual Recognition and Appreciation Dinner, we honored those who earned the most praise.

Earlier this year, CBS received a \$1.7 million grant from the Howard Hughes Medical Institute to provide training for science teachers. I'm proud of this grant because it enables us to do more for teachers like Kalli and for young people who may one day cross our threshold. Even better, our own Itasca Biological Station will be the primary campus. The site was chosen because it is central to schools in greater Minnesota, where there is a shortage of science teachers.

The program adds an important new dimension to CBS undergraduate education. As the metamorphosis of our undergraduate education continues, we will add other courses that allow students to learn by discovery and experience. This reflects an emerging national trend to move biology education from a fact-based discipline to one that focuses on concepts and learning by doing.

I hope you enjoy this issue of *BIO*. As always, your comments and suggestions are welcome.

Robert Elde, Dean  
College of Biological Sciences  
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**On the Cover** Undergraduates Joline Lushine and Erik Lam work with researcher Karen Oberhauser in her laboratory. Providing undergraduates with more research opportunities like this one is a key goal of the transformation in progress at CBS. See story page 9. Oberhauser, who is nationally known for her monarch research and outreach programs, is profiled in a separate story on page 6. *Photo by Richard Anderson*

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'Muscle man' Dave Thomas

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Science teacher Kalli Binkowski

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## Fewer bugs, more money

George Weiblen, plant biology, helped prove there are roughly 25 million fewer bug species on the earth than previously believed. His findings, published in *Nature*, were based on associations between insects and plant families. Now he has won a \$625,000 Packard Fellowship to continue studying biodiversity in tropical rainforests.

Weiblen gathers ecological and genetic data to study the evolution of species in tropical rainforests, using fig trees and insects that interact with them as a model system for testing theories of co-evolution. He combines natural history with molecular techniques in his research.

The highly competitive Packard Fellowship allows the nation's most promising young scientists and engineers to pursue research with few restrictions. Claudia Schmidt-Dannert, BMBB, received a Packard Fellowship last year. ■



George Weiblen studies biodiversity in a Costa Rican rainforest.

## NSF taps CBS professor to chart fungal family tree

We've called them scum, lifesavers, and even hors d'oeuvres, but only since 1995 has anyone called them relatives. That



DAVID MCLAUGHLIN

*Hygrocybe conica*, photographed by David McLaughlin at Cedar Creek. See the UM fungi collection at [www.fungi.umn.edu](http://www.fungi.umn.edu).

was the year scientists determined that mushrooms, yeast, mildews, and other fungi are more closely related to animals than to plants. Now, the National Science Foundation has awarded \$2.65 million to the University of Minnesota —

along with Duke, Oregon State, and Clark universities — to sort out relationships among this diverse group of organisms. The four-year grant is part of NSF's Assembling the Tree of Life program. David McLaughlin, professor of plant biology, is principal investigator for the university's \$510,000 share of the grant.

Several widely used drugs, including penicillin, are made from fungi. The study could point researchers to species of fungi that may produce new drugs or other useful products. Fungi perform a very useful role in the environment, helping to form soil, recycle leaves and wood, and enable trees to absorb nutrients more efficiently. McLaughlin says the evolutionary line leading to fungi split from lines leading to plants and animals more than 1.5 billion years ago. Only 5-10 percent of an estimated 1.5 million species are known. ■

## Cynthia Weinig wins NSF Young Investigator Award

Cynthia Weinig, new faculty member in the Department of Plant Biology, has received a Young Investigator Award from the National Science Foundation's Plant Genomics Research Project (PGRP) for \$1.7 million over five years.

Weinig uses *Arabidopsis* to study the genetic basis of adaptation. She and collaborator Julin Maloof at UC Davis, who will share the award, are interested in understanding how selection acts on crowding responses in agricultural settings. More specifically, plants can modify their phenotype (for instance shape or form) in response to crowding and the onset of competition for sunlight. There is now strong evidence that flexible developmental responses to crowding, such as stem elongation, confer a fitness advantage to individual plants in natural



JUSTIN PIEKOWSKI

Cynthia Weinig with *Arabidopsis* seedlings in growth chamber.

settings. However, little is known about the genetic basis of adaptive evolutionary responses. Characterizing the loci targeted by natural and artificial selection is a primary aim of their research.

Weinig, who arrived at CBS this fall, earned a Ph.D. in evolutionary biology from Indiana University and served a post-doctoral fellowship at Brown University. ■

## Dark manes attract female lions and the media

Male lions with long, dark manes suffer more from the African heat, but when rival males threaten or females are checking out potential suitors, they are the coolest cats in the jungle, according to a study by Peyton

West, graduate student in the Department of Ecology, Evolution, and Behavior, and adviser Craig Packer, Distinguished McKnight University Professor.

When West and Packer examined

the data on several dozen males that had been sedated and had blood samples drawn, they found a strong correlation between blood testosterone levels and mane color.

“Dark color tends to be found in high-testosterone males. So it isn’t surprising that females would prefer darker manes and males would be intimidated by

males with darker manes,” West said. Packer added that “the lion’s mane functions much like the peacock’s tail; it’s a visual cue indicating a male’s health and fitness.”



West’s study was covered by media outlets around the world, including the *Star Tribune*, *New York Times*, *Washington Post*, *San Francisco Chronicle*, *London Telegraph*, *Independent Online* (South Africa), *National Geographic*, MPR, NPR, The BBC, WPVI (Philadelphia), WFAA (Dallas), BAYN(Tampa), KSWB (San Diego), and CNN. ■

## Arabidopsis 2010

John Ward, plant biology, and collaborators at the University of Maryland and Baylor College of Medicine, will receive \$2.8 million over four years for their role in Arabidopsis 2010. The goal of the effort, funded by the National Science Foundation, is to learn the function of all *Arabidopsis* genes by the year 2010.

*Arabidopsis* is the primary model organism used in plant genomics. The research will provide insights into how to make crop plants more productive and more resistant to pests and climate variations.

The group’s project, “*Arabidopsis* 2010: Discovering transporters for essential minerals and toxic ions in plants,” will focus on understanding the functions of 57 genes that are homologous to cation antiporters—membrane proteins that export cations such as sodium and calcium from plant cells. Several of the genes are known to have important roles in resistance to salt stress, which is an important and growing concern for agriculture, and for cellular calcium homeostasis.

Ward is also working on a bioinformatics project to characterize all *Arabidopsis* membrane proteins on a genome-wide scale. ■

## Microbial biochemistry and biodegradation

Larry Wackett, head of BMBB’s division of microbial biochemistry, recently received two grants. The first, \$224,000 from the Department of Energy, will enable him to identify microbial genes with novel biochemical reactions. While genomes of several hundred microorganisms have been sequenced, the function of many genes remains unknown.

The second grant, \$200,000 from the U.S. Department of Agriculture, supports research on the bacterial breakdown of s-triazine compounds such as the herbicide

atrazine. Previous research has revealed the metabolic pathways and the evolutionary steps that allow bacteria to degrade atrazine in soil and water. Wackett and his colleagues will also look at the regulation of the atrazine genes in *Pseudomonas* ADP, a bacterium they isolated from an abandoned agricultural chemical dealership in Little Falls, Minnesota.

Wackett, who is also a member of the Biotechnology Institute, has published 10 papers so far this year. Researchers in his group, which focuses on biodegradation

and biocatalysis, study underlying mechanisms by which bacteria transform chemicals in their environment. This work helps scientists understand how nature recycles compounds and how microbial metabolism can be harnessed to generate commercial chemicals via environmentally-friendly processes. ■

## CBS donors meet scholarship and fellowship recipients

Donors who contribute to CBS scholarships and fellowships met the grateful recipients of their generosity at the annual CBS Recognition and Appreciation Dinner, held October 10 in the McNamara Alumni Center. Dean Elde spoke on investing in the next generation and introduced this year's scholarship and fellowship

recipients. Elde and Professor Pete Snustad, plant biology, presented an Outstanding Achievement Award to Julie Kiriwara (B.S. '81 and Ph.D. '88 Biochemistry). Kiriwara, founder of ATG laboratories and president of MNBIO, received the award for scientific contributions and her efforts to promote Minnesota's biotech industry. If you would like information on establishing or contributing to a CBS scholarship or fellowship fund, or making a gift to the College, contact Janene Connelly at [connelly@biosci.cbs.umn.edu](mailto:connelly@biosci.cbs.umn.edu). ■

Julie Kiriwara received the Outstanding Achievement Award from Dean Elde and Professor Snustad.

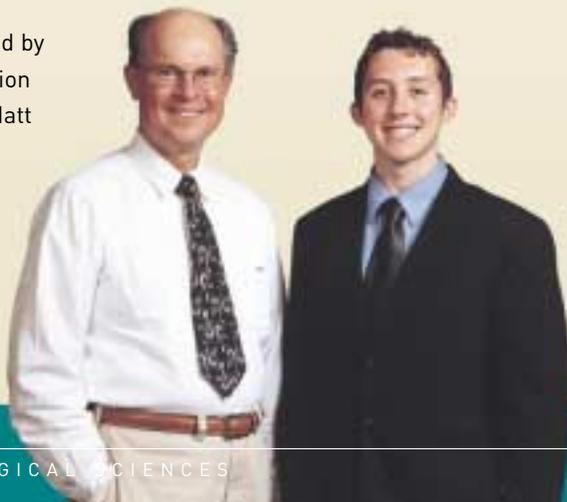


## High school science teachers honored

John Stangl, who teaches biology at North St. Paul High School, was among five teachers honored at the Recognition and Appreciation Dinner. Honorees were selected from among more than 100 high school science teachers nominated by freshmen for their inspiration and guidance. Freshman Matt Kuehl said Stangl taught students that "Biology is not just a class, but is part of us, and emphasized the

John Stangl, biology teacher at North St. Paul High School, with student Matt Kuehl.

importance and brilliance of nature..." and that he "put every ounce of his energy and soul into his AP biology class." Stangl also helped Kuehl get a full scholarship to the U. ■



## Cargill Building for Microbial and Plant Genomics



Construction of the Cargill Building for Microbial and Plant Genomics is nearing completion. The building, funded by a \$10 million gift from Cargill, Inc. and a matching grant from the state, will be home to more than 22 principal investigators and 175 supporting researchers. Research will focus on using microorganisms to clean up the environment; making agricultural plants more resistant to disease, pests, and climate; and developing new drugs for cancer and other life-threatening diseases. An opening celebration is planned for spring, 2003.

## New faculty boost research enterprise

Hiring new faculty with the combined resources of the Molecular and Cellular Biology Initiative and reallocation has had a transforming impact on the research enterprise, as evidenced by a dramatic surge in new grants awarded to faculty in the core departments. In the Department of Plant Biology, 10 new faculty hired in the past two years have obtained 12 grants (from NSF, USDA, DOE, NIH, and the Packard Foundation). In the Department of Biochemistry, Molecular Biology, and Biophysics (BMBB), eight faculty hired in the past three years have been awarded 11 multi-year national grants (AHA, NIH, NSF). And in the Department of Genetics, Cell Biology, and Development, nine new faculty have brought in 11 grants from national and local sources. ■

## U Legislative Request

The University is asking the 2003 Minnesota Legislature for \$96 million for the 2004-05 Biennium. The budget breaks down into four categories:

- \$26 million for implementing academic directions
- \$88 million for supporting talented faculty and staff
- \$20 million for helping students realize educational goals
- \$58 million to build and maintain academic infrastructure

The U will contribute \$96 million through reallocation and tuition increases. Unlike in previous years, no programs or projects are specified because lawmakers will need to address the budget deficit before awarding new funds. ■

## 'U' third among research universities

For the second year in a row, the University of Minnesota – Twin Cities was ranked third among public research universities in the nation. The study, conducted by the University of Florida, is based on quantitative measures of performance rather than opinion and reputation, which are used in other well-known rankings. Only the University of Michigan and the University of California, Berkeley scored higher than the U. The report can be viewed at <http://thecenter.ufl.edu>. ■

## CBS at the State Fair



A colorful new display and hands-on activities attracted lots of visitors to CBS' booth at the State Fair this summer. Activities included a biology computer quiz, isolating salmon DNA, learning about the role of fermentation in biocatalysis, and looking at a variety of microbes through a microscope.

## PEOPLE

**Victor Bloomfield**, BMBB and Dean of the Graduate School, established a graduate fellowship in molecular biophysics with a \$50,000 inheritance from his mother that was matched by the 21st Century Graduate Fellowship Endowment. Ben Mueller, a student in the M.D./Ph.D. program, is the first recipient of the fellowship. The two were featured on the cover of the fall issue of *Legacy*, the University of Minnesota Foundation's magazine.

**Irv Liener**, professor emeritus of biochemistry, was awarded the 2002 Sterling B. Hendricks lectureship.

The Hendricks lectureship recognizes senior scientists in industry, university, or government positions who have made important contributions to the chemical science of agriculture. Liener received a B.S. degree in food technology from Massachusetts Institute of Technology in 1941 and a Ph.D. in biochemistry and nutrition from the University of Southern California in 1949. In 1949 he joined the Department of Biochemistry at the U of M, where he taught and did research on soybeans until his retirement in 1985.

**Henrietta Miller**, retired BMBB administrator, with a newly installed plaque in the Henrietta Miller Garden, located in front of Gortner Laboratories. The garden was dedicated to Henrietta on her retirement in 1983, after more than 40 years of dedicated service to the department. Henrietta and her husband, Phil, have remained very involved with the CBS community.



**Herbert Jonas**, professor emeritus of botany, passed away on September 13 at the age of 87. After emigrating from Germany in 1934, Jonas did research for the U.S. government and the University of Virginia before becoming a professor of pharmacognosy at the University of Minnesota. In 1968, he moved to the Department of Botany, where he remained until 1985. His interests included mineral nutrition and chemotaxonomy.

The Lake Itasca Biological Station received \$50,000 from the estate of **Thomas Morley**. Morley received his bachelor's, master's, and doctoral degrees in botany from the University of California, Berkeley during the 1940s. He joined the faculty of the University of Minnesota in 1949. Morley was widely recognized as an expert on Minnesota native flora and a charter member of the Nature Conservancy. He was also very active in the Minnesota Native Plant society.



# Monarch project brings citizen scientists out of their cocoons



Karen Oberhauser is well known in classrooms and fields throughout Minnesota and the U.S. for her outreach programs on monarch butterflies. She was recently featured in the *New York Times*.

“They’re learning about ecological interactions occurring in ecosystems close to their homes. They’re really seeing how complex and wonderful nature is.”

—Karen Oberhauser

**C**indy Petersen knows the perfect way to spend a summer day: walking a transect through a big open field, counting milkweed plants, and searching their surfaces for the pinhole-sized eggs and tiger-striped caterpillars that announce the presence of monarch butterflies.

Petersen, a Chanhassen middle school teacher, is one of hundreds of volunteers across North America who gather data for the Monarch Larva Monitoring

Project (MLMP), a citizen science effort directed by ecology, evolution, and behavior assistant professor Karen Oberhauser. The project is providing scientists with valuable insights into the ecology of what is likely America’s most charismatic—and enigmatic—butterfly.

Monarchs are unusual among insects in that, rather than going dormant in winter, they go south. Western monarchs migrate to California. Those east of the Rockies fly a thousand miles or more to mountainside forests in central Mexico, where they huddle together, covering the trees like orange, antennae shingles. In spring they head north again, taking two generations to reach the furthest part of their range.

The MLMP, begun by Oberhauser and EEB grad student Michelle Prysby in 1997, is an attempt to improve understanding of the migration and corresponding population fluctuations. Volunteers select sites where milkweed, monarch caterpillars’ sole food source, abounds. They scout their sites weekly during breeding season, recording the number of eggs and larvae of various stages they find on the milkweed plants. They send their tallies to Oberhauser’s lab, where they are combined and analyzed.

This past year scientists were particularly interested in the MLMP observers’ reports. A freak frost had killed millions of mon-

archs in the Mexican mountains, and everyone wondered what the impact would be on summer populations.

“Monarch numbers were lower than average, but not the lowest we’ve seen during the six years of the project,” Oberhauser says. “Monarch population dynamics are driven by events that occur during the winter, the spring and fall migrations, and the summer breeding period. The MLMP will help to understand how all of these interact.”

The MLMP also benefits participants by giving them a taste of the scientific method and a chance to observe the intricacies of nature. “They’re learning about ecological interactions occurring in ecosystems close to their homes,” Oberhauser says. “They’re really seeing how complex and wonderful nature is.”

The MLMP is an offshoot of an educational program called Monarchs in the Classroom that Oberhauser initiated more than a decade ago as a way to teach children about insect biology and scientific methodology.

“Monarchs are a perfect organism to use in classrooms,” Oberhauser says. “They’re easy to rear in captivity, and they’re not scary.”

For more information on MLMP, check out [www.mlmp.org](http://www.mlmp.org).

—Mary K. Hoff

# 'Muscle man' Dave Thomas pumps iron in the lab

**A**n ex-wrestler who tried out for the 1972 Olympic team, David Thomas has built a career as a different type of muscle man. He has long been fascinated by the motions of large proteins found in assemblies, and when he turned to muscle proteins, he was hooked. Now a professor of biochemistry, molecular biology, and biophysics, Thomas is unlocking secrets of muscle proteins that hold the keys to muscular dystrophy, some forms of heart disease, and other maladies.

Getting hooked is more than a metaphor when the subject is myosin, the muscle protein that does most of the work of contraction. When the signal to contract arrives in a muscle cell, myosin molecules hook onto strands of a neighboring protein called actin. They pull the whole assembly tighter, then let go, grab actin again, and tug in a repeated ratcheting motion. Individual cycles last less than a thousandth of a second, yet are too slow for the standard techniques of magnetic resonance and laser spectroscopy to catch.

"This is kind of a blind spot for most physical techniques, but it seems to be the most important time frame for all kinds of molecular machines," Thomas says. Such machines include the tiny motors that move chemicals across membranes, transport materials within cells, and power the whip-like flagellum that propels a sperm cell.

More than two decades ago, Thomas modified a magnetic reso-



RICHARD ANDERSON

nance technique to "tag" myosin so its motions could be followed. In 1982 he overturned then-current theory when he found that during contraction, myosin spends only 20 percent of its time doing actual work. The "recovery stroke"—when myosin is in between tugs—eats up 80 percent of the time. Also, it has long been known that energy for muscle contraction usually comes from the splitting of a small, energy-rich molecule called ATP. Thomas discovered that the energy released from ATP is used to pry myosin away from actin. That is, ATP drives the recovery stroke, not the actual work.

Sharing the excitement of discovery, Thomas has welcomed a long list of undergraduates into his lab. Among the first was Christine Wendt, a CBS student who went on to Medical School at the University and is now a pulmonary specialist in the department of medicine. A current CBS student,

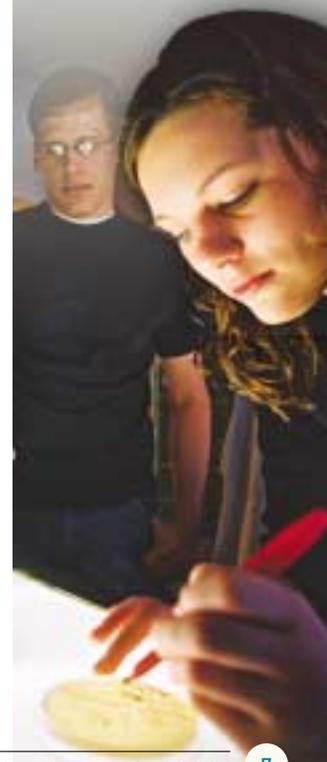
Erika Helgerson, has received a scholarship from the Lillehei Foundation and is working with Osha Roopnorine, an assistant professor in Thomas' research group, on mutations in myosin that cause thickening of heart muscle (cardiomyopathy), the leading cause of sudden death in young athletes.

Lately, Thomas and colleague LaDora Thompson of the Medical School have found a molecular explanation for muscle aging: Myosin changes its structure so that during contraction, it spends even less time doing actual work while consuming the same amount of energy as younger muscle.

Still active physically, Thomas maintains several more muscle-related projects. Thanks to him, CBS is doing some heavy lifting in the fight against debilitating conditions that strike people of all ages.

—*Deane Morrison*

Sharing the excitement of discovery, Thomas has welcomed a long list of undergraduates into his lab.





# ME

Undergraduate Jolene Lushine assists with research in the laboratory of Karen Oberhauser, who studies monarch butterflies. Creating more research opportunities for undergraduates is a key part of the transformation.

# TAMORPHOSIS

metamorphosis *ˌmɛtəˈmɔːrˌfəʊsɪs*, *IL*, *fr.* *fr.* *metamorphosis*, *fr.* *metamorphoûn* to transform, *fr.* *meta-* + *morpho-* form] 1. a striking alteration in appearance, character, or circumstances.



**Undergraduate education at CBS is undergoing a profound transformation, driven by scientific advances, growing interest and career opportunities, the U's molecular and cellular biology initiative, and national trends in biology education.**

If you were an undergraduate student at CBS more than a few years ago, you might be surprised to drop in on a class today and see how much has changed.

Since you've been gone, several forces have converged to reshape the undergraduate experience: the U's reorganization of the biological sciences and molecular and cellular biology initiative, the continuing explosion of knowledge in biology, a growing interest in biology and career opportunities for biologists, and national trends in biology education.

So, if you did come back to the U today, you might be sitting in a classroom in a new \$80 million building, learning something that hadn't been discovered when you were an undergrad, getting more opportunities for hands-on research than you had before, working with a new crop of talented young faculty, living in a special residence hall for biology students, and feeling pretty optimistic about your future.

But the metamorphosis isn't complete. Robin Wright, new associate dean for faculty and academic affairs, who arrived just after the first of the year, is planning a College-wide effort to take CBS to the next level. Her goal will be to capitalize on all the positive changes that are taking place and make CBS one of the top places in the U.S. to get an undergraduate biology degree.

## How it all began

Change had been brewing at CBS for a long time, but in retrospect, two events mark the beginning of a new era: the admission of freshmen to the college in 1997 and the reorganization of the biological sciences in 1998.

Freshman admission was an important step because CBS and students alike can accomplish a lot more when they are committed to a four-year relationship. Students have more course and research opportunities, a better chance to get to know each other and faculty, the feeling of

being part of a community, and more academic and career guidance than they did in the past.

The biological sciences reorganization unified similar basic sciences departments that had evolved separately on the Minneapolis and St. Paul campuses to support health sciences and agriculture. The result was fewer but much stronger departments poised to seize opportunities generated by the revolution in the biological sciences. The molecular and cellular biology initiative took the reorganization a step further, by allocating state and University funds to hire 41 new faculty and build a home – the \$80 million Molecular and Cellular Biology Building – for three of the consolidated departments.

Each of the new departments took over responsibility for education, which focused and strengthened undergraduate programs and increased the number of faculty who taught undergraduate classes. Faculty in the Medical School, who had previously taught only medical students,



SARAH HUHTA

This summer CBS piloted a new program for 30 freshmen at Itasca Biological Station. The purpose was to help students get acquainted with each other, faculty, and the curriculum before starting school. The program will be extended to all freshmen next year.

## AWARD WINNERS

CBS faculty who have been recognized by the University for distinguished teaching since 1990.\*

John Anderson	Douglas Pratt
Franklin Barnwell	Palmer Rogers
John Beatty	Murray Rosenberg
David Bernlohr	Leslie Schiff
David Biesboer	Janet Schottel
Iris Charvat	D. Peter Snustad
William Cunningham	Thomas Soulen
Margaret Davis	Anthony Starfield
Richard Hanson	David Thomas
Alan Hooper	Susan Wick
Norman Kerr	Amy Winkel
Willard Koukkari	Clare Woodward
P.T. Magee	Val Woodward
Robert McKinnell	Robert Zink
Richard Phillips	

\* For a complete list of teaching award winners, visit [http://www.cbs.umn.edu/1ab\\_cbs/1eii\\_teachwinners.html](http://www.cbs.umn.edu/1ab_cbs/1eii_teachwinners.html)

began teaching courses for undergraduates.

"There's a deeper understanding of the importance of quality undergraduate education now than there was before the reorganization, says Robert Elde, dean of the College of Biological Sciences, who, along with Medical School Dean Alfred Michael, spearheaded the effort.

When he became dean seven years ago, Elde adopted the philosophy that if you put students first, everything else will fall into place almost naturally. The approach is espoused by Stanford President Donald Kennedy in his book *Academic Duty*. Over the past few years CBS has added numerous programs that put students first, including Freshman Seminars taught by distinguished faculty; Biology House, a special residence for CBS students; BioBuds, which matches freshmen with upper class students; the Alumni Mentor Program; and the CBS Career Center. This summer CBS will launch a three-day orientation camp for all freshmen at Itasca Biological Station and Laboratories.

## Growing interest in biology

Interest in biology, driven by the sequencing of the human genome and other highly publicized achievements, has grown dramatically. Over the past five years, the size of the entering freshman class has increased from 113 to 351. The caliber of students is also increasing. Half of the students in this year's freshman class were in the top 10 percent of their high school class. And a record number of prospective University students are requesting information from the Admissions Office about majoring in biology. In fact, biology is now among the top five majors in which students express an interest, along with pre-med, engineering, communications, and psychology.

At the same time, biologists at the national level are rethinking the way biology is taught. This is driven in part by the growing volume of knowledge and in part by concerns that curriculum tends to be based on memorizing facts rather than understanding concepts. Last year, an issue of *Science* was devoted to revamping undergraduate science curriculum to make it both more conceptual and more hands-on.

## From facts to concepts and images

A curriculum that is experiential and based on discovery is a much more effective way to learn, says Elde. "We are struggling as biologists with how to break through the mountain of facts and distill to concepts and in some cases images, as with the mountain of data produced by genomics."

John Anderson, interim associate dean for faculty and academic affairs, adds that areas of biology need to be taught together. "We need to integrate topics so we don't talk about biochemistry, cell biology, and genetics in isolation," he says. "We need to weave them together because they are all interrelated. And we need to be more cognizant of whole-world implications."



Anderson teaches a Freshman Seminar called "Six Billion and Who's Counting?" which focuses on consequences of global population growth from an ecosystem perspective.

"When is the system going to crash? Even students interested in molecular issues need to be aware of global issues," he says.

### Teaching is being rewarded

"Undergraduate biology education is definitely on the radar screen around the country," says Robin Wright, new associate dean for faculty and academic affairs, who just arrived from the University of Washington. "There have been big changes lately. It used to be that teaching didn't make a difference to a biologist's research career, but that's no longer the case."

Over the past five years, Wright says, the National Science Foundation has been changing the way it reviews grants to reflect this trend. While funding decisions used to be made based on research merit alone, the NSF and other funding agencies now want to know what else they'll get for their money besides research, Wright says.

"Even if the research plan is excellent, the grant may not be funded if the researcher doesn't include a plan for impact of the research on teaching and outreach," she adds. "This is a dramatic change that affects all researchers because everyone needs to get grants in order to carry out their research."

Another trend Wright sees is the addition of math courses to the curriculum. Historically, biology has been a descriptive rather than quantitative science, but

today's undergraduates need more math to handle large amounts of data produced by genomics as well as modeling ecosystem processes. Adding courses to help students strengthen their writing skills is also a national trend, as is integrating technology into learning.

Yet another sign that the topic is hot, the National Academy of Sciences recently published a book called *BIO 2010: Transforming Undergraduate Education for Future Research Biologists*.

### Still room for improvement

With all the changes at CBS over the past few years, there is still room for improvement. Some of the most immediate needs are revamping the core curriculum, getting faculty more involved in mentoring students, and making it easier

## A HISTORY OF EXCELLENCE IN TEACHING

Although undergraduate education at CBS is new and improved with more good things to come, CBS has always been known for its outstanding undergraduate teachers.

One of them is John Anderson, professor of biochemistry and interim dean for faculty and academic affairs. Anderson, who has taught undergraduate education on and off during his 35 years with the College, has garnered every distinction the College and University give to recognize excellence in teaching, as well as a "Nobel Prize for Excellence in Teaching" given to him by his students in 2002.

### What's his secret?

"It's understanding where the student is on their educational journey so that I can meet them where they are and take

them from there," he says. "Periodically, I introduce a little humor, which is particularly effective if it's self deprecating. That gets the message across that I'm just an ordinary person who happens to be familiar with the material. I'm approachable and I won't take offense if they don't get it. I also set high expectations and make it clear what those expectations are."

One recent example of Anderson meeting students where they are is his Web-based course in biochemistry, which was the College's first Web-based class. When he learned of the need for such a course, he readily agreed to adapt his for that audience. And he is now meeting students from all over the United States and beyond via the Internet to bring them along on their educational journeys.



RICHARD ANDERSON

John Anderson has received many awards for distinguished teaching. He is shown here with students in his Freshman Seminar, called "Six Billion and Who's Counting?" which addresses the impact of population growth on the Earth's ecosystems.



for students to become involved in research labs.

The CBS core curriculum has long been an issue, says Janet Schottel, chair of the Educational Policy Committee and Director of Undergraduate Studies for the Department of Biochemistry, Molecular Biology, and Biophysics. CBS used to have a core curriculum for all majors, but over the years it has evolved to allow more specialization within majors. While students now have more flexibility, some faculty are concerned that their education may not be as broad-based, Schottel says. One solution under consideration is a consolidation of several previously required core courses into a two-semester sequence that all students would be required to take.

Schottel says she and other faculty are looking forward to discussing the plan with Wright.

Another improvement in progress is involving more faculty as mentors and delineating the roles and responsibilities of faculty mentors and advisers in the Student Services Office.

As per a new plan, Student Services advisers will be responsible for guiding first-year students, and faculty mentors will take over after students declare a major. Faculty mentors will be assigned to students based on majors or areas of interest. Advisers will still do some of the paperwork, but faculty mentors will get to know students and help them plan their futures.

Providing opportunities to work in research labs has always been a strength at CBS, but with freshman admission and growing enrollments, the need for student research opportunities, particularly for freshmen and sophomores, is increasing. Many faculty are reluctant to take on younger students because they don't have the time to train them. To address this, a new course in laboratory techniques is being planned, Schottel says. The two-

level course will teach lab safety, techniques, the scientific process, and how to develop a research project.

### What lies ahead

Figuring out how CBS undergraduate programs need to change to better serve students and reflect national trends is Wright's top priority. As the College's new associate dean for academic and faculty affairs, she will be responsible for working with departments, faculty, staff, and students to shape undergraduate education programs.

It's an assignment that she is passionate about, saying that her goal is to make CBS the best place in the United States to teach and learn biology.

"When the National Academy, the Carnegie Foundation, research societies, and funding agencies discuss excellence in biology education, I want the University of Minnesota to be at the top of their list," she says.

Wright adds that colleges like CBS are rare in the U.S. because biological sciences are typically fragmented over multiple departments housed in a college of arts and sciences. But the unified structure created by the U's reorganization uniquely positions Minnesota to move into a national leadership role in undergraduate biology education.

As she works with the CBS community to build a vision, some of her priorities will include:

- Building inquiry and discovery into the curriculum so students will think like biologists rather than just thinking about biology

- Strengthening quantitative and computational skills to prepare students for genomics and other emerging areas
- Integrating biology curriculum with other sciences and the liberal arts, so students will have a better idea of how biology fits into the big picture
- Increasing diversity and building a community that celebrates the success of individuals
- Encouraging faculty and teaching assistants to approach teaching with the same rigor and creativity as they do research

"I accepted the position because I believe CBS has the potential to be a national leader, and because I want to help the College realize that potential," she says.



RICHARD ANDERSON

Jen Sandmeyer, who grew up in St. James, Minnesota, graduated from CBS last spring. She is now a student at Harvard Medical School. More than half of this year's freshman class graduated in the top 10 percent of their high school class.

"I couldn't be more pleased that Robin has joined us," Dean Elde says. "The search committee did a great job of identifying excellent candidates around the country and of getting Robin to come to Minnesota to help us achieve our goals."

—Peggy Rinard

# Biology House makes the U a smaller, friendlier place

**T**here are few things as intimidating as freshman year at the University of Minnesota. Especially if you are one of more than 700 freshmen assigned to Frontier Hall—the U's largest residence. But if you are a biology major, there is hope.

It's called Biology House—two corridors of massive Frontier Hall where 60 biology students currently live in suite-style rooms. CBS set up Biology House in 1997 to create an environment where freshman biology majors could get to know each other more quickly. It also makes study groups easy to organize and very popular.

Each year, a community adviser (C.A.) lives with and supervises students in Biology House. This year's C.A. is Liz Bentzler, a junior in CBS. Liz is responsible for helping students with academic, personal, and social issues as well as larger University and community issues. She also handles emergencies and enforces University and hall regulations.

Liz became a C.A. because she remembers all the questions she had as a freshman. "I wanted to answer all those questions and help first-year students get adjusted," she says.

Liz is assisted by two 'U Crew' students—Ashley Lawson and Melissa Goetter, who also live in Biology House. Ashley and Melissa, both sophomores, lived

in Biology House last year as freshmen.

"We help our residents with classes and issues that arise for freshmen. More importantly, we hope to be friends," Lawson said.

New friendships are essential for adjusting to University life. Amanda Munzenmeyer, a Biology House freshman studying genetics, cell biology, and development, says making friends comes easily at Biology House,

"There is always someone around you can study with or walk with to class," she said.

Alumni also connect with students through Biology House. In December, the board of the Biological Sciences Alumni Society hosted a pizza party at the residence.

Biology House emphasizes academics as well as socializing. This year staff are sponsoring "Biopoly," a contest where students turn in a test score of 75 percent or higher—or two tests where the second test shows significant improvement—to the 'U Crew' students. For each submission, the student gets a chance to win a gift certificate to places that are vital to freshman life; Subway, Chipotle, U of M Bookstores, and so on.

And Biology House residents have a chance to exercise their bodies as well as their minds. All



JUSTIN PIEHOWSKI

Students in biology house often take advantage of close quarters to form biology study groups.

students who live, or have lived, there are eligible to play for the house's soccer team, appropriately named "The Bio-Hazard."

With all these connections, Biology House makes the University feel more like a molecule than an ecosystem.

"Being in a house like this, as part of the College of Biological Sciences, makes the University a much smaller place," Lawson said.

—Justin Piehowski

With all these connections, Biology House makes the University feel more like a molecule than an ecosystem.



CAMPAIGN MINNESOTA  
UNIVERSITY OF MINNESOTA

# CAMPAIGN COUNTDOWN

## ALUMNA USES MATCHING FUNDS TO CREATE A FELLOWSHIP TO SUPPORT A WOMAN GRADUATE STUDENT AT CBS



TIM RUMMELHOFF

Carol and Wayne Pletcher at home with Queen Elizabeth, their poodle.

**C**arol Pletcher knows how important support can be to women in graduate school. During her years at CBS in the late 1970s, she had two sons yet managed to earn a fellowship from the American Association of University Women (AAUW).

“This fellowship served as a bridge to my last year, which was very, very wonderful,” she said. Now, Carol and her husband, Wayne, want to be sure other young women have the same kind of support by offering their own fellowship.

In particular, Carol wants the fellowship to go to a woman who is interested in helping and supporting other women, rather

than only competing for herself. “Of course, I would like her to be brilliant and do great bio-chemistry and all that, too,” she added.

Remembering her own two pregnancies in grad school, “it was clearly an adjustment for the faculty to have a pregnant woman running around,” she recalled. “It adds a whole new dimension to being a student.”

Carol describes being a grad student and studying with John Gander and other colleagues as one of the most exciting and happiest times of her life.

Carol often jokes that she used some of the money from the AAUW fellowship to pay parking tickets. “I was known for creative parking,” she said.

Besides excelling in creative parking, Carol and her husband know how to leverage opportunities.

Because the Pletchers started the fellowship during Campaign Minnesota, the University of Minnesota’s 21st Century Graduate Fellowship Endowment matched every dollar. Additionally, Carol and Wayne’s employers, Cargill and 3M respectively, matched each dollar the Pletchers contributed. After all the matching, the Pletcher Fellowship totals \$50,000.

“What we discovered was that by leveraging, the Fellowship came together easily. We hope that others will see the same

opportunity to support the University that we saw,” stated Carol.

The Pletchers plan to create fellowships at other schools; however, the University of

**Carol wants the fellowship to go to a woman who is interested in helping and supporting other woman, rather than competing with them.**

Minnesota was the first because of the 21st Century Graduate Fellowship Endowment. “Once the matching funds from the University became available, it was the obvious thing to do,” she said.

While Carol is the University of Minnesota alumna, she said this fellowship is a family effort. She and her husband are passionate about education.

“We believe in the power of education. We believe in the power it gives you personally for your own well-being and your own enjoyment of life. We believe in the power of education and what it gives you in your professional life, the ability to have exciting, interesting, and rewarding jobs. We believe in the power of education and what it does for society. An educated society, in our mind, has a whole different set of options than an uneducated society.”

The Pletcher fellowship will help pay for the education of a female graduate student studying biological sciences for years to come, but hopefully not too many parking tickets.

—Justin Piehowski

# Alumna trades lab for a middle school classroom

**K**alli Ann Binkowski was one of those kids who know just what they want to be when they grow up. As a sixth grader at Kenneth Hall in Spring Lake Park, she decided she would become a scientist and study genetics. As a teen she began researching plant cell regeneration in the College of Biological Sciences through a mentoring program for high school students. After completing her undergraduate degree at the University of Wisconsin, she returned to the University of Minnesota to earn her Ph.D. She spent her days looking for the gene responsible for a gangly mutant of *Arabidopsis thaliana* as a Ph.D. student under plant biology faculty member Neil Olszewski. “We isolated the gene, and it was very, very cool,” she says.

Then life changed dramatically. As part of the price one pays for getting a Ph.D., Binkowski had to teach an undergraduate class. She found herself spending her spare time thinking, not about the latest puzzle in the lab, but about better ways to get course content across to her students.

“That’s when it hit me,” she says. “I realized that I liked teaching a lot more than I like doing research.” After lots of soul-searching and introspection, she decided to go into education. She finished her master’s in plant biological sciences, then earned a teaching degree.

Binkowski is now in her sixth year of teaching science at Spring Lake Park High School—the same school she attended as a budding scientist a dozen years ago.

“It’s a tremendously challenging and interesting career,” she says. Particularly gratifying is the chance to light a spark in young people’s minds. “The kids are growing and changing and you get to influence that,” she says.

The first few years of teaching were “tremendously difficult” as she got the hang of managing 35 kids in a classroom, planning lessons, and carrying out administrative duties, Binkowski says. She laughs that one of the toughest things was learning to call her former instructors by their first names. “I spent the whole summer practicing,” she says.

Though she has no regrets for her career shift, Binkowski says teaching has one major downside: the lack of appreciation educators receive.

“Teaching is not looked up to as a really respectable position. People say you get the summer off so it’s an easy job, or there’s no money in it, so you’re not worth it,” she says. “As teachers we know better.”

Through it all, Binkowski remains grateful for the solid foundation she received in CBS. “It’s given me a good under-



RICHARD ANDERSON

Kalli Ann Binkowski, M.S. '95, finds teaching science a very satisfying career.

standing of biological concepts along the way,” she says. “I can see the big picture because I’ve seen so much of the picture.”

—Mary K. Hoff

“That’s when it hit me. I realized that I liked teaching a lot more than I liked doing research.”

—Kalli Ann Binkowski



# So many ways to volunteer at CBS



EMILY JOHNSTON

Side by side with 13 other alumni volunteers, Rebecca Marrs-Eide '01, Steve Schulstrom '84, and Mike Coyle '72 review resumes at the 2002 CBS Career and Internship Fair held in the McNamara Alumni Center. CBS alumni volunteered a total of 929 hours last year, which equals a cash contribution of \$14,910 as determined by Independent Sector.

**W**hether you want to help others, give back some of what you received at CBS, or connect with other alumni, there is a place for you at the College of Biological Sciences. Just ask Dan Liedl '96, who volunteers for CBS because he wants to meet people of similar interests, to learn about advances in his field, and because it's the right thing to do. "I wish I had started sooner," says Dan, who finds that volunteering gives his life balance. "Time is valuable, but giving a few hours a month can make a difference in someone's life," he adds. By volunteering your time and talents you, like Dan and other CBS volunteers, can help students and the College and enrich your own life.

There are many different ways you can volunteer your time. The Biological Sciences Alumni Society Board meets monthly to strengthen the relationship among the College, alumni, students, and the community. Board committees meet every other month to plan activities and recruit

new members. The Mentor Program matches undergraduate students with alumni who hold jobs related to a student's field of interest. The Career Network is a group of individuals who talk with students about career-related issues. Job shadowing allows CBS students to spend a day at work with an individual who shares their career interests. The Career and Internship Fair is a chance for alumni to interact with students and help them plan for a career. Alumni are asked to review resumes, talk with students about job search strategies, and provide interview tips as well as answer questions about their own careers and assist in practice interviews. The Speakers Bureau invites alumni to campus to talk with students about life after graduation. Volunteers are also needed to help plan and implement Homecoming festivities each fall. To learn more about these opportunities, contact Emily Johnston (612-624-4770 or [ejohnsto@cbs.umn.edu](mailto:ejohnsto@cbs.umn.edu)).

## Volunteer Events

### Career and Internship Fair

Alumni are invited to participate in the Career and Internship Fair by volunteering a few hours between 11 a.m. and 3 p.m. on February 28 to review resumes, provide interview tips, offer job search strategies, answer questions about their career, and help students participate in mock interviews. If you are interested in helping, please e-mail [alumni@cbs.umn.edu](mailto:alumni@cbs.umn.edu) or call Emily at (612) 624-4770. This is a wonderful opportunity to help students as they begin to think about their life after college.

### Alumni Lost & Found

The University of Minnesota Alumni Association conducted a search for U of M graduates this summer that resulted in finding more than 52,000 missing alumni. More than 900 are graduates of the College of Biological Sciences. If you were lost and have been found, welcome back! We're very happy to be reconnected with you, and would love to hear from you. Please let us know what you've been up to. E-mail [alumni@cbs.umn.edu](mailto:alumni@cbs.umn.edu) with an update.

## Networking Events

### Join us at Northern Vineyards Winery

Join the deans, alumni, faculty, and staff at Northern Vineyards Winery in Stillwater for networking, tours, and tasting on January 30 from 6-8 p.m. Guests will take a tour of the cellar and have a chance to taste five of the best wines hosted by the winemaker, as well as a delicious array of bread, cheese, fruits, spreads and chocolates. Cost is \$20 per person. You can register by calling (612) 624-4770 or e-mailing [alumni@cbs.umn.edu](mailto:alumni@cbs.umn.edu). Feel free to invite a friend or colleague to join with fellow alumni and taste some of Minnesota's finest wines.



## Welcome, new board members

### Dan Liedl

B.S. Genetics, Cell Biology, and Development, 1996

### Kelly Hadsall

B.S. Biology, 1996

## Attention mentors!

You and your student are invited to attend Networking Necessities on February 4 at 6:30 p.m. in the McNamara Alumni Center. Students and Mentors will learn helpful hints for networking and try out their skills with those in attendance. Alumni can build their network as well. Look for more details to arrive soon!

Mentors and students are invited to the Mentor Program Appreciation Reception on April 15, 2003 at 5:30 p.m. in the McNamara Alumni Center. This is an opportunity for mentor pairs to meet one last time before the program officially ends. It's also a chance to meet with other mentor pairs and find out about their experiences.

## A night at the theatre

Have you ever thought about reconnecting with other College alumni for an evening on the town? If so, we have a fun opportunity for you. You are invited to see "I Love You, You're Perfect, Now Change" at the Plymouth Playhouse on April 25 at 7 p.m. Guests will enjoy a light buffet before the show. Cost is \$25 per person. You can register today by calling (612) 624-4770 or e-mailing alumni@cbs.umn.edu. Please feel free to extend this invitation to your family, friends, and co-workers. We hope that you'll join us at this fun CBS event.

## Class Notes

**Richard Forbes (B.S., M.S., Ph.D., Zoology, 1964)** passed away in July, 2002 at the age of 65. Forbes joined the faculty of Portland State University in 1964 and was professor emeritus at the time of his death. A popular teacher, he won several awards for outstanding teaching during his tenure. He was also widely published as a writer and photographer for scientific and popular publications. He wrote a regular column for *Urban Naturalist*, an Audubon Society newsletter, and took photographs for *Mammals of North America*, published by the Smithsonian. Forbes was also an active volunteer for Oregon naturalist groups and for public schools. While at the U of M, he was very active at Itasca Biological Station. He is survived by his wife, Orcilia; daughter, Eryn; son, Bryan, and a granddaughter.

**Alan Price (Ph.D. in Biochemistry, 1968)** is currently the Associate Director for Investigative Oversight at the Office of Research Integrity in Rockville, Maryland.

**William Berg (Ph.D. in Ecology, 1971)** retired from the Minnesota Department of Natural Resources this summer after 30 years of service.

**Timothy Voller (B.S. in Biology, 1984)** is an Executive Search Consultant for LarsonAllen Search, LLC in Minneapolis.

**Ernest Retzel (Ph.D. in Microbiology, 1984)** married Catherine Clark in May 2002. They met during a workshop organized by Catherine in North Carolina, where Ernie was involved as co-principal investigator of an NSF grant in pine genomics. While Catherine completes her studies in NC for the next 6-12 months, they have discovered the joys of 3.5-cent-per-minute phone cards and discount airfares.

**Bill Diekman (B.S. in Biology, 1987)** is the Manager for QC Validation at Protein Design Labs, Inc. in Plymouth.

**Andrew Hudak (B.S. in Ecology, Evolution, and Behavior, 1990)** is a Research Forester with the U.S. Forest Service Rocky Mountain Research Station in Moscow, Idaho. He is working on several projects relating to vegetation ecology at the landscape level.

**Gretchen Radloff (B.S. in Biology, 1991)** just moved to Cincinnati to work in cancer research at Cincinnati Children's Hospital Medical Center. She worked in Stella Davies lab at the University of Minnesota. When

Davies and her husband were recruited by Cincinnati Children's Hospital, they asked Gretchen to join them and run the lab. It was an opportunity she couldn't turn down! However, she does plan to move back to Minnesota in a few years.

Hats Off to **Todd Lemke (B.S. in Genetics & Cell Biology, 1992)**, **Julie Kirihaara (B.S. and Ph.D. in Biochemistry, 1981 & 1988)**, and **Beverly Schomburg (B.S. in Biochemistry, 1967)** for volunteering at the first Alumni Speakers Bureau. They kicked off our "Exploring Careers in the Life Sciences" series on October 2, 2002.

**Christine Schoenbauer (B.S. in Ecology, Evolution & Behavior, 1994)** served as a Peace Corps Volunteer in Niger, West Africa for two years following graduation. Upon returning to the U.S., she took a position with the Minnesota Department of Agriculture for two years in their chemistry lab. Christine is presently employed at the Minnesota Department of Health as an Environmental Analyst.

**Aimee (Anderson) Lawson (B.S. in Biology, 1996)** recently married Steven J. Lawson and moved from St. Paul to Oakdale, MN. Aimee met Steven at the University of South Alabama during their physician assistant graduate program in 1999.

**Pam Skinner (B.S. in Genetics & Cell Biology, 1995 and Ph.D. in Pathobiology, 1998)** accepted a position this fall as assistant professor in the Veterinary PathoBiology Department at the University.

**Jennea Dow (B.S. in Biology, 1999)** recently joined Eli Lilly as Specialty Representative in Eli Lilly's Neuroscience/Retail Sales Division.

**Katherine Himes (B.S. in Neuroscience, 1999)** married Mark Lescher (B.A. in Psychology, 1997) in 2001. Katherine and Mark first met in Comstock Hall in fall 1996 where she was an office assistant and worked at the front desk, and he was a resident assistant.

*Have any news to share? We'd love to hear from you. Send your Class Notes to Emily Johnston, ejohnsto@cbs.umn.edu. And please be sure to let us know if you move.*

## CBS Calendar

### Networking Necessities

*Monday, February 3, 6:30 p.m., McNamara Alumni Center.* Alumni and students are invited to learn and practice networking tips.

### Career and Internship Fair

*Thursday, February 28, 11 a.m. to 3 p.m., McNamara Alumni Center.* Alumni are needed to review resumes, provide interview tips, offer job search strategies, answer questions about their careers, and participate in mock interviews.

### Outstanding Achievement Award Presentation and Lecture

*Thursday, March 6, 4 p.m., Earle Brown Center.* Douglas DeMaster will receive an Outstanding Achievement Award from the University and give a lecture titled, "Impossible Problems, Improbable Solutions: The Life of a Wildlife Biologist in a Federal Regulatory Agency."

### UMAA Mentor Connection Appreciation Reception

*Tuesday, April 15, 6 p.m., McNamara Alumni Center.* For alumni and students involved in the CBS Mentor Program.

### CBS Commencement

*Saturday, May 17, 7:30 p.m. Northrop Auditorium.*

Contact Emily Johnston at [alumni@cbs.umn.edu](mailto:alumni@cbs.umn.edu) or (612) 624-4770 for more information about any of the above events.

## Cedar Creek 60th Anniversary

Nearly 300 people made the trip to Cedar Creek Natural History Area on Saturday, September 21 to help celebrate the 60th anniversary. Speaking at the program, Dean Elde said he believes Cedar Creek's biodiversity research plots are better known outside of Minnesota as a symbol of the U than Northrop Mall. David Tilman, CCNHA director, noted that humans now dominate global ecosystems, a dramatic change from 60 years ago. Consequently, the value of Cedar Creek for studying the impact of humans in ecosystems has also increased. And David Hamilton, Vice President for University Research, called Cedar Creek a "jewel in the University's crown." Activities, which followed the program, included a research update from Tilman, tour of Cedar Bog Lake, demonstration of radio-tracking starring Goldy Gopher, and nature crafts and games for children.

[www.cedarcreek.umn.edu](http://www.cedarcreek.umn.edu)



CLARENCE LEHMAN