Winter 2002

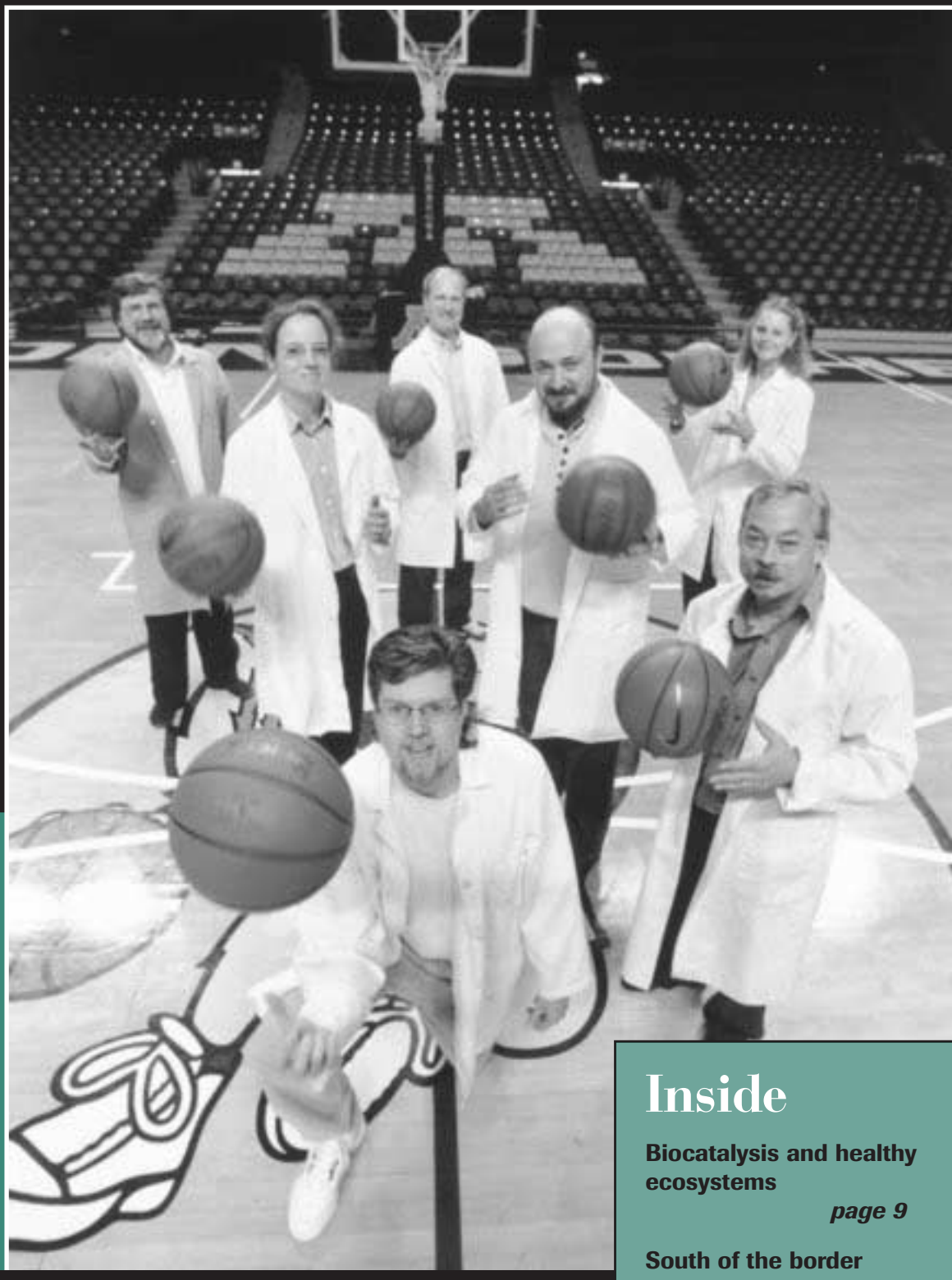
University of Minnesota

Frontiers

MAGAZINE OF THE COLLEGE OF BIOLOGICAL SCIENCES

Dream Teams

All-star teams are giving the College a competitive edge in emerging areas of biology. This team develops microbial systems that produce earth friendly biochemicals for industrial use and environmental clean-up.



Inside

From the dean

Collaboration drives growth in science and business

John Noltner

Dean Robert Elde

Team work has long been a buzzword in the business world. But it wasn't long ago that scientists worked in relative isolation. When the word interdisciplinary first came into use at universities, many researchers were skeptical. Increasingly, however, we are recognizing the value of collaboration. In fact, scientists are seeing that discoveries are often made at the boundaries between disciplines. And funding agencies are rewarding interdisciplinary efforts.

At the College of Biological Sciences, our strategy for recruiting faculty is based on the value of collaboration. We are forming "Dream Teams" in growth areas by identifying our strengths and recruiting talented young faculty with skills and knowledge that complement those of other team members. Some of these teams are featured in this issue of *Frontiers*.

The next step is collaboration between academia and industry. Many universities already have taken this step and realized scientific and economic benefits of these partnerships. In many cases, industries have grown around universities to better take advantage of their resources. Stanford, UC Berkeley, MIT, and Duke University are examples.

The article "Biocatalysis and Healthy Ecosystems" demonstrates some of this potential in Minnesota. A November forum presented by CBS and the Institute of Technology explored how using biocatalysis to create new products from renewable resources such as corn can be good for Minnesota's economy as well as its ecosystems. There are many other opportunities for a strong biotechnology industry here.

While the University has valued partnerships with a number of Minnesota companies, the potential for much more collaboration exists. In fact, compared to many states Minnesota is behind the curve. We need to recognize and seize opportunities to catch up. The planned Biotechnology Precinct is a step in the right direction, but many other steps must be taken.

When people work together they can always accomplish much more than by working alone. It's a simple but very true idea that the University and Minnesota companies need to take to heart.

Robert Elde
Dean, College of Biological Sciences

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Frontiers is published three 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.

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Cover photo: Front: Larry Wacket, team leader; middle row, Claudia Schmidt-Dannert, Arkady Khodursky, and Michael Sadowsky; back row, Michael Flickenger, David Sherman, and Janet Schottel

Dream teams

Richard Anderson

Members of the biocatalysis and biodegradation team take time out at Williams Arena. From left to right are Janet Schottel, David Sherman, Michael Sadowsky, Claudia Schmidt-Dannert, Larry Wackett, Arkady Khodursky, and Michael Flickenger.

The University of Minnesota is organizing all-star teams of scientists in areas of biology with strong growth potential.

MOVE OVER MAGIC JOHNson, Michael Jordan, and Larry Bird?

Since the term "dream team" was coined in the 1992 Olympics, when basketball's finest formed the first professional team to compete in the games, it has been used widely in popular culture. Now, it's moving into the scientific community.

Traditionally the University of Minnesota, like most large, public research universities, has recruited faculty to cover the breadth of disciplines. But in biology particularly, where boundaries are rapidly expanding, focus has shifted to depth in areas of strength and growth potential.

By using state funds for molecular and cellular biology and reallocating other resources, the College of Biological Sciences, in collaboration with other schools, is forming "dream teams" in key areas such as biocatalysis and biodegradation, developmental biology, molecular biology of plants, and global ecosystem change.

"It's a novel strategy," says Michael O'Connor, "captain" of the developmental biology dream team, who came here from the University of California, Irvine a few years ago to build a team.

"There are lots of good developmental biologists at places like Stanford and Harvard, but they aren't integrated as teams. There's a synergy on our team that you just don't find elsewhere," he says. Because of this, he adds, he believes his group is on its way to becoming one of the top programs of its kind in the country.

O'Connor, a Howard Hughes Institute scholar and Ordway Professor of Developmental Biology, was an important catch for the College, says Robert Elde, dean. The "dream team" approach has drawn other talented young faculty, such as Claudia Schmidt-Dannert, a molecular biologist recruited from California Institute of Technology, named a rising star by *U.S. News and World Report*, and featured in *Nature Biotechnology* and *Chemical Engineering News*. Arkady Khodursky, recruited from Stanford, is another example. Khodursky, a mathematician with expertise in DNA microarray technology, was courted by research universities around the country before choosing the College of Biological Sciences.

Thanks to President Mark Yudof's investment in biological sciences, the College has the resources to hire these and other talented new faculty. Not long after he arrived in 1997, Yudof announced the Molecular and Cellular Biology Initiative, a plan to position the University and the state as leaders in biological sciences and biotechnology. Yudof recently told the Board of Regents that the University has invested $865 million in biology and medicine over the past few years.

The plan and investments are paying off, says Elde. About half of the 41 faculty positions created by the initiative are filled. The Molecular and Cellular Biology Building will be completed this summer, and construction has begun on the Microbial and Plant Genomics Building, funded in part by a $10 million gift from Cargill. Regents approved plans for a Biotechnology Precinct on the St. Paul campus, which will include several research and development buildings. And there's growing collaboration among biologists across the University as well as in industry.

"We're building a critical mass of expertise to create the synergy we need to move up to the top," Elde says. "Dream teams are an important part of that."

Following are a few examples of dream teams. Others will be featured in future issues of *Frontiers*.

Biocatalysis and Biodegradation

In an era when pollution and dwindling fossil fuel supplies are serious concerns, there aren't many frontiers of science as promising as biocatalysis, the use of biological processes and renewable resources to create environmentally friendly products. Its counterpart, biodegradation—bacterial metabolism of environmental pollutants—is equally appealing.

When the College was identifying areas of strength and potential growth for investment, this one topped the list.

"It's very compatible with other College strengths and it's a good fit for the state because we live in an agricultural area," says David Bernlohr, head of the Department of Biochemistry, Molecular Biology and Biophysics, where the team is based.

Team members are all in the department's Microbial Biochemistry and Biotechnology Division, headed by Larry Wackett. Simply put, the group develops microbial systems that create products or clean up chemical contamination, says Wackett.

Wackett himself turns microbes into clean-up crews. Working with soil scientist Michael Sadowsky, he engineered bacteria that consume spills of atrazine, a pesticide, in soil. David Sherman uses bacteria from soil and the ocean to produce biochemicals active against cancer, viruses, fungi, and other bacteria. Michael Flickenger and Janet Schottel engineer bacteria, then encapsulate them in plastic film to create biosensors that detect contaminants in soil and water.

New members Claudia Schmidt-Dannert and Arkady Khodursky are basic scientists who bring new tools and knowledge. Schmidt-Dannert "shuffles" microbial genes in test tubes to alter their activity. In essence, she is speeding up evolution to achieve a desired outcome, Wackett says. Khodursky, who has a math degree from Moscow State University and a biophysics degree from UC Berkeley, did postdoctoral research in the laboratory where microarray screening, a key technology for genomics research, was developed. He uses microarrays to evaluate genome expression patterns in bacteria.

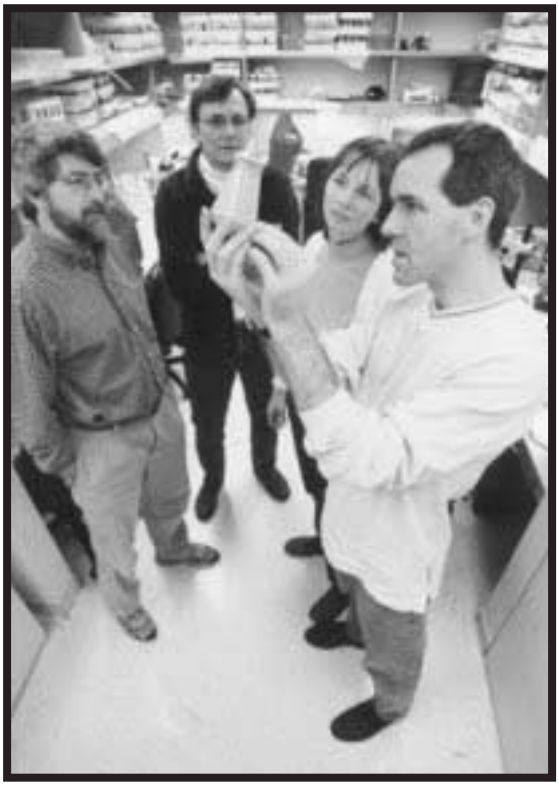
Bernlohr says the group is unique. "There's no other university I know of with the faculty horsepower we have in biocatalysis and biodegradation."

Developmental Biology

Now that genomes of many organisms have been sequenced, developmental biologists are turning their attention to how genes interact as an organism develops, says Michael O'Connor, leader of the developmental biology team, which is based in the Department of Genetics, Cell Biology, and Development.

Complementary roles of members give the team an advantage. O'Connor's interest is in signal transduction – how cells communicate with each other – while Jeff Simon studies transcription, which is cued by signaling. Tom Hays focuses on cellular motors that transport proteins. Tom Neufeld identifies genes that regulate cell size and organ shape and Catherine Kirkpatrick looks at genes regulating protein turnover. The overlap between these areas creates a strong synergy, O'Connor says.

The group works with a family of gene products that relay information during development. Called BMPs for bone morphogenetic proteins, they were originally derived from cow bones. BMPs now include proteins involved in the formation of heart, eyes, and skin as well as bones, and they function the same in fruit flies, the group's primary model organism, as in vertebrates. While the group's focus is understanding development, some of the proteins have potential for treating cancer and other diseases.



Richard Anderson

Developmental biology team members include Mike O'Connor, Tom Hays, Catherine Kirkpatrick, and Tom Neufeld.

[Other members of the developmental biology group focus on C. elegans and on zebrafish. A story on the zebrafish team appears on page 10.]

Arabidopsis Genomics

If you walked by an *Arabidopsis thaliana*, you probably wouldn't look at it twice, let alone recognize its significance in agriculture. This small, plain plant is a model for biologists to better understand and ultimately improve key crop plants

Although it's not a crop plant itself, Arabidopsis, a member of the mustard family, was selected because it's small, easy to grow, goes from seed to seed in six weeks, and has a small genome. Since it was adopted as a model plant in the 1980s, it has since risen from obscurity to prominence. It was the first higher plant to have its genome sequenced.

"It's a powerful tool for studying questions in other green crop plants," says Neil Olszewski, professor and team spokesperson. Members of his team, based in the Department of Plant Biology, all use arabidopsis in their research.

Olszewski, who studies plant hormones, looks for genetic mutants that cause growth defects. Potentially, genes identified and knowledge gained in this model system can be used to improve crops. The "green revolution" was launched with a mutant gene for dwarfism that makes wheat more productive. Bill Gray studies auxin, another plant hormone. Other group members look at a variety of questions, such as how plants perceive light (Min Ni), how hairs grow on leaves (David Marks), how proteins are transported (John Ward) and how plants survive within their ecosystems (Cynthia Weinig).

"Although we're all addressing different questions, there's a strong convergence among our interests."

Richard Anderson

Min Ni, Pete Snustad, John Ward, Neil Olszewski, and William Gray use Arabidopsis as a model to study genomics of higher plants.

Global Ecosystem Change

"We identified global ecosystem change as a top priority when we were considering areas for recruiting new faculty," says Robert Sterner, head of the Department of Ecology, Evolution, and Behavior. "It's a highly integrative subject that includes genetic adaptations, how organisms respond to environmental changes, effects of reduced biodiversity, and other topics. We're fortunate to have a very strong mixture of senior leadership and new expertise."

"There are lots of good developmental biologists at places like Stanford and Harvard, but they aren't integrated as teams. There's a synergy on our team that you just don't find elsewhere."

—Michael O'Connor

EEB has a long history in the field. Margaret Davis and Eville Gorham, now emeritus professors, studied how living things respond to atmosphere and climate changes. Evolutionary biologist Ruth Shaw is carrying on that work, looking at how plants may or may not adapt to predicted environmental changes. David Tilman, holder of the McKnight Presidential Chair in Ecology, is internationally known for his work on the value of biodiversity. Sarah Hobbie and new member Joe McFadden study the effect of global warming on frozen tundra and snow cover in the arctic. Jennifer King, also a new member, studies the impact of carbon dioxide and ultraviolet radiation on plants and ecosystems. And Jim Cotner looks at effects of ultraviolet light on aquatic ecosystems. *[See story on this team, page 7]*

"Increasingly, society will be looking to scientists to provide information on how humans are changing the environment, what effects those changes will have on humans and the planet, and on how to mitigate those changes," Sterner adds. "I look to EEB and the University of Minnesota to be among the key generators of this critical new knowledge."

—Peggy Rinard

Global ecosystem change

While most biologists tackle their subjects one molecule at a time, ecologists on the Global Ecosystem Change team take a broader view – how humans are altering Earth's life support systems on a global scale.

Sarah Hobbie is learning how decomposition of frozen tundra, thawed by global warming, could affect the planet.

THINGS JUST HAVEN'T BEEN the same since humans showed up on this planet.

That in itself is no huge surprise: after all, every organism reshapes its environment. What is startling is the extent to which we are doing so. Thanks to our ubiquity and our brains, our species is now altering Earth's life support system on a global scale.

What exactly are we doing? What are the implications? And how can and should we alter our course? Those questions are hot topics in the Department of Ecology, Evolution, and Behavior (EEB), where global ecosystem change is a growing focus.

"It's a terribly important issue facing society, and one sure to continue to increase in public and scientific awareness," says EEB head Robert Sterner. "It's also a very broad topic, so it allows for a lot of diverse scholarship."

When most people think of global change they think of global climate change due to fossil-fuel-burning induced increases in atmospheric carbon dioxide. Groundwork was laid in this area years ago by now-emeritus professors Margaret Davis and Eville Gorham. Gorham looked at the impact of human alterations to the atmosphere on living things. Davis used records left by pollen to explore how plant communities responded to prehistoric climate shifts.

Recently Davis and evolutionary geneticist Ruth Shaw published an article in *Science* using that past to predict the future. They noted that both migration and genetic adaptation contributed to the persistence of plant species through prehistoric climate change, and will likely both be important in the decades to come. But can evolution keep pace with anticipated change, which is expected to be an order of magnitude higher than prehistoric rates?

If a recent study by Shaw and former graduate student Julie Etterson of adaptation rate in a common plant, the partridge pea, is any indication, perhaps not.

The partridge pea "has ample genetic variation in the populations," Shaw says. "That would suggest plenty of potential for the plant to adapt to environmental change. But the structure of that genetic variation indicates that the rates of evolutionary response are substantially less than the rates of climate change. So it does raise questions about the viability of wild populations through the course of climate change."

Some global climate change researchers focus on how increased atmospheric carbon dioxide and temperature affect plant growth. Assistant professor Sarah Hobbie is looking at the other side of the coin—how warming might alter decomposition. As tundra

warms, Hobbie expects decomposition of the massive accumulation of organic material currently frozen into its soil to increase, releasing large amounts of carbon and nitrogen—a change with implications for both plant growth and atmospheric carbon balance.

Another change Hobbie anticipates as tundra thaws is the spread of shrubby plants across the grass-dominated landscape. Such a shift would be far more than a change of scenery, says global ecologist Joe McFadden, who will join the EEB faculty in January.

Using field measurements and computer models, McFadden has shown that invasion of shrubs into Arctic tundra alters snow cover, which affects aquatic and soil ecosystems—in turn setting the stage for further vegetation modification.

McFadden hopes to apply lessons learned in this research to exploring ramifications for global ecology of another large-scale change—urbanization.

Why look at development on a global scale? McFadden says that, just as what appear to be random dots in a close-up view of a newspaper photo form a recognizable image when seen from a distance, a big-picture perspective can produce insights not discernible at smaller spatial scales.

"It's really hard to understand the impact of certain types of land-cover changes unless we can work at large scales," he says. "Patterns snap into place at the global scale that we can't see at other scales."

"It's really hard to understand the impact of certain types of land-cover changes unless we can work at large scales," Joe McFadden says. "Patterns snap into place at the global scale that we can't see at other scales."

Urbanization and introduction of nonnative species have been implicated in yet another type of global change, loss of diversity within an ecosystem. McKnight Presidential Professor David Tilman is exploring the relationship between the biological richness of an ecosystem and its ability to weather the winds of change. As we reduce diversity, Tilman has found, we are also reducing the ability of ecosystems to deal with other perturbations.

"It's been an area of heated debate in the discipline," Tilman says. "We once thought that it was which species, not how many species, that mattered. Our work shows both which species and how many species matter."

Jennifer King, a biogeochemist who will begin a joint appointment with EEB and the Department of Soil, Water, and Climate in January, is studying the impact of both increased carbon dioxide and yet another global change – the increase in ultraviolet radiation (UV) due to ozone depletion in the upper atmosphere—on plant growth, plant chemistry, and ecosystem nutrient cycling.

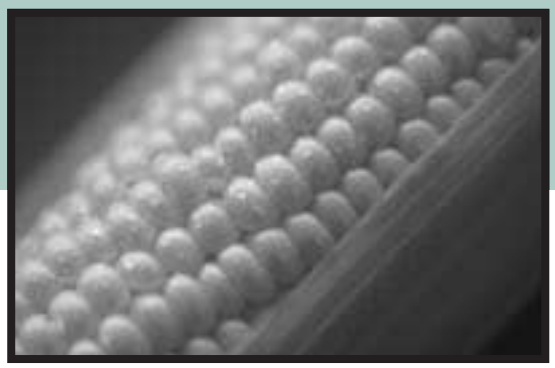
King has found that grassland plants under elevated carbon dioxide not only are more productive and have lower tissue nitrogen concentrations than plants under normal conditions, but also may decompose more quickly.

Impacts of changes in UV on plant productivity and decomposition, she says, will probably be more subtle. She has just begun a field study to examine the effects of altered UV on shortgrass steppe ecosystem processes.

Large-scale impacts of increased UV are evident, however, in work by Jim

David Tilman, McKnight Presidential Chair in Ecology, is a world authority on biodiversity.

lysis and ecosystems



Cargill Dow is producing a biodegradable alternative to plastic made from corn.

THE EARTH'S INCREASING population and the diminishing capacity of ecosystems to provide essentials such as clean air, water and food are on a collision course, according to David Tilman, McKnight Presidential Professor of Ecology. Tillman says we have about 50 years to restore ecosystems and learn to manage them. If we don't, society will incur great costs.

The problem, its solutions, and the economic opportunities it creates were the subject of a fall forum jointly sponsored by the College of Biological Sciences and the Institute of Technology. Called "Forum on a New Science and a New Industry in Minnesota: Biocatalysis and its Synergy with Healthy Ecosystems" the event featured Tilman and Pat Gruber, vice president and chief technology officer of Cargill Dow, which is producing a biodegradable alternative to plastic made from corn. The audience included biotechnology industry leaders and government officials.

"The purpose of the forum is to explore how the University can improve the ecological and economic health of the state by supporting the development of a biocatalysis industry," said Robert Elde, dean of CBS.

Tilman, a widely recognized authority on ecology and biodiversity, explained to attendees that ecosystems won't continue to provide humans with basic needs such as clean air and water, fertile soil, and removal of carbon dioxide from the atmosphere unless they are better managed.

"Humans are using up the biological capital of the world," he said. Within 50 years, the earth's population is expected to grow from six billion to nine billion, which could seriously harm already strained ecosystems.

"There's going to be a paradigm shift from using petrochemicals as a basis for materials to using renewable resources such as corn. It's inevitable because petroleum is running out. And it's good for the environment."

—Pat Gruber

The answer lies in strategies that support rather than deplete ecosystems, Tilman said. He cited a recent decision in New York State to restore an ecosystem that naturally purified water rather than build a water treatment facility. He urged government agencies to assess the health of ecosystems and to incorporate knowledge into policy. The decision saved money in addition to saving the environment.

Industry, driven by consumer demands, has been at least in part to blame for the strain on ecosystems. But biocatalysis offers the opportunity for industry, academia, government, and consumers to be part of a win-win solution.

Pat Gruber of Cargill Dow talked about how that solution is playing out at his company. The relatively new organization was created to develop sustainable products from renewable resources. Recently, they opened a plant in Nebraska to manufacture their first product, "plastic" pellets made from a polymer derived from lactic acid from corn using biocatalysis. So far, other companies have turned the pellets into disposable plates, cups, bottles, packaging, and wrapping. The pellets can also be used to make fibers for fabrics and carpets. He said there is a $10 billion market for PLA, and a need for other biodegradable polymers made from renewable resources. Gruber has a Ph.D. in chemistry and an MBA from the University of Minnesota. Cargill Dow is a spinoff company created by parent companies Cargill and Dow.

PLA can be recycled back to lactic acid. Gruber showed a photograph of a yogurt cup in compost that decomposed in 47 days. The polymer is made by fermentation, he said. It takes less energy to produce than plastic. There is no chemical or polluting waste. And it isn't harmful to the environment.

"There's going to be a paradigm shift from using petrochemicals as a basis for materials to using renewable resources such as corn. It's inevitable because petroleum is running out. And it's good for the environment."

—Peggy Rinard

No rest for 'Sleeping Beau

Since the novel gene transfer technology was created four years ago from an ancient fish gene, 'Sleeping Beauty' has won a $2.5 million grant from the Beckman Foundation, attracted $3 million from Techne Corporation to start a new company, and inspired another technology.

SLEEPING BEAUTY TRANSPOSON System™ "awakened" in 1997, when Perry Hacket turned a fish gene dormant for 15 million years into a vehicle for integrating foreign genes into human chromosomes. The technique, not to mention the scientists who support it, hasn't gotten much rest since then. In July of 1999, Hacket and colleagues won a $2.5 million Technology Development Grant from the Arnold and Mabel Beckman Foundation to support further development of the system. The team has used the funding to add a new technology to their repertoire and has set up a company to tackle challenges in genomics.

The four scientists—Hackett, Steve Ekker, David Largaespada, and Scott McIvor—had similar interests to begin with, but the grant has allowed them to integrate their efforts and get a bigger return on their separate research funding.

"The Beckman grant served as a nucleus that drew our four labs together," Hackett explains.

In October 2000 the four scientists set up Discovery Genomics Inc. (DGI) to broker collaborations with people and companies interested in finding new genes and using the discoveries to design therapies for diseases with a genetic basis. This summer the company got a $3 million boost from Techne Corp. of Minneapolis, bringing its total investment to date to $3.9 million.

Like the Sleeping Beauty Transposon System™, Morphant can be used to "knock down" the workings of individual genes. Then, by noting what goes wrong in an organism, the researchers can deduce what the genes do.

Two technologies form the scientific underpinnings of DGI: Sleeping Beauty Transposon System™ and Morphant®. Sleeping Beauty is essentially an enzyme called a transposase that can move a defined segment of DNA into chromosomes. When scientists insert genes into a Sleeping Beauty Transposon, it ferries those genes into the nuclei of cells and then into chromosomes. It originated as an obsolete fish gene that Hackett's lab found, "awakened" – hence the name – and modified as an agent for transferring genes. They performed that work using cultured human HeLa cells and zebrafish, a tiny fish that makes an excellent model for genetic studies. With Beckman funding, the group improved Sleeping Beauty's frequency of gene delivery in cultured cells by 10 times.

Sleeping Beauty has already been put to work in the search for genes. Largaespada, along with scientists in Japan and elsewhere, has used the system to discover genes in mice. The researchers placed Sleeping Beauty in mouse sperm and let it insert into chromosomes at random. The result was mice with mutated genes whose functions are being investigated. Largaespada focuses on finding and studying genes that, when disrupted, cause cancer in humans.

In the future, Sleeping Beauty holds promise for gene therapy, Hackett and McIvor's primary interest. Working with mice, they have achieved longterm expression of genes delivered to lung tissue by the Sleeping Beauty Transposon and the trans-

A fluorescent image of a two-day-old zebrafish with glowing cells that indicate the presence of Sleeping Beauty transposons.

ty’

Richard Anderson

Dave Largaespada, Scott McIvor, Perry Hackett, and Steve Ekker use zebrafish genes to develop gene transfer technologies.

posase. McIvor and Hackett hope one day to perfect the system to deliver genes to lungs via an inhalant, as well as to liver and blood-forming cells of bone marrow in human patients.

But much remains to be done before the Sleeping Beauty Transposon System™ can be used in people. The second technology, Morphant®, is now on the front burner at DGI.

Morphant® uses DNA analogs that leave chromosomes intact but block the expression of genes by interfering with the translation of messenger RNA. Like the Sleeping Beauty Transposon System™, Morphant® can be used to “knock down” the workings of individual genes. Then, by noting what goes wrong in an organism, the researchers can deduce what the genes do. Ekker’s laboratory did much of the groundbreaking work with Morphant® in zebrafish. The system also works in frogs, chickens, sea urchins, and fruit flies, he says.

DGI scientists can use Morphant® in two ways: first, by serving customers who want to find the function of a vertebrate gene; and second, to discover genes of interest to DGI scientists themselves. Such genes would be any whose functioning contributes to a health problem and, therefore, creates a potential target for drugs. With a healthy second dose of financing, the company can perform further tests on the workings of both the gene and candidate drugs to bring a new therapy closer to clinical trials.

DGI is well positioned to fulfill the potential of both technologies in its stable. The company holds exclusive licenses from the University of Minnesota to develop technologies related to “knock-downs” in zebrafish produced by Morphant® and to the use of the Sleeping Beauty Transposon System™. The reach of these technologies was extended this summer by an agreement that gives Techne Corp. the rights to develop antibodies and immunoassays for proteins discovered by DGI and an exclusive, royalty-free license to sell such products in the research market.

“Our dream is to grow into a longterm therapeutic-based business, doing basic research or providing lead compounds that are relevant to humans.”

—Steve Ekker

The four scientists who began DGI maintain close ties with the company and each other. Hackett has taken an indefinite leave from the University to serve as DGI’s chief scientific officer. Ekker, Largaespada, and McIvor served on the board of directors, resigning when the license agreement with Techne was signed. They remain consultants to the company, which counts them and the University among its stockholders.

“I think there are excellent resources in terms of personnel on the Minnesota scene,” says Ekker. “We can compete because we can do things cheaper, better and faster. Our dream is to grow into a longterm therapeutic-based business, doing basic research or providing lead compounds that are relevant to humans.”

—Deane Morrison

South of the border

As Minnesota temperatures drop, plant biologists head south to study plant life around the lakes of Brazil, and to compare ecological similarities and differences of South American rainforests.

George Weiblen, CBS, Rebecca Montgomery, University of Wisconsin, and Kyle Harms, Louisana State University find a comfortable perch in a Latin American rain forest.

If the plant life on the St. Paul campus was representative of Earth's biodiversity, life would be simpler for College of Biological Science plant biology researchers, but much less exciting.

Luckily, they are sometimes called to the far corners of the earth to study exotic flora. And they count themselves especially lucky if duty calls as Minnesota's temperatures drop. This fall, for example, David Biesboer and George Weiblen traveled to Latin America to advance research each has been working on for almost a decade.

Here's an account of what they saw and did.

Blame it on Rio

Given that David Biesboer, professor of plant biology, lives and works in Minnesota, it should be no surprise that his research involves plant life around lakes.

But the lakes Biesboer studied this fall were a continent away and resemble Minnesota lakes only in that they contain fresh water. That's where the obvious similarities, for the most part, end.

Biesboer was in Rio de Janeiro, Brazil, partly to continue the research he began there in 1993, which involves ecology and limnology related to these coastal lagoons. But he was also there to carry out his responsibilities as a Fulbright Scholar to Brazil. Much of his time was spent at the Universidade Federal do Rio de Janeiro, giving seminars and teaching a graduate class.

When he wasn't sharing his biological expertise, Biesboer studied Brazilian lakes, which are called coastal lagoons. They're found along the Atlantic coast and can be hundreds or thousands of acres in size but are very shallow – about three or four feet on average. Biesboer's research focuses on nitrogen and how it cycles from the atmosphere and soils into the lagoons' plants, a very complex process.

"The studies are often slow and laborious and may take several years to fully complete," Biesboer says. "We have published a few papers about these processes, both in the coastal lagoons and in lakes of the Amazon. At the very least, we know that these processes are different for the different lagoons (in Brazil) and are different for the lakes in the Upper Midwest."

The "we" refers to Biesboer and the universadade's Dr. Francisco Esteves, who has been studying coastal lagoons with Biesboer since 1993. Biesboer's trips have been supported by the Brazilian government and the National Science Foundation and, currently, by the U.S. State Department.

Research in Rio has its perks, as you might expect. Some of the world's top beaches and breathtaking scenery are a start. But when temperatures creep up over 100 during the day, the coastal lagoons provide a refreshing retreat for

Biocata healthy biology

Biocatalysis forum explores how academia and industry can work together to improve the earth's ecosystems and Minnesota's economy.

Biesboer. Who says science labs can't be enjoyable?

Nature's Nursery

Assistant Professor George Weiblen has a piece of advice for anyone looking for biodiversity: Visit a rainforest.

Take Panama's rainforest, for example. Panama is about the size of New York State but has more species of trees than all of North America. It's no wonder Weiblen's fascinated by the biodiversity he finds in rainforests. In fact, he has studied rainforest plant life – specifically, figs – the past nine years in Papua, New Guinea.

But this fall, Weiblen and a group of junior faculty and post-doctoral associates toured the rainforests in Costa Rica, Panama, Peru, and Brazil to conduct individual and group research to better understand the ecological similarities and differences among rainforests in Latin America.

David Biesboer

In Brazil, David Biesboer studied coastal lagoons (above) and the vegetation that grows around them, such as the tropical flower above right.

Weiblen's research involved the diversity and distribution of hemiepiphtyes, plants that begin life by growing on trees in the forest canopy but ultimately send roots to the ground. As he did in Papua New Guinea, Weiblen focused his attention on strangling figs, which attack their host trees and eventually replace them in the forest.

Weiblen collected specimens of hemiepiphyte species, classified them and studied their evolutionary relationships using DNA sequences. These collections, and others Weiblen has accumulated, will be added to permanent research collections in Minnesota and around the world.

In documenting the diversity, Weiblen was assisted by a team of scientists from the United States, Argentina, Costa Rica, France, Holland, Brazil and Mexico. They were supported by the U.S. - based Organization for Tropical Studies, which received a grant from the Mellon Foundation to carry out rainforest comparisons.

So, you might be wondering, how do you sift through all that biodiversity to focus on hemiepiphytes? According to Weiblen, it's as easy as taking a walk through the rainforest. That's what he did every day; he walked through the forest, surveyed the trees and collected small branches using a pruner that extended 40 feet.

David Biesboer

"In Panama, I used a research canopy crane, which provided a spectacular view of life above the forest floor," Weiblen says.

One of his most exciting finds in Panama was Cecropia trees, which participate in mutualism with Azteca ants. The ants live in the hollow stem of the tree and feed on special food bodies that it produces. In return for shelter and food, the ants defend the tree against leaf-chewing insects.

Weiblen sums up his experience best: "The rainforest is such a complex environment that you can walk the same trail every day and see completely new things, and much that is new to science. That's why I was there."

—Geoff Gorvin

CBS News

University of Minnesota at the Legislature

New facilities for plant growth are at the top of the University's list of capital projects

The University will ask the Legislature to approve funds for 12 renovation and construction projects when the session opens January 29, 2002. Total amount of the capital request, paid through bonds, is $239.8 million. The state would pay two-thirds of that amount, or $186.5 million.

The largest portion of the request, $80 million, is for HEAPR (Higher Education Asset Preservation and Replacement) funds to support approximately 85 safety, building code, and renewal projects. Lake Itasca Forestry and Biological Station is among the facilities that will be improved by these funds.

The request includes $18.7 million for upgrading plant growth facilities on the St. Paul campus. Outdated facilities, including the Northwest Greenhouses, would be replaced and others renovated to meet research standards and comply with state laws.

Ecology professor Ruth Shaw, who has been involved in planning, says she hopes the Legislature will recognize how urgent the need is this time. In 2000, the Legislature funded only a third of the amount. The greenhouses aren't reliable for research because temperature, light, and carbon dioxide levels can't be controlled, Shaw says. Recently, a large experiment was abandoned because of temperature and light variations within a greenhouse.

"The University can't maintain its leadership in agricultural and plant research with these greenhouses," she says, adding that the facilities won't support plant genomics research, studies of native prairie plants, or evaluation of genetically modified crop plants, all areas she believes are important to Minnesotans.

CBS Alumni are encouraged to support the request by contacting their legislators. For contact information, go to http://districtfinder.urbanplanet.com/.

The University can't maintain its leadership in agriculture and plant research unless the greenhouses are upgraded. Control of temperature, light, and C02 levels is not adequate for research.

Jim Cotner (right) samples water in Lake Michigan to understand how UV radiation affects aquatic ecosystems.

Cotner, occupant of the Moos Chair in Limnology. Cotner is studying effects of UV in aquatic ecosystems. He has found that increased UV—due not only to ozone depletion but also to human-induced losses in organic matter, which acts as a sort of sunscreen—could deplete the food supply of bacteria.

"UV essentially 'burns up' dissolved organic carbon, making it unavailable to microbes growing in the sea and in our lakes," Cotner says. In addition, the loss of the natural sunscreen makes organisms themselves more vulnerable to the harmful effects of UV. These effects, he says, are likely to have repercussions for the entire balance of nature in the world's waters.

—Mary K. Hoff

"We once thought that it was which species, not how many species, that mattered. Our work shows both which species and how many species matter."

—David Tilman

David Sherman, microbiology and the Biotechnology Institute, is one of three researchers sharing a $2.5 million federal grant to develop a drug against smallpox. They are using a technique Sherman developed to genetically engineer molecules that target an enzyme the virus needs in order to reproduce.

Claudia Schmidt-Dannert, biochemistry, molecular biology and biophysics, received a 2001 Packard Fellowship for Science and Engineering, which carries a grant of $625,000 over five years The program, established by the cofounder of Hewlett-Packard, recognizes the nation's most promising young scientists and engineers.

Karen Oberhauser, ecology, evolution and behavior, published a study in the September 18 issue of *Proceedings of the National Academy of Science* reporting that milkweed growing in cornfields sometimes supports monarch butterfly larvae at the same time the corn is shedding pollen. The overlap implies that monarchs feeding next to corn genetically engineered to contain the insecticide *Bacillus thuringiensis*, (Bt) toxin, could be exposed to the toxin.

The NSF has awarded more than $6 million for plant genomics research to faculty in the College of Biological Sciences, the Academic Health Center, and the College of Agricultural, Food and Environmental Sciences. Half, $3,098,136, goes to a multi-college group consisting of Nevin Young, plant pathology and plant biology, Kate VandenBosch, professor and head of plant biology; J. Stephen Gantt, plant biology; Ernest Retzel, Academic Health Center; Deborah Samac, plant pathology; and Carroll Vance, agronomy and plant genetics. The purpose of this research is to study the genome of the model legume, *Medicago truncatula*. The ultimate goal is to characterize and clone genes involved in valuable traits such as disease resistance, crop productivity, and nitrogen fixation—the unique ability of legumes to supply their own nitrogen.

The other half, $3,081,245, goes to Regents' Professor Ronald Phillips and USDA-ARS Adjunct Professor Howard Rines, agronomy and plant genetics, to develop a radiation hybrid system for the physical and genetic mapping of corn. Both awards are over four years, from 2001 to 2005.

Thirty-nine students and alumni mentors met each other at the BSAS Student/Alumni Mentor Program kick-off reception on Nov. 8. Mentors represented careers in pharmacy, medicine, research, veterinary medicine, ecology, public health, and business. The program seeks to match CBS students with alums working in their field of interest. Each year, needs for the alumni pool change in response to interests of students who apply. Pairs initially meet to get acquainted, then make arrangements to communicate monthly by phone, e-mail, or in person. If you would like information about becoming a mentor, contact Paul Germscheid at 612-624-3752 or pgermsch@cbs.umn.edu.

The proposal for the Biotechnology Precinct grew out of plans for the Microbial and Plant Genomics building, pictured above, which is under construction.

The Board of Regents approved plans for the University of Minnesota Biotechnology Precinct on the St. Paul Campus in October, 2001. The proposed precinct, which grew out of planning for the Microbial and Plant Genomics Building, will be located on the northeast quadrant of the campus.

Other components include an incubator for industry collaboration, facilities for research and development of biocatalysis, biomaterials, and biosensors, and renovation of an historic barn to provide dining services and meeting space. Construction on the Microbial and Plant Genomics building began in October.

UPCOMING EVENTS

Capital Request Briefing for Alumni
January 22, 2002, Memorial Hall, McNamara Alumni Center, 5:30 to 7:30 p.m. Learn how you can help promote the U's Legislative request. Displays, briefing by President Mark Yudof, buffet dinner, free parking. Refer to www.umaa.umn.edu for details.

David Tilman Lecture—Alumni Invited
February 21, 2002, Bell Museum, 3:30 p.m., reception at 5:00 p.m. David Tilman will present a special lecture to celebrate his appointment as McKnight Presidential Endowed Chair in Ecology. His topic is managing ecosystem services.

James Page Brewery Alumni Tour
February 28, 2002, 6:30 p.m., James Page Brewery, 1300 Quincy Ave. NE. Alumni networking event—includes tour, food, music, socializing with other U of M alums. Cost is $12. Call Karla Hoff at 612-625-9195 to make a reservation.

CBS Career and Internship Fair
March 1, 2002, Memorial Hall, McNamara Alumni Center, 11:00 am to 3:00 p.m. Students and alumni are invited to meet employers, learn about internships and careers. For details, contact Maggie or Traci, careercenter@cbs.umn.edu

CBS Alumni Networking Event
March 2, 2002, 3:00 p.m., Minnesota Commons Room, St. Paul Student Center. "Bio-weapons: How to See Through the Hype." Discussion on how to interpret media sensationalism with Martin Dworkin, professor of microbiology. RSVP to Lija Greenseid, 612-625-7705 or lgreense@cbs.umn.edu.

Life Sciences Undergraduate Research Symposium
May 1, 2002, Earle Brown Center, 2:00 to 6:00 p.m. Undergraduate students will showcase their contributions to life sciences research. For more information, call 612-624-3481.

60th Anniversary of Cedar Creek
September 21, 2002. Alumni gathering and celebration of the 60th Anniversary of Cedar Creek Natural History Area. Details in spring issue.

Goldburg honored for public policy role

Rebecca Goldburg, Ph.D. 1985, will receive one of the U's highest honors.

The University of Minnesota has selected Rebecca Goldburg to receive an honorary Doctor of Law degree for her advocacy of public policy to promote food safety.

As the nation's investment in agricultural biotechnology grows, policymakers, consumers, and the media struggle to understand its far-reaching effects – and they're turning to Rebecca Goldburg for help. As a senior scientist at Environmental Defense, Goldburg is one of the nation's leading experts on how our methods of food production affect human health and the environment.

Goldburg, who holds an A.B. in statistics from Princeton University (1980) and an M.S. in statistics and Ph.D. in ecology from the University of Minnesota (1985 and 1986), is an advocate for balanced, coherent, and scientifically defensible public policy regarding food safety. She has been interviewed frequently by journalists from the *New York Times* to CNN and serves on the USDA's Advisory Committee on Agricultural Biotechnology and on the USDA's National Organic Standards Board. She recently served on the National Academy of Science Committee on Genetically Modified Pest-Protected Crops and the U.S. State Department's Consultative Forum on Biotechnology.

In her work with Environmental Defense, Goldburg has been on the front line of public policy debates surrounding the consequences of antibiotic use in farm animals, the potential environmental consequences of bioengineered food products, and the environmental effects of aquaculture (fish farming). Environmental Defense is a national nonprofit organization that combines science, economics, and law to find solutions to environmental problems.

"I find I'm someone who most enjoys working in several areas and being on the edge of what I know, rather than exploring a narrow subject in great depth," she says. This Renaissance approach is what led her to work in public policy.

Goldburg was amply prepared for this role by her graduate work at the University where, she says, "I found the graduate students in the ecology department and elsewhere to be stimulating friends with a lot of new ideas. I remember graduate students whose knowledge of natural history and taxonomy was extraordinary and inspiring."

Goldburg herself continues to inspire many at her alma mater. Professor Patrice Morrow, who was Goldburg's Ph.D. advisor, follows her career like a proud parent. "Becky's advocacy is built on the best of science and on solutions that are practical and that work," says Morrow.

"Without Rebecca's efforts, much of the scientific data related to these issues would not have been collected, and most ecological scientists would have been left on the sidelines."

—David Andow

"It would be difficult to understate her role in enabling a scientific discussion of the environmental risks of genetic engineering," says David Andow, entomology. "Without Rebecca's efforts, much of the scientific data related to these issues would not have been collected, and most ecological scientists would have been left on the sidelines."

In recognition of her outstanding accomplishments, Goldburg has been selected to receive an honorary Doctor of Law degree from the University. "The award brings honor to her and to the university that helped to prepare her for an exceptional career," says Morrow.

An award ceremony will be held in fall 2002.

—Jennifer Amie

Adrienne Kari, social scientist

Adrienne Kari enjoys the social side of the CBS student experience. She also helps keep alumni in the loop.

If you had met Adrienne Kari at her sixth grade science fair, you might have predicted her future. Assigned to create three-dimensional models of viruses, most of Kari's classmates built simple examples that looked like diamond-shaped lollipops. But Kari constructed an elaborate spherical model of cytomegalovirus that cracked open to reveal spiraling DNA inside.

Today, Kari brings the same kind of enthusiasm to her work as a University student and president of the Biological Sciences Student Association.

"I've always been interested in science," says Kari. "There's a lot of room to move and always something new to discover."

But for Kari, there's a lot more to her CBS experience than she finds in classrooms and labs. She's also vitally interested in discovering new friends and supporting the social life of the college, from networking with students to keeping alumni in the loop.

"Now that we're together for four years, we're forming stronger relationships with each other and the College. I think we'll be more inclined to stay in touch after graduation."

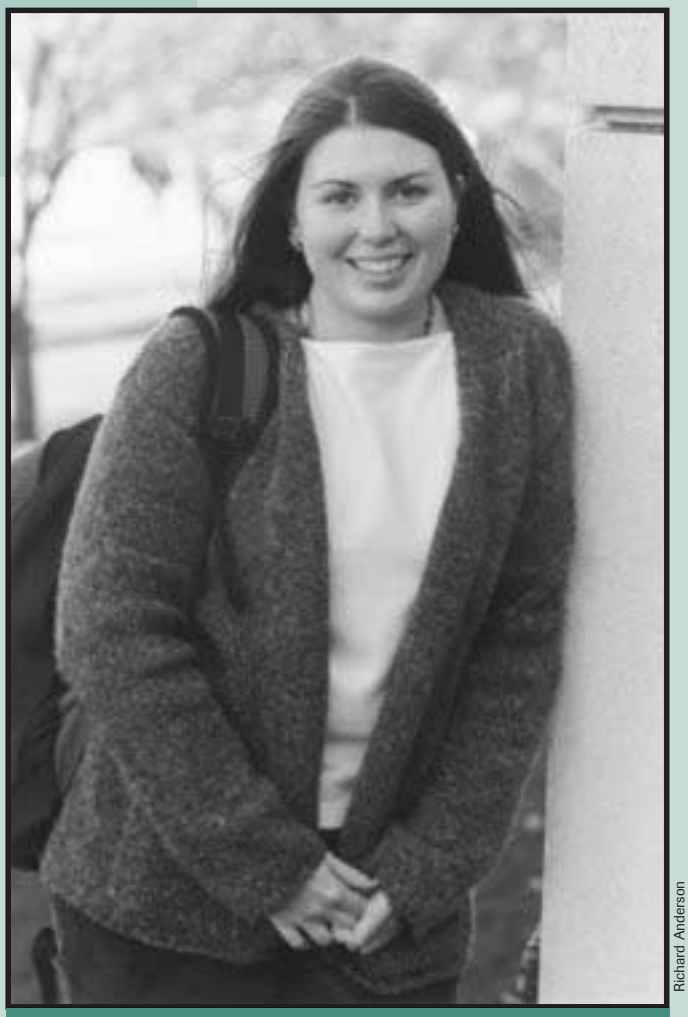
Now a senior majoring in biochemistry, Kari joined the Biological Sciences Student Association as a sophomore, hoping to meet people and find study partners. "It's been a really good way to turn friends from classes into social friends," she says. "And I've gotten a lot of good advice on selecting classes because students in every major belong to the association."

This year, Kari has expanded her role by serving as student representative on the college's alumni board. "I'm a resource for alumni who would like to understand what CBS is like today," she says. "Alumni who graduated 20 or 30 years ago are surprised to find out how dramatically things have changed. For example, the College now admits students as freshmen, there are new buildings and labs, and even studying is different because of the Internet."

Many alumni, she says, are curious about today's student experience. "They'd like to know if students are getting to know each other better, and if CBS has a small-college feel," Kari says. To meet alumni, Kari also volunteers at events such as the homecoming picnic and reunions.

As she prepares to graduate, Kari also realizes the importance of preparing today's students to be tomorrow's alumni. "Now that we are together for four years, we're forming stronger relationships with each other and the college," she says. "Because of this, I think we'll be more inclined to come back to a reunion or to stay in touch after graduation."

—Jennifer Amie



Richard Anderson

Adrienne Kari is president of the Biological Sciences Student Association.

AlumNews

From the president

Join an alumni 'dream team'

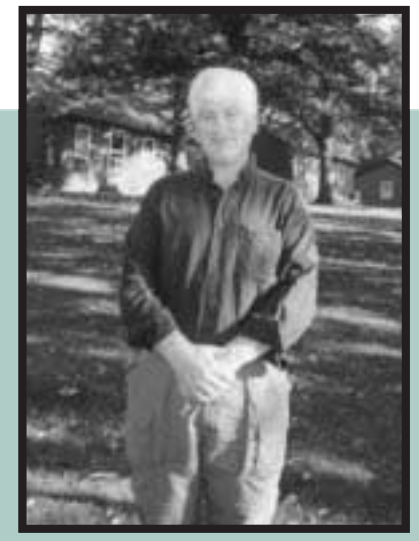
Several years ago, I participated in a Citizen's League research committee that evaluated the quality of graduate education and research at the University of Minnesota. Our report was titled "A Competitive Place in the Quality Race: Putting the University of Minnesota in the Nation's Top Five Public Research Universities." We undertook the effort to support President Yudof's goal of making the University of Minnesota one of the top five public research universities in the nation.

We concluded that the U's role as a land-grant institution and the state's higher education policies impeded this goal. Our recommendations to overcome these impediments included focusing resources on fewer emerging research opportunities and strengthening their respective departments.

It is gratifying to learn that CBS is adopting this strategy by forming "dream teams." *(See story, page 4.)* Seeking talented researchers and building high-powered teams will make the College more competitive in important areas of biology. Not only is this exciting from an academic point of view, but from an economic point of view. Dream teams attract great students and investments in Minnesota businesses.

This is good stuff. As alumni, we too can create "dream teams" to serve the College. There are lots of opportunities to help with events planning, the Legislative Network, the Mentor Program, volunteering at the CBS State Fair exhibit, and Board participation. Please reflect on your talents and how you can use them to serve on one of these teams. Your involvement will have a big impact on CBS students and the quality and reputation of the college.

I invite alumni to contact me or Emily Johnston, Alumni Relations Coordinator, at 612-624-4770 or to learn more about these dream teams or about the work of the Biological Sciences Alumni Society. I also encourage you to attend one of our events or meetings.



Dick Osgood

Dick Osgood,
President, Biological Sciences
Alumni Society

Alumni Weekend at Itasca

About 120 alumni, family, and friends enjoyed a beautiful fall weekend at Lake Itasca Forestry and Biological Station Sept. 28-30. In addition to the usual hikes, boat rides, classes, and other activities, there was a dedication ceremony to rename the recreation field in honor of Professor David Parmelee, who was station director from 1971 to 1986 and died in 1998. His widow, Jean, who took part in the ceremony, made a generous gift to upgrade the field. Improvements include a new baseball diamond, badminton court, playground equipment, and landscaping. Dean Elde spoke about Parmelee's many contributions to the College and students, and alumni shared memories of him.

David Parmelee remembered at Itasca dedication.

CBS Homecoming Picnic

Alumni joined students, faculty, and staff on October 19 for the First Annual CBS Homecoming Picnic. The well-attended event was held on the front lawn of Snyder Hall. Activities included a buffet dinner, hayride, tours of Biodale, drawings for prizes, and a tug-of-war between departments. The Dean's Office, winner of the tug-of-war, was presented with the coveted Golden Microscope Award. The Spirit Award went to the Department of Ecology, Evolution and Behavior. EEB's prize was a bagel breakfast served by Goldie Gopher. Bob Burgett from the UM Alumni Association attended to present Dean Elde with a Hats Off award for his ability to explain complex biological concepts to lay audiences. Following the Homecoming Picnic, guests attended the University's Homecoming bonfire and rally behind the St. Paul Student Center.

CBS Career Center brings employers and graduates together

CBS Career Center and Andcor are working to find biotechnology jobs for CBS graduates and meet workforce needs of the state's growing biotechnology industry.

Richard Anderson

Eric Erickson gets advice from Maggie Kubak, Career Center coordinator.

Looking for a biotechnology job in Minnesota? Or a skilled employee to fill a biotech job? Whether you're a current student, an alumus, or an employer, the CBS Career Center can help.

Following are some of the ways the Career Center brings job seekers and employers together. Web accessible resources and databases are being developed or improved to provide better service.

BSAS Mentor Program

The Alumni Mentor Program matches CBS students with alumni working in biotechnology or other fields of interest. The purpose is to offer students exposure to a variety of areas to help them make career decisions. The program is open to all CBS students and on an individual basis to alumni making career changes. Alumni are always needed as mentors. Contact Paul Germscheid at 612-624-3752 or pgermsch@cbs.umn.edu for further information.

Informational interviews and job shadowing

Talk to a CBS grad at a Minnesota biotech company who has a job that interests you. Or spend a day job shadowing to learn even more about a company and type of job. Contact the Alumni Career Network, careercenter@cbs.umn.edu.

University career services

The University also offers career services and access to job postings. University of Minnesota Alumni Association (UMAA) Career Connection contracts with national career and job posting sites. To learn about their services and view postings, refer to www.umaa.umn.edu. The Career Connection is under the heading "Get Active." The College of Continuing Education administers the Career and Lifework Center, which provides a "front door" to the U for adults seeking education to refocus and enrich their careers and lives. Refer to www.lifework.umn.edu.

Internships

Gain valuable experience in a field of interest while you make connections that could lead to a career opportunity. Or hire an intern to work at your company. R&D Systems will fund eight internships for CBS students this summer. Amgen recently invited CBS to collaborate on an internship program. Many other Minnesota companies offer paid and unpaid experiential opportunities. Contact careercenter@cbs.umn.edu.

Resume Filing Service

Submit your resume to this service, offered as a free resource to Minnesota employers. Resumes that match job requirements are forwarded to employers. Send your resume to careercenter@cbs.umn.edu.

Job postings

Listings of jobs are maintained by the Career Center. For information, contact careercenter@cbs.umn.edu. Position openings are also advertised via e-mail newsletters to alumni and students.

Career and Internship Fair

Come to the Career and Internship Fair on March 1, 2001 in the McNamara Alumni Center. Learn about careers and job opportunities. Meet with prospective employers/employees. For more information, contact careercenter@cbs.umn.edu.

Building relationships with biotech companies is a top priority of Maggie Kubak, new Career Center coordinator. By strengthening connections, she hopes to better serve CBS job seekers while helping biotechnology companies meet workforce needs.

"Biotechnology is one of the fastest growing job markets for biology graduates," says Kubak. "There are new jobs emerging all the time in health care, agriculture, environmental clean-up, and biocatalysis."

Andcor recruits biotech execs for Minnesota companies

Richard Anderson

Dennis Anderson, Terri Naughtin, and Jack Hauser of Andcor.

Dan Johnson left Minnesota after graduation from the University of Minnesota to find his fortune in Silicon Valley. Within ten years he had achieved that goal as an executive with a software company.

But by this time Dan's values had changed. He and his wife wanted a different kind of environment for raising their three children than California could offer. They realized they had left another kind of fortune in Minnesota and wanted to explore the possibility of returning home.

Dan contacted Andcor, a Minnesota firm that recruits executives for emerging growth companies. At the time Andcor didn't have the kind of job Dan was looking for, but they added him to their database and about a year later contacted him about a position with a new company. The company has grown explosively since he joined it a few years ago.

"The reason companies like this one grow is because of talented people like Dan," says Jack Hauser, Principal and CFO. "One of our main goals at Andcor is to match the right people with the right companies and watch them take off."

Andcor, which began 30 years ago as a search firm, today offers a wide range of services to help companies be successful.

"This can be as broad as securing financial resources, forming a board of directors, and building an executive management team, or as narrow as filling one or two key positions," says Principal Terri Naughtin, who specializes in organizational design for emerging growth companies.

For the past 10 years, Andcor has focused on emerging growth companies based in Minnesota. These tend to be young companies with exceptional growth potential that are capable of attracting venture capital. And lately, many have been biotechnology and medical companies.

Minnesota has a lot of potential for developing a strong biotechnology industry, Naughtin says. In fact, Andcor is working with the University to help grow the state's community of biotech companies by focusing on the human capital component. The University is a fertile ground for new product ideas. But, she says, "It takes more than ideas. It takes talented, capable, experienced people. Team is the important thing."

Hauser and Naughtin believe graduates of the College of Biological Sciences are just the kind of people they're looking for. Andcor has begun working with CBS to build a database of talented people with biotechnology expertise who want to relocate to Minnesota. They are particularly interested in alumni like Dan Johnson, who have moved away and want to come back for lifestyle reasons.

"There's something special about Minnesota that brings people back—the people, culture, quality of life, economy, schools," says Dennis Anderson, CEO and founder of Andcor. "You can't find a better place to live and raise a family. We're especially interested in people who have ties to Minnesota and are looking for opportunities to return."

Andcor is looking for people with exceptional skills in all areas of biotechnology, from research and development to sales, marketing, and management, who have an entrepreneurial spirit.

"We're looking for people who have an interest in working in an entrepreneurial environment, who want hands-on involvement, and are willing to take risks in exchange for equity and growth opportunities," Hauser says.

To learn more about Andcor, refer to their web site at www.andcor.com. CBS Alumni are also invited to contact Jack Hauser at jhauser@andcor.com, Terri Naughtin at tnaughtin @andcor.com, or Dennis Anderson at danderson@andcor.com.

Class notes

James March, Ph.D. (B.S. 1964; M.S. 1967) has retired from the Wisconsin Department of Natural Resources after 31 years. His career included variety of positions from research biologist through administrator.

Vicki Schuman (B.S. 1979) is working in marketing communications for technical industries at Schuman and Associates.

Julie Anderson Kirihara (B.S. 1981; Ph.D 1988) recently became president of MNBIO, a Minnesota association of biotechnology companies. Kirihara is founder and CEO of ATG Laboratories, Inc.

Ariana Lindemann, (B.S. 1987) recently joined the staff of the Department of Plant Biology, where she is engaged in collaborative work in genomics with responsibility for overseeing a robotic facility. Lindemann received a number of awards while she was an undergraduate at CBS, including the Eloise Pittman Scholarship and the Biological Sciences Alumni Society scholarship.

Paula Penning (B.S. 1989) provided emergency support services following the Sept. 11 destruction of the World Trade Center. Penning works for 3M's Occupational Health & Environmental Safety Division, which manufactures occupational health products including respiratory protection. Members of her group went to New York and Washington, D.C. to provide on-site assistance on respiratory products. Paula was a member of the emergency response team located in St. Paul.

Beau Liddell (B.S. 1992; M.S. 1997) has been promoted to area wildlife supervisor for Little Falls, Minnesota by the Minnesota Department of Natural Resources (DNR). In his new position, he is responsible for directing, promoting, and implementing DNR wildlife programs and policies in Benton, Morrison, and Todd counties. Previously he was the acting area wildlife manager in Redwood Falls. Beau, his wife, Judy (B.S.1992), and their daughter, Jamie, moved to the Little Falls area in November.

Chris Jameson (B.S. 1993) graduated from the University of Michigan with a master's degree in biology and is looking for employment in the area of international conservation. After earning his B.S. at CBS, Chris worked as a Peace Corps wildlife biologist in Niger, West Africa and hopes to continue to work on African conservation and resource management issues. He would like to hear from alumni working in this field, particularly in Washington, D.C. He can be reached at cjameson@umich.edu.

Maria Legatt Taft (B.S. 1993) completed a master of science degree from Midwestern University. She works for Park Nicollet Clinic as a family practice physician assistant.

Melinda Bimberg (B.S. 1994) is working for Chiron Corp in the San Francisco Bay Area. She invites other alumni interested in working in northern California to e-mail her at melinda_bimberg@chiron.com.

Jeff Humbert (B.S. 1995) was featured in a *Star Tribune* article this fall about the cost of Medical School. Jeff is a first-year resident in pediatrics at Fairview-University Medical Center.

Robert Wild (B.S. 1995, Ph.D. pharmacology, 2000) recently joined the oncology drug discovery group at Bristol-Myers-Squibb Pharmaceutical Research Institute in Princeton, New Jersey. He is a research investigator responsible for all *in vivo* pharmacology aspects of oncology drug development. Previously he was an oncology research scientist at Sugen, Inc., a subsidiary of Pharmacia Corp.

Daniel Liedl (B.S. 1996) is a captain for the U.S. Army Health Care Team based in Bloomington, MN, and lives in Apple Valley. He recently published a paper on digital temperatures for the Mayo Clinic. Liedl can be reached by e-mail at daniel.liedl@usarec.army.mil.

Peggy Rinard

Goldy Gopher pays a visit to Biodale, the College's one-stop shopping center for advanced research services.

Joe Fong (B.S. 1998) completed an MBA in health care management and is currently in Anchorage, Alaska, serving a fellowship with Providence Health System.

David Watrous McCabe (B.S. 1998) is in his second year of the Ph.D. program in biomolecular chemistry at the University of Wisconsin School of Medicine in Madison. He is working in the laboratory of Dr. Michael Sheets.

Katherine Himes Lescher (B.S. 1999) completed an MBA at the University of Wisconsin, Madison, where she was named one of two top students in her class. She recently began a Ph.D program in neuroscience at the University of Minnesota.

Malcolm Johns (B.S. 1999) is working in a neurobiology lab at Georgia State University in Atlanta.

Jennifer Johnson (B.S. 1999) recently returned from Gambia, where she served as a Peace Corps volunteer. Johnson worked on the R.T. Rybak mayoral campaign and plans to remain in the Twin Cities for a while.

Darren James Baker (B.S. 2000) is working in a cancer research laboratory at Mayo Clinic. His group published a study in the Nov. 16, 2001 issue of *Science* Baker is applying for medical school.

Cassandra Hamilton (B.S. 2000) is in Rochester going to nursing school.

David Simmons (B.S. 2000) recently accepted a new position with ATG Laboratories, Inc., a Minnesota biotechnology company founded by Julie Kirihara.

Amy Steffenhagen (B.S. 2000) is a technical services specialist for Gentra Systems, Inc., in Plymouth. Her position involves lab research and communication with customers. She works closely with the sales department and often has the opportunity to travel.

Christa Van Patten (B.S. 2000) was hired in August by DiaSorin.

Wade Anderson (B.S. 2001) is in the Ph.D. program in biochemistry at Stanford University. His e-mail address is wadea@stanford.edu.

Dan Owens (B.S. 2001) is in medical school at the University of Michigan

Peggy Rinard

The Dean's Office staff shows off their muscles during the Homecoming tug-of-war. The team won the coveted Golden Microscope.

A night to remember

Donors and scholarship recipients meet at annual Recognition and Appreciation Dinner.

It was almost like watching a reunion of long-lost friends or relatives. Donors who endowed scholarship funds and student recipients moved through the crowd in Memorial Hall, scanning nametags for the special person they had come to meet. The search often ended with smiles and a hug.

In most cases, this was the first time donors and students had met each other. Every year the College awards approximately 75 scholarships funded by endowments created by or to honor faculty, staff, alumni, and friends. About 300 donors, students, and parents attended this year's Recognition and Appreciation Dinner, held for the first time at the McNamara Alumni Center.

Tim Rummelhoff

Henrietta Miller, with student Jackie Chan, right, and her parents, left. A scholarship was established in Miller's name when she retired from the Biochemistry Department.

Tim Rummelhoff

Donors, students, and parents enjoy dinner and conversation at the Recognition and Appreciation Dinner.

Robert Elde, dean, spoke on "Celebrating Investments" in students. CBS, which has a scholarship endowment of approximately $1 million, hopes to raise that to $10 million to remain competitive with other schools and to help students pay rising tuition costs.

Laura Brunner, Class of 2002 and recipient of the Harold Paul Morris Scholarship, was student speaker. Brunner, who is from Alaska, talked about why she chose Minnesota and expressed her appreciation to donors for putting their money and faith in CBS students.

Tim Rummelhoff

Robert Elde, CBS dean

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