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University of Minnesota

Frontiers

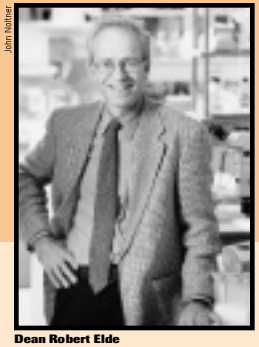
MAGAZINE OF THE COLLEGE OF BIOLOGICAL SCIENCES

Studying the big picture

Researchers at Cedar Creek take on some of the planet's biggest biological questions.

Inside

From the dean


John Noltner

Dean Robert Elde

WHEN A SPARK FROM THE HIGHWAY STARTED A BRUSH FIRE THIS FALL IN East Bethel, Minnesota, one of the college's—and the University's—most valuable assets nearly went up in smoke. Fortunately, the Cedar Creek Natural History Area and the priceless experiments it contains were largely spared, thanks to the efforts of Cedar Creek staff and a dozen state and local firefighting groups. One thing the firefighters had in their favor, says Cedar Creek associate director Clarence Lehman, is the fact that the hundreds of acres of prairie grass that burned have been the subject of controlled-burn experiments for more than 35 years, so they provided limited fuel.

Cedar Creek's long-term, prescribed-burn research not only saved the site from a fiery disaster, but also has illuminated the way forests and prairies develop. But, as Clarence points out, Cedar Creek is a lot more than a controlled-burn experiment. According to the journal *Nature*, "the site is rapidly becoming one of ecology's classic localities." It is world-renowned for the biodiversity experiments conducted there (read about them starting on page 4) and for its amazing history. Raymond Lindeman, now recognized as the father of modern ecosystem ecology, did his pioneering research at Cedar Creek in the 1940s (page 6). Two decades later, University researchers invented electronic telemetry technology, which allows the study of animal behavior through radio tracking, at Cedar Creek. The old radio antenna still stands there, although telemetry—which is now used throughout the world—relies on satellites and hand-held antennas these days.

Starting in the 1980s, Cedar Creek researchers have helped establish modern ecological theory, examining how species compete and coexist, how species diversity contributes to ecosystem stability, and how habitat destruction affects extinction. Recent large-scale experiments look at impacts of human changes to the environment: increased carbon dioxide, increased fertilization, elimination of species.

Aside from its stellar research history, the site itself is unique, located in one of the most ecologically diverse areas in Minnesota. Three great plant biomes come together in the region: eastern hardwood forest, northern evergreens, and western prairie. Cedar Creek also contains a rare outpost of northern black spruce bog along with a white cedar forest that has escaped a century of logging, stretches of never-plowed prairie amid a large remnant of oak savanna, and an uninhabited mile-wide lake. The biological content is unparalleled in a location so accessible from the Twin Cities.

Cedar Creek deserves notice—and receives it, around the nation and around the world. It's a registered National Natural Landmark, a National Science Foundation Long-Term Ecological Research site, a Department of Energy Free-air Carbon Dioxide Exchange site, and a National Science Foundation Microbial Observatory.

And Cedar Creek will continue to play a critical role in ecosystem research, with several cutting edge projects by University faculty underway there and a proposed new University initiative in global ecosystem change that promises to intensify efforts in this field.

We can all thank our lucky stars that the October grass fire that threatened Cedar Creek was successfully contained!

Robert Elde
Dean, College of Biological Sciences

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Cover photo of David Tilman by John Carnett, courtesy of the LA Times Syndicate.

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Big-picture biology

David Tilman takes on ecosystem-size questions at the outdoor lab of Cedar Creek

by Deane Morrison

THE LAST DAY OF MAY IS only a few hours old, and a morning chill lingers in the air at the College of Biological Sciences' Cedar Creek Natural History Area. The hustle and bustle of the Twin Cities, less than an hour to the south, is quickly forgotten as visitors follow ecology professor David Tilman through dew-laden grass along the faintest of paths. The path runs between small plots of green grass that at first glance look much the same. After less than a minute's walk through the field, Tilman finds what he's looking for and stops.

"See how many different types of plants grow here," says Tilman, indicating one plot. Then he points to another just a few feet away. "But look at this one. It's almost pure quack grass."

The two swaths of grass suddenly look as different as day and night. Tilman explains that the prairie plants in the first plot, where diverse species grow, were fertilized with only a small amount of nitrogen. But the plot that turned to quack grass was treated with about five times as much. Its fate, explains Tilman, could be shared by terrestrial ecosystems around the world as more and more nitrogen, spewed into the atmosphere by human activity, settles into soil.

The nitrogen experiment is just one of Cedar Creek's many projects designed to tease apart the mechanics of ecosystems; not just to understand how ecosystems work, but to predict how they will respond to the inevitable intensification of human impacts. A researcher at Cedar Creek since 1980 and director since 1992, Tilman has spent half a career studying the forces that shape ecosystems and dictate how they respond to change. Now 51, he sees the second half of his career as a time to get people around the world thinking about what the future will bring if current trends continue.

If the world's ecological future can indeed be predicted, it is in part due to Tilman, who spent his childhood in a showcase of ecological succession: the eastern shore of Lake Michigan, where sand dunes steadily yield to grass, shrubs, and finally trees as one walks landward from the beach. He was attracted to ecology largely because it offered so much growing space for scientists with a theoretical bent. A physics major when he began college at the University of Michigan, he saw that field as one where many of the greatest discoveries had already been made. But ecology was a much younger science, bursting with potential.

"We're producing a rain of nitrogen around the world. But nitrogen is like money to an ecosystem. Think what would happen to our economic system if it rained $100 bills. Professions that paid less than one could earn by picking up $100 bills would go extinct." *David Tilman*

"Ecology was like physics at the time of Newton," says Tilman. "There was a vast storehouse of knowledge about organisms, species, and so forth, but no theory to explain it. I saw its potential to be a quantitative, predictive science."

The nitrogen enrichment experiments at Cedar Creek fit the quantitative mold nicely. They indicate that nitrogen enrichment can quickly become a case of too much of a good thing, pushing ecosystems toward fewer plant species and less total vegetation. In Tilman's experiments, quack grass took over when nitrogen additions passed a certain point. But the stand of pure quack grass couldn't maintain equilibrium; it grew fast and died in big clumps that will eventually decay and add their nitrogen to the load already in the soil. The crash in the quack grass population also means fewer living plant roots to absorb soil nitrogen and keep it from contaminating groundwater.

"With more nitrogen fertilizer being applied and more oxides of nitrogen being released from internal combustion engines, we're producing a rain of nitrogen around the world," says Tilman. "But nitrogen is like money to an ecosystem. Think what would happen to our economic system if it rained $100 bills. Professions that paid less than one could earn by picking up $100 bills would go extinct. That is just what happens to many plant species because of nitrogen deposition."

The nitrogen experiments go to the heart of Tilman's nearly two decades of work at Cedar Creek: the question of whether and how maintaining a diversity of species—biodiversity—makes a difference to the health of ecosystems we all depend on. Does it really matter if the number of species is allowed to dwindle over large tracts of land and water?

Yes, says Tilman. His plots of prairie plants at Cedar Creek survived the drought of 1987–88 much better, and produced more vegetation, if they contained many plant species. All in all, he has found that a greater diversity of species means greater stability and productivity for plant life, even if individual species may suffer some wild boom-and-bust cycles. And if the pattern with nitrogen enrichment is any indication, stress is likely to work against biodiversity.

Lisa Tilman

David Tilman is a Distinguished McKnight University Professor in the College of Biological Sciences' Department of Ecology, Evolution, and Behavior and director of the Cedar Creek Natural History Area.

FOR MUCH OF THIS century, the science of ecosystem ecology has had a distinctly descriptive nature. That's hardly surprising, given the enormity of a task like sorting out the mathematical principles that govern huge natural systems with thousands of species. But Tilman has long believed that such principles must exist and so can be discovered, just as physicists have found laws to describe the behavior of matter. Knowing that basic laws lurk within the maze of ecological complexity has drawn him, fascinated, ever deeper into the labyrinth.

As a graduate student at the University of Michigan, Tilman found that Lake Michigan's algae were dispersed in the lake according to the ratio of two key nutrients: phosphorus and silicon. Soon after arriving at the University of Minnesota in 1976, he realized that the fields of Cedar Creek would make an even better laboratory to test theories of how species interact, both with each other and with the nutrients and other factors that

A creek runs through it

RESEMBLING A TEARDROP ON THE LANDSCAPE, TINY CEDAR Bog Lake barely holds its own against the vegetation that crowds and threatens to slowly swallow it. Though perhaps doomed to such a fate, this unprepossessing pond in the College of Biological Sciences' Cedar Creek Natural History Area enjoys a secure reputation among limnologists and ecologists. Here, barely an hour north of the Twin Cities, a young University of Minnesota graduate student named Raymond Lindeman revolutionized the science of ecosystem ecology.

Frail of health and blind in one eye, Lindeman arrived at Cedar Creek in the late 1930s and chose Cedar Bog Lake as a model of how ecosystems function. He gathered and analyzed countless samples of water and vegetation, even when so weak he needed his wife do heavy lifting or row the boat. His Herculean labors resulted in what is known as the trophic-dynamic concept, by which organisms are classified according to how they obtain, use, and pass on energy to the next trophic level. (For example, herbivores would occupy a trophic level between photosynthetic plants and carnivores.) As one follows the food chain of an ecosystem up through its trophic levels, the amount of available energy decreases dramatically with each step.

Lindeman wrote a now-classic paper based on this work, but it met with rejection when he tried to publish it. Fortunately, Lindeman's postdoctoral adviser, the legendary Yale limnologist G. Evelyn Hutchinson, went to bat for him. But Lindeman never saw his work in print. He died at age 27 in April 1942, a few months before his paper appeared in the journal *Ecology*.

More than half a century later, Cedar Creek remains an ecologist's dream laboratory. Its nine square miles comprise remnants of native prairie, oak savanna, cedar forest, hardwood forest, and northern black spruce bog, along with mile-wide Fish Lake. The bogs harbor hordes of insectivorous pitcher plants, which survive in nitrogen-poor bog mats by upending the usual animals-eat-plants order of things. Wood-plank walkways lead across the mats, protecting the fragile vegetation and offering visitors safety from wet boots and a potentially nasty fall through the mat. The dry areas boast a variety of wildflowers and woodland plants such as trillium and jack-in-the-pulpit.

Besides David Tilman's biodiversity studies, Cedar Creek continues to support work at the leading edge of ecology. University faculty like Peter Reich (forest resources) and Sarah Hobbie (ecology, evolution, and behavior) are tackling big questions about ecosystems. Among the projects is Reich's study of how a prairie ecosystem responds to three of the biggest perturbations from humans around the globe: excess carbon dioxide, excess nitrogen, and artificially varied numbers of species. Hobbie is studying how carbon and nitrogen flow through ecosystems. Her work involves tracking of nutrient cycling as leaves fall, accumulate, and decay.

University of Minnesota Archives

Raymond Lindeman

Savannas are often subject to fire, and some sections of Cedar Creek are regularly burned to see its effects. This fall, however, dry conditions and an errant spark resulted in 500 acres of uncontrolled burn, mostly in the burn study area. Although the fire didn't deal a death blow to Cedar Creek, it did throw a monkey wrench into the design of burn experiments, and destroyed some data collection devices in the process.

Though destructive, fire isn't Cedar Creek's biggest threat. That comes from encroaching suburban development, and staff are planning ways to protect Cedar Creek from the inevitable crush of civilization. By working with government to discourage further road development and giving the public a stake in preserving the site, the caretakers of Cedar Creek hope to keep it in shape to tackle the big ecological questions of the next century.

—Deane Morrison

Continued from page 5

affect them. In 1982 the National Science Foundation recognized the potential of work by Tilman and other University ecologists by designating Cedar Creek as the site of an NSF-funded Long-Term Ecological Research project. There are only 18 such sites in the country.

In 1994 Tilman published his work on drought resistance, in which he concluded that biodiversity alone could play a protective role in ecosystems.

"The tradition from the 1970s to the 1990s was to view diversity only as a consequence of environmental factors, for example, habitat size, rates of disturbance, or how isolated the ecosystem was, and so on," he says. "But we showed in 1994 that diversity can impact a system. Therefore, causation can go in both directions. That was a major shift, a paradigm shift, in the discipline."

One doesn't shift paradigms without attracting notice. Six years after his work on biodiversity and drought resistance appeared, Tilman has become the most cited environmental author of the past decade, according to an analysis by the publication *Essential Science Indicators*. This year it reported that 15 of Tilman's papers have been cited a total of 1,222 times.

But controversy, too, seems to come with the territory. Some prominent ecologists have criticized Tilman's work, saying that, among other things, plots with more plant species came out better after a drought simply because they had contained species that naturally produce more vegetation. Tilman counters that his analyses control for this possibility and still show that diversity exerts strong effects on stability. Moreover, a new mathematical theory he recently published with Clarence Lehman, associate director of Cedar Creek, explains how diversity leads to stability.

"The effect is similar to the reason why a mutual fund containing many different types of stock has its price change less than the stock of a single company," he explains. "In essence, the more species there are in an ecosystem, the greater is the likelihood that some will resist drought—or pests, or whatever the stress may be."

"The effect [of biodiversity] is similar to the reason why a mutual fund containing many different types of stock has its price change less than the stock of a single company. In essence, the more species there are in an ecosystem, the greater is the likelihood that some will resist drought—or pests, or whatever the stress may be." *David Tilman*

But a debate still rages over whether it's the *number* of species or the *type* of species that's crucial to ecosystem health.

"For example, the original pine, oak, and aspen forests in Michigan, Minnesota, and Wisconsin have been turned into aspen and oak forests," says Tilman. "If the current forests are found to be less stable or less productive, would it be from the loss of diversity or a change in their composition [of species type]? I think both. Sometimes we lose a rare species, and sometimes, as in chestnut blight, a dominant one. The question is, are there equal effects from loss of rare versus dominant species? We don't know."

ANSWERS TO SUCH QUESTIONS ARE becoming ever more important to local and national policy makers. To this end, Tilman, armed with a grant from the Pew Charitable Trust, founded *Issues in Ecology,* a publication that presents basic science on environmental issues in a way lay people can understand. His goal is to spark discussion of the links between nature and human society, asking questions that won't be answered during his lifetime.

One link Tilman says often goes unrecognized is that healthy ecosystems perform vital services many of us take for granted. Purifying water is one.

"Water that's as inexpensive as we'd like comes from undisturbed ecosystems," he says. When an ecosystem fails to deliver this

David Tilman

Plots in one of the biodiversity experiments at Cedar Creek

Johannes Knops

Tilman and summer research interns at Cedar Creek

service, it can impose real hardship. "Many farmers in the corn belt can't drink their own well water because of pesticides or nitrates from fertilizer."

The nitrate-laden well water points up the importance of humans in many ecosystem "failures." With colleagues at universities around the country and in Canada, Tilman has identified two major avenues for human impact on the planet. The first, energy use, has been linked not only to global warming, but to the worldwide increase in atmospheric nitrogen.

"Even clean combustion creates much biologically active nitrogen," says Tilman. "There are lots of costs to restraining consumption of fossil fuels. It will be painful."

No surprise there. What did surprise Tilman was the huge, manifold power of agriculture. Agricultural practices have caused gluts of nutrients that would otherwise be in short supply, notably nitrogen, the "currency" of terrestrial ecosystems, and phosphorus, the currency of freshwater environments. Low-phosphorus detergents, and especially removal of phosphorus during sewage treatment, have helped restore some polluted bodies of water, but nitrogen inputs remain problematic.

Tilman remains optimistic that people can develop ethics to deal with nature, just as societies developed the ethics that enabled strangers to interact two or three thousand years ago, when families and clans were giving way to city-states.

"In the last 35 years, we've doubled the nitrogen economy of the terrestrial world," says Tilman. "We're on a course to quadruple it by 2050. We may also level off at a population of nine billion, which means three billion more people. But the kicker is the increased consumption, as people around the world become more affluent and shift from a diet of grains to a diet of meat."

While population may go up 50 percent by 2050, a 140 percent increase in per capita consumption will cause demand for agricultural products to double, Tilman and his colleagues found. The smallest impact is likely to be on the amount of cultivated land required, but even that translates to a 20 percent increase worldwide—turning the equivalent of the entire United States from natural vegetation to farmland. This, he says, could cause massive extinctions of species unless the extent and spatial pattern of land use and ecosystem preservation are carefully planned. That would require an unprecedented level of local, regional, and international planning and cooperation.

Nevertheless, Tilman remains optimistic that people can develop ethics to deal with nature, just as societies developed the ethics that enabled strangers to interact two or three thousand years ago, when families and clans were giving way to city-states. He hopes to see a time when, for example, citizens pay the full cost of a product, be it corn or a sport utility vehicle, including the costs of mitigating its pollution and ecosystem destruction.

"We need 10 more commandments for the environment," muses Tilman. "We have to have a society that provides options and extracts costs that reflect the impact of society."

For more information on Tilman and his research, go to www.cbs.umn.edu/eeb/faculty/TilmanDavid.html. For more on Cedar Creek, go to www.lter.umn.edu.

SCHOLAR PROFILE

Renaissance man

FORGIVE MATTHEW ABDEL IF HE'S quick to tell you about the value he places on being a well-rounded individual. If he took too long to explain it, he might be late for his next activity.

Abdel, 20, is a second-year biochemistry major in the College of Biological Sciences (CBS) with a 4.0 grade point average. By spring semester, he'll have achieved junior status, meaning he could probably finish his degree—along with his business minor—a year early and proceed with his plans for medical school. But that would preclude another year holding a gavel at meetings, volunteering, maybe rejoining the cheerleading team…

John Noltner

Matthew Abdel

"I don't want to rush anything; it's not worth it," Abdel says. "I want to develop myself as a leader, as a diverse individual, as a team player, and just overall as a well-rounded person, and that's the reason that I participate in a lot of organizations."

Abdel was elected last spring as Speaker of the Forum for the Minnesota Student Association (MSA), the undergraduate governing body for the Twin Cities campus. He's also vice president of the Residence Hall Association. Last year Abdel was vice president of the Centennial Hall Council, an at-large representative to the MSA, and a member of the biology and biochemistry clubs. For physical balance he also joined the University of Minnesota Spirit Squad as a cheerleader last year, more or less on a whim. "It was unbelievable, hard, physical work," Abdel says. "It was great."

Believe it or not, he also finds time to volunteer—as a deacon, counselor, and peer minister at his church; as a referee for youth soccer; and at Fairview University Medical Center, where he spends a few hours a week with kids ages 9 months to 17 years, to "comfort, talk, hang out as a friend."

His experience at Fairview has shown him all sides of patient care and interaction, and solidified his aspirations of becoming a physician. "There's always that one thing that makes you say, 'Yes, this is worth it; this is definitely what I want in my heart, this isn't just mental,'" Abdel says. "And I'd say that was a definite turning point [for me]."

Down the road, Abdel hopes to work in general practice for 10 or 12 years, and then start his own biomedical or biotechnology company—ideally in cooperation with a hospital or clinic. "I think the business minor is vital," he says. "You can't just step out there and say 'I'm going to start a company' and have no background."

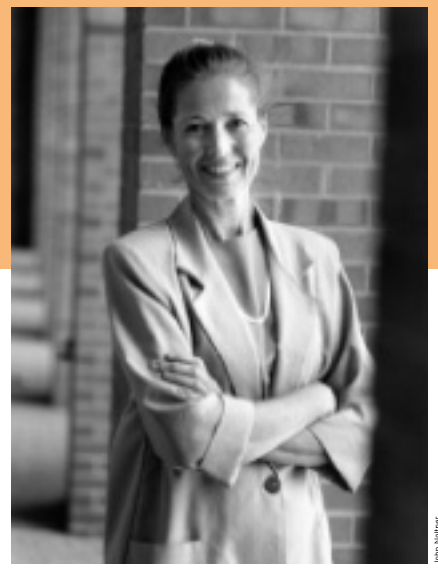
With Abdel's background—high school valedictorian, recipient of a Biological Sciences Alumni Society Scholarship, and Coca Cola Scholar, among many other honors and scholarships—the options for college were bountiful. But he knew he was at the right place shortly after he arrived here as a freshman. "I was riding the bus to one of the classes on the West Bank and it hit me," Abdel says. "I can remember it distinctly. I was like, 'This is definitely where I want to be. I love this place.' And I'll give a lot of that credit to CBS. I can't speak on behalf of other colleges, but CBS is so close and tight-knit that maybe I do get that small-college [feel] at a large college, you know?"

–Rick Moore

Not your father's master's degree

by Geoff Gorvin

Not everyone pursuing an advanced degree in biological science wants to earn a Ph.D. and work in academia. For professionals who want to upgrade their knowledge, the MBS is just the ticket.



John Noltner

IF YOU WERE TO SIT DOWN AND think about the profile of a typical master's degree candidate, it's a pretty sure bet that Bill Klatt wouldn't factor into that profile.

Klatt is a 50-year-old Twin Cities man who worked for 27 years as an electrical engineer for a medical device company. One day he woke up and decided he'd had enough. Although he'd enjoyed a successful career and liked the work, he was ready for a change. A big change. The kind of change that starts by quitting your job, attending college full time, and starting a new career from scratch.

Picking a subject was a no-brainer; Klatt had always loved biology, dating back to his undergrad days. "It's always been an interest of mine," he says. "I worked as a lab technician in the neurology department during college and really enjoyed that."

Finding a college program wasn't quite as easy, though. Klatt wanted a master's degree in biology but the programs he found were primarily geared for preparing students for a doctorate program. "That was *not* for me," Klatt says.

When he discovered the University's new Master of Biological Science (MBS) program through a newspaper ad, it didn't take long for him to go from being Bill the Engineer to being Bill the Master's Candidate. Two years later (last spring), Klatt had a master's degree—one of the six students to complete the MBS program to date. He's now considering a position at the University as a junior scientist.

Not at all a typical master's candidate. But then, the MBS program isn't a typical master's program. In fact, Klatt is a pretty good fit for the profile of an MBS student; he's what the College of Biological Sciences (CBS) had in mind when the program was developed three years ago in cooperation with the Colleges of Veterinary Medicine and Agricultural, Food, and Environmental Sciences.

"We were hoping we'd get people like that," says MBS administrator Carol Gross, referring to professionals interested in a career change. "A lot is happening in biology right now. The opportunities are going to increase in terms of types of jobs."

The MBS program is not designed to vault students into a doctorate program. Gross points out that there's an abundance of people with Ph.D.s who don't have the jobs in academia that they trained for. Instead, she says, the MBS program is designed to offer working professionals a chance to change careers, stay current in biological issues, or maintain a high level of technical training.

John Noltner

One of the most appealing aspects of the program is that it's structured to allow professionals to take classes around their work schedule. "We wanted to develop a program that people could take advantage of without missing work," Gross says. "There's a growing population with this need. We have to look at where students are and where they're going. Many people can't take two years out of their lives for a master's degree, and we're not doing society a favor by keeping them from an education."

Though many of the courses are offered during the day, popular courses are being moved to evenings. Weekend and summer options also will become available based on student demand. CBS also is looking at offering courses at off-campus locations and on the Internet using streaming video and other technology.

In addition to being convenient, the MBS program is a multi-college, interdisciplinary effort, drawing from other colleges at the University but administered through CBS. The program requires that students take graduate-level elective classes related to their career goals. For example, students might take business classes through the University's Carlson School of Management if their career goals involve managing a biology-related business or a research lab.

Concentration credits are required as well. Students can pick cross-discipline courses to combine, for example, a law degree with biology to focus on biological ethics or patent law. Core credits in biochemistry, genetics, cell biology, and ecology also are needed.

The program is very self-directed, says biochemistry professor Jim Fuchs, director of graduate studies for the program. "People in industry know exactly what they need and our faculty know exactly what programs we have.

"It's not a research program. We include a capstone experience as a final project, but we anticipated a lot of people from industry who have a lot of hands-on lab work every day. Instead, they need theory."

Ed Quinn is an MBS student who fits that bill. He'd been a naturalist and biologist for 19 years in Michigan, Ohio, and Vermont before moving to Minnesota two years ago to work for the state Department of Natural Resources. He had started a master's program in Ohio and found a perfect fit for completing it through the MBS program.

"I wanted a master's degree mainly to build additional knowledge in my field," says Quinn, who has less than a year left in the program. "More and more positions in this field are looking for this type of experience. I knew that if I did this, I could clearly make myself a better candidate for future positions.

"Because I've been in the field for quite a while, I know the information I need," says Quinn, echoing Fuchs' comments. "It wasn't too difficult to find (courses) I wanted. The difficulty was in making the choices because there were so many courses to pick from."

Quinn is in a minority in terms of the types of jobs MBS students are pursuing. Of the 88 students accepted into the program in three years, 34 percent come from medical research jobs; 28 percent are in industry; 10 percent are in clinical lab work; 10 percent are teachers; and the rest are in government, business, and law.

An unusual mix of students, but they all share a desire to increase or update their biological knowledge to advance their careers. And that demand creates a niche for an atypical program—a niche that the MBS program fills perfectly.

For more on the MBS program, go to www.cbs.umn.edu/biolink/mbs.html.

Back from the brink

Peregrine falcons are off the endangered species list and thriving on smokestacks and skyscrapers—will they now return to their historic cliff-side homes?

By Jennifer Amie

Carol Gross

IN LATE MAY, A small group of tenants gathered at the North Central Life Building in downtown St. Paul to witness the banding of three peregrine falcons that had been born on the roof of the skyscraper just 18 days before. The babies were born to Meg, a female peregrine who has nested there for the past 13 years. Meg has gained quite a following among downtown birdwatchers, who enjoy watching her swoop down on pigeons and admire her swift flight, which reaches speeds of up to 60 miles per hour. Meg lays eggs and raises babies in a specially designed box placed on the building by staff of the Bell Museum. Mark Martell, the University of Minnesota Raptor Center's coordinator of conservation programs, borrowed Meg's babies for a few minutes to take blood samples and place identification bands on their legs. Covered in fluffy white down, the birds looked scrappy and gangly as they gaped at their handlers and squawked at the top of their lungs. Soon, however, they were returned to their gravel-lined box, where Meg and her mate awaited their return, flying back and forth past the scientists and greeting the babies in the nest.

Just 30 years ago, this scene would have been virtually unimaginable. In 1970, there were only 39 known pairs of peregrine falcons in the lower 48 states. The remarkable birds of prey, which can dive at speeds of 200 miles per hour, seemed destined for extinction. Peregrine reproduction virtually ground to a halt when the female birds began accidentally crushing their eggs beneath them as they nested. With the birds' population plummeting, scientists turned to museum collections, in part, to determine what was happening to the eggs. By comparing damaged eggs to older eggshells, they discovered that the walls of the eggs had become substantially thinner over time, and could no longer support the weight of a nesting mother. Researchers speculated that something was interfering with calcium metabolism in the birds. That substance was eventually found to be DDT, a pesticide sprayed on crops and trees. Thanks to a successful political effort, DDT was banned in the United States in 1972.

The peregrine's comeback in the Midwest has taken place, for the most part, on skyscrapers, bridges, and smokestacks. The recovery has been so successful, says Tordoff, that the Midwest population is twice what it was before DDT, because originally the birds nested only on cliffs.

Since then, the environment has begun to recover gradually, and so have the peregrines. In 1999 they were removed from the endangered species list. Midwest populations are healthy today, thanks in part to Bud Tordoff, coordinator with Pat Redig of the Midwest Peregrine Recovery Project. Tordoff, who was director of the Bell Museum from 1970 to 1983, was recently awarded the University of Minnesota's Outstanding Community Service Award for his contribution to species preservation. "Peregrines are charismatic birds," says Tordoff. "They're fierce, wild, and spectacularly athletic. The success of their recovery is a truly cooperative effort on a scale never before seen."

Tordoff, who is also a retired professor of ecology, worked with Pat Redig, now director of the Raptor Center, to release captive-bred birds into the wild. Their first attempts, in 1976 and '77, failed. They released eight birds along the Mississippi, the birds' original habitat. All were killed by owls and raccoons. Between 1982 and 1988, about 40 more birds were released along the river, but despite eight nesting attempts, all of the young fell victim to predators. "It was at that point that we made the decision to release birds in downtown Minneapolis," says Tordoff. They chose the Multifoods Tower because its flat, gravel roof offered room for the young to practice.

Of 21 birds released, 10 lived to breed successfully. The peregrine's comeback in the Midwest has taken place, for the most part, on skyscrapers, bridges, and smokestacks. The recovery has been so successful, says Tordoff, that the Midwest population is twice what it was before DDT, because originally the birds nested only on cliffs. "Now every city of any size has a pair of peregrines," Tordoff says. Although the birds have flourished in urban areas, and about two dozen pairs are nesting in cliffs around Lake Superior, they have not thrived in their original habitat on river cliffs.

Photo by Jackie Fallon, courtesy of the University of Minnesota Raptor Center

Harrison "Bud" Tordoff, professor emeritus of ecology, evolution, and behavior and former director of the University's Bell Museum of Natural History, holds a baby peregrine falcon. He is about to attach an identification band to its leg.

However, that may be about to change. For the first time this year, five pairs of birds resided on cliffs along the Mississippi. Tordoff credits their return to the cliffs to successful efforts to establish peregrine nesting sites at power plants along the river and to releases of young birds from cliffs in Iowa. "Peregrines seem to be attracted by other peregrine activity," he says. Three of the cliff-dwelling pairs incubated eggs last spring, and fledged a total of eight young. These pioneers represent a significant attempt at reclaiming historic habitat. "It's a start," says Tordoff, "and it's very encouraging."

Tordoff cautions, however, that the peregrine's success cannot be replicated for most endangered species. "It's much easier to replace a species when its habitat is intact and when the cause of its decline can be identified," he says. "Most species, however, are endangered because their habitat is gone, and there's nothing you can do for them except hope they survive in captivity or in small numbers in the remaining wild places. The long-term outlook is not particularly hopeful for most endangered species. But peregrines are a success story that gives us hope. They have helped raise environmental awareness because a lot of people who never otherwise would think about wild things are watching peregrines outside their office buildings and they care about them."

"Peregrines are charismatic birds. They're fierce, wild, and spectacularly athletic. The success of their recovery is a truly cooperative effort on a scale never before seen." *Bud Tordoff*

This article was reprinted (with updates) with permission from Imprint, *the magazine of the University of Minnesota's Bell Museum of Natural History.*

CBS News

Julie Ulrich

The CBS parade unit gets ready to march at U of M Day at the State Fair.

Kudos

CBS won the Most Creative Unit in the U of M Parade at the State Fair award for its showing at the first-ever U of M Day at the fair, August 27. Twenty-nine volunteer marchers wearing CBS T-shirts carried posters depicting "the ABCs of life" to entertain and educate the public about the myriad ways biology affects our lives and how CBS is involved. Goldy Gopher presented the award certificate to CBS dean Bob Elde and hosted a pizza luncheon for the marchers and poster contributors in October.

University researchers have received a $2.97 million grant from the National Science Foundation to study ecosystems that have experienced massive perturbations, primarily on account of humans. The five-year, interdisciplinary, multi-college project, "Biocomplexity—Evolution and Ecology of Perturbed Interactions: Modeling Disequilibria in Time and Space," will take a holistic approach to examining prairie landscapes fragmented by human structures and invaded by non-native species, notably corn and soybeans, and will look at how to manage natural and agricultural environments. **Claudia Neuhauser,** a professor in ecology, evolution, and behavior (EEB) and mathematics, is the principal investigator. The team also includes **Donald Alstad, Georgiana May, Patrice Morrow, and Ruth Shaw** of EEB along with several researchers from the College of Agricultural, Food, and Environmental Sciences. For more information, go to cbs.umn.edu.

Iris Charvat, plant biology associate professor, has been elected to the Council of the Mycological Society of America.

Transitions

Biochemistry, molecular biology, and biophysics (BMBB) professor **David Bernlohr** has been appointed head of that department.

Anja-Katrin Bielinsky will join BMBB as an assistant professor in January; **Alex Lange** was promoted to assistant professor of BMBB last summer.

Dorothy Bromenshenkel, Itasca Biology Program secretary for 17 years, retired in July.

Plant biology has two new assistant professors. **Min Ni** joined the department in August; **John Ward** will arrive in January.

Nikunj Somia joined the Institute for Human Genetics and genetics, cell biology, and development (GCD) in September as an assistant professor.

Kate VandenBosch will join CBS January 1 as head of plant biology. She comes to the University from Texas A & M University, where she was an associate professor of biology. Her research interests include development of nitrogen-fixing symbioses, root development, plant cell wall structure and function, comparative legume biology, and functional genomics of the model legume *Medicago truncatula* and its symbionts and pathogens. Professor **Peter Snustad** is interim plant biology head until her arrival.

GCD professor **Brian Van Ness** is serving as head of that department while a national search for a department head is underway.

BMBB professor **Clare Woodward** retired last summer.

James Underhill

James Underhill, professor emeritus of zoology and curator of fishes at the Bell Museum of Natural History, died at his home August 4 after a battle with lung cancer. He was 77. Underhill earned his degree in biology from the University of Minnesota, Duluth, and his Ph.D. from the University of Minnesota, Twin Cities. During his 37 years with the University, he led countless biology courses and conducted research in ichthyology and limnology. This research led to his creation of a fish atlas describing how the effects of glaciation affected the distribution of fish in Minnesota. He is survived by his wife and two daughters.

News

"Human Encounters and Conversations: Environment, Evolution, and Experience," part of the President's Sesquicentennial Conference Series at the University of Minnesota, will be held April 11 in Northrop Auditorium on the Minneapolis campus. This symposium will bring together leading scholars to engage in a public conversation about encounters between humans and their environments, cross-cultural encounters in human evolution, and encounters reflecting human perception and experience. CBS, the College of Liberal Arts, College of Natural Resources, Bell Museum of Natural History, and Institute of Technology are cosponsors. For more, go to www1.umn.edu/sesqui/resources/conference.html.

Robert McKinnell, GCD professor emeritus, is secretariat of the **Sixth International Symposium on the Pathology of Reptiles and Amphibians,** to be held April 18–20 at the Earle Brown Continuing Education Center on the St. Paul campus. For more information, go to www.cbs.umn.edu/meetings/path/.

Like to see sharks without having to trek to the zoo? Visit the Minnesota Zoo's "sharkcam," installed in the zoo's shark reef by CBS Imaging Center director **Mark Sanders**. Sanders set up imaging and optics, AquaVu supplied the underwater cameras, and WCCO provides Web video for the live shark view at www.mnzoo.com/partners/mnzoo/sharkcam.html.

To watch wildlife and weather at the Mississippi headwaters without leaving home, go to www.cbs.umn.edu/itasca/webcam for up-to-the-minute **views of Lake Itasca** from CBS' Lake Itasca Forestry and Biological Station.

AlumNews

Hats off!

Two members of the Biological Sciences Alumni Society (BSAS) received Hats Off Awards at the 2000 University of Minnesota Alumni Association (UMAA) Volunteer Awards Ceremony September 8.

Paul Gemscheid

Carol Gross has been the driving force in setting up CBS' annual Itasca Weekend since the program's inception 19 years ago. This event has been recognized by the UMAA as a Program Extraordinaire.

Paul Gemscheid

Paula Penning and husband, Bruce

BSAS board member Paula Penning was instrumental in reviving the CBS mentor program, which pairs undergrads with mentors, including alumni. Last year's program far surpassed its participation goal.

Want a change?

The annual CBS Career and Internship Fair will be held Friday, March 2, 2001, in the McNamara Alumni Center, University of Minnesota Gateway, from 11 a.m. to 3 p.m. The fair aims to help students make career decisions and experience the breadth of opportunities available in the biological sciences. It also is an excellent opportunity for young alumni interested in making a career change to meet with representatives of more than 50 companies and organizations. For more information, call 612-624-9270.

Paul Gemscheid

Wade Anderson with his parents

Student volunteer of the year

Wade Anderson, last year's president of the Biological Sciences Student Association and liaison to the BSAS board, was named one of only two Student Volunteers of the Year at the UMAA Volunteer Awards Ceremony September 8. He helped plan kickoff and closing events for the CBS mentor program and took the lead in matching students to members, following up with more than 10 pairs throughout the year.

Deans discuss biology's future

CBS dean Robert Elde and Virginia Hinshaw, dean of the Graduate School at the University of Wisconsin, Madison, discussed "Tensions and Synergies: Genomics to Global Ecosystems" November 3 at UW-Madison. The presentation, cohosted by the Madison chapter of the UMAA, attracted about 40 people.

Support your U!

The 2001 Minnesota Legislature will consider the University's 2002–2003 biennial budget request. The University is requesting a level of state funding greater than it has ever received—because *the fundamentals of the institution are at stake.* The request has two components: $150 million to strengthen the University's foundation and $71.5 million for strategic investments to allow it to move forward and to position it to fuel Minnesota's economy and quality of life. For more information, please visit www.umn.edu/govrel.

AlumNews, continued from page 15

Need info? Have ideas?

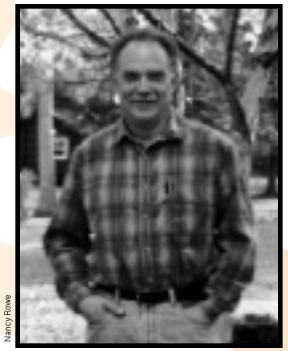
For up-to-the-minute information on BSAS events and activities, to give us your ideas for alumni networking events, or to let us know of speakers who may be willing to come to campus to talk with CBS undergraduate students, contact Paul Germscheid, CBS alumni relations coordinator, 612-624-3752, pgermsch@cbs.umn.edu.

BSAS Board of Directors–Officers

President: Jerald Barnard
President-elect: Dick Osgood
Past President: Lisa Weik
National Board Representative:
Carol Pletcher
Co-chairs, Alumni Relations Committee:
Dick Osgood, Tom Skalbeck
Chair, Homecoming 2001 Committee:
Mary Jo Zidwick
Chair, Student Relations Committee:
Deanna Croes

Be sure to visit the CBS Alumni & Friends Web pages at cbs.umn.edu/7alumni/7alumni.html.

From the president



Nancy Rowe

Jerry Barnard

CBS HAS MORE THAN 7,600 alumni, with more than 1,200 in the Twin Cities metro area. Other than a cluster of buildings on the University campus, what identity do we, as CBS alumni, present to the outside world?

I owe a debt to past Biological Sciences Alumni Association (BSAS) presidents, who have established well-run BSAS functions such as funding of undergraduate scholarships, the annual alumni weekend at Lake Itasca, and the mentor program. With such an established legacy, it is time to move off campus and expand our presence. We have brainstormed, committeed, and postulated … and have decided to start at the small and intimate level of activity, with events open to alumni for a more casual look at biology.

For our first such event, held in October, we invited neighboring CBS alumni to the new Woodwinds Health Campus in Woodbury for an update on CBS expansion by Dean Elde, followed by a presentation, tours, and discussions of the evolution of health care with the blending of alternative and traditional medicine in the Twin Cities.

The second event will be "Exploring Orchids: How We Love 'Em and Why We Kill 'Em," with presentations promised by authorities on how not to do the latter, February 8 in Richfield.

Another new move by BSAS will be to start bringing experts to campus to meet our undergraduates on an informal basis. This is possible; the Carlson School of Management invites hundreds of nonacademicians into the classroom each year. The exposure and additional viewpoints developed from such discussion add value to a college education. Our first expert talk will be December 1, when Dr. Daniel Dumesic, chair of the Department of Obstetrics and Gynecology at the Mayo Clinic, will discuss population models for hyperandrogenic females and answer questions about how he blends research, clinical practice, and daily family life.

A swell start, but I challenge you: Do you have ideas for casual events or know of speakers coming to town who would be willing to take time to talk to our undergraduates? If you do, or if you would like to take part in any of the above-mentioned BSAS functions, please contact Paul Germscheid at 612-624-3752 or pgermsch@cbs.umn.edu. With your help, BSAS will achieve the expanded presence we want for our alumni, both current and future.

Jerry Barnard
President, Biological Sciences Alumni Society

CALENDAR OF EVENTS 2001

Tuesday, January 9	BSAS board meeting, 342 Gortner Lab, 5:30 p.m.
Tuesday, January 16	Legislative Briefing, McNamara Alumni Center, University of Minnesota Gateway, 5:30 p.m.
Thursday, February 8	BSAS event, "Exploring Orchids: How We Love 'Em and Why We Kill 'Em," Woodlake Nature Center, Richfield, Minn., 6 p.m.
Friday, March 2	CBS Career and Internship Fair, McNamara Alumni Center, University of Minnesota Gateway, 11 a.m.–3 p.m.
Tuesday, March 6	BSAS board meeting, 342 Gortner Lab, 5:30 p.m.
Wednesday, April 11	"Human Encounters and Conversations: Environment, Evolution, and Experience," Northrop Auditorium
April 18–20	Sixth International Symposium on the Pathology of Reptiles and Amphibians, Earle Brown Continuing Education Center
Wednesday, April 25	CBS Mentor Program celebration, Minnesota Commons Room, St. Paul Student Center, 5 p.m.
Tuesday, May 8	BSAS board meeting, 342 Gortner Lab, 5:30 p.m.
Friday, June 29	UMAA annual meeting and celebration, location and time TBA

For the complete college calendar, go to cbs.umn.edu/cgi-bin/calendar/calendar.pl.
For the U of M events calendar, go to events.tc.umn.edu.
For a list of biological seminars at the U of M, go to cbs.umn.edu/college_info/seminar.html.

Class notes

David Dilcher (B.S. '58, M.S. '60), who was profiled in the spring 1999 *Frontiers*, is currently doing forest ecology field work at Harvard Forest, a 3,000-acre research site in Massachusetts directed by CBS alumnus David Foster (profiled in the spring 2000 *Frontiers*).

Penny Krosch (B.S. '63) earned her master's degree in library science and is now in charge of the University of Minnesota Archives. She reports that her zoology background has been invaluable in obtaining collections with life science content and in selecting and organizing material for permanent retention in the archives.

Charles Arntzen (B.S. '65) is the Florence Ely Nelson Presidential Chair in Plant Biology at Arizona State University, Tempe, Ariz., and president/CEO emeritus of the Boyce Thompson Institute for Plant Research, Inc., a not-for-profit corporation affiliated with Cornell University. He has held faculty positions at the University of Illinois and Michigan State University, has served as director of biotechnology in the Agricultural Products Department of E.I. DuPont, and has served as dean and deputy chancellor for agriculture of Texas A&M University. He was elected to the National Academy of Sciences in 1983 and is a fellow of the American Association for the Advancement of Science. He received the Award for Superior Service from the USDA for international project leadership in India, and has an honorary doctor of science degree from Purdue University. He currently serves on the National Research Council's Committee on Space Biology and Medicine and is a member of the Board of Directors of the American Society of Plant Physiologists Education Foundation. He served for eight years on the editorial board of *Science*.

Steven Barker (B.S. '75) is senior director of corporate environmental programs for Seagate Technologies, LLC, near San Jose, Calif.

Mark Ellinger (Ph.D. '76) is one of the founding attorneys of the Twin Cities office of Fish & Richardson, one of the largest intellectual property firms in the country. He and other F&R staff teach the three-day biotech course included in the Kayton group of continuing legal education courses. He also serves on the board of directors of MNBIO.

Susan K. Harlander (M.S. '78) is president of her own St. Paul consulting firm, BIOrational Consultants, Inc., which specializes in food and agricultural biotechnology issues facing all aspects of the food supply chain. She received her Ph.D. in food science from the University of Minnesota in 1984; was an associate professor in the University's Department of Food Science and Nutrition; and has held management positions at Diagnostic, Inc., Land O'Lakes, and Pillsbury. She has served on numerous government agency advisory committees regarding food, agriculture, education, and biotechnology.

Paul Germscheid

Christina Bigelow (M.S. '80, 2nd from left) and family were among the marchers in the CBS parade unit at U of M Day at the State Fair August 27.

David Blockstein (M.S. '82, Ph.D. '86) is a senior scientist with the National Council for Science and the Environment, a nonpartisan organization of scientists, environmentalists, businesspeople, and policymakers working to improve the scientific basis of environmental decision-making. He was the organization's first executive director and is chair of the Ornithological Council. He organized the first National Conference on Science, Policy, and the Environment, which took place December 7–8, 2000, at the National Academy of Sciences, Washington, D.C.

Mary L. Frick (M.S. '82) was promoted to vice president of regulatory affairs, quality assurance, and clinical affairs for Bio-Vascular, Inc., a St. Paul diversified medical device company, in November. Before joining Bio-Vascular in 1998, she held several positions at INCSTAR Corp., including regulatory/clinical affairs manager and regulatory manager of product registration.

Cheryl Quinn (B.S. '85) received her Ph.D. in biochemistry from the University of Illinois in 1991 and did postdoctoral research at Oxford University. She is now a senior research scientist in infectious diseases at Pharmacia Corp, Kalamazoo, Mich., where she is the antifungal program team leader. Her research areas are molecular mycology, genomics, microbiology, and molecular genetics.

Eric A. Drier (B.S. '87) received his Ph.D. from Princeton in 1997 and is now an American Cancer Society postdoctoral fellow at Cold Spring Harbor Laboratory, working on learning and memory using *Drosophila* in Jerry Yin's laboratory. He is working on the transition of shorter forms of memory to longer forms, and is also working to develop single-chain "intrabodies" as a genetic tool. He and his wife, Diana, have two children: Nathaniel, 8, and Gillian, 5.

Larry Fontaine (B.S. '89) has had four jobs in his career in the medical device industry: medical writer, marketing communications manager, product manager, and sales representative. He is currently a sales representative for Medtronic in the Upper Midwest area, serving a specialized group of cardiologists called electrophysiologists.

Lisa Kircher Lumbao (B.S. '90), Philippine country coordinator for the United States-Asia Environmental Partnership, has been awarded certification as a Qualified Environmental Professional (QEP) by the Institute of Professional Environmental Practice. Achievement of QEP certification signifies strong professional and ethical standards in the arena of environmental management, and comes after rigorous scrutiny of experience and qualifications and successful completion of a written examination.

Lisa A. Schneider (B.S. '91) received her J.D. from Northwestern University School of Law in 1994 and was law clerk to the Honorable Paul R. Michel of the United States Court of Appeals for the Federal Circuit in 1996 and '97. She now practices intellectual property law at Sidley & Austin in Chicago, focusing primarily on litigation involving pharmaceutical and medical device patents.

Christine Schoenbauer (B.S. '94) is an environmental analyst for the water quality division of the Minnesota Department of Health.

Pamela J. Skinner (B.S. '95) is a postdoctoral fellow in the University of Minnesota's Department of Microbiology, researching HIV and Simian Immunodeficiency Virus with professor Ashley Haase.

Matthew P. Finke (B.S. '97) received his master's degree in public health from the University of Minnesota in spring 2000 and is now an epidemiologist in the infectious disease division of the Colorado Department of Public Health and Environment.

Magdalen Barton (B.S. '99) is a research technician in the University of California's plant and microbial biology department.

Justin Endo (B.S. '99) is in medical school at the University of Nebraska.

Mike Lockheart (B.S. '99) began the M.D./Ph.D. program at the University of Minnesota this fall.

Chris Marquardt (B.S. '99) is a quality assurance chemist at Cargill Dow, LLC.

Mike Schwalbach (B.S. '99) is a first-year Ph.D. student in the marine biology program at the University of Southern California.

Susan Tousey (B.S. '99) is enrolled in the University of Minnesota's neuroscience graduate program.

Amanda Kostyk (B.S. '00) began the M.D./Ph.D. program at the University of Colorado this fall.

Mona Schmidt (B.S. '00) is enrolled in the University of Minnesota's graduate program in molecular, cellular, developmental biology and genetics.

ALUMS ONLINE

Amy Grack (B.S. '99) has created a new Web site in conjunction with her work with the Dakota Science Center and Grand Forks Public Schools. It's at www.natureshift.org.

Read additional class notes and enter your own information online at cbs.umn.edu/cgi-bin/class_notes/class_notes.pl.

Turning back the clock

by Mary Shafer

CBS alumnus makes headlines with research on restoring aging brain cells.

Photo courtesy of Mark Tuszynski

Mark Tuszynski

ASK MARK TUSZYNSKI WHAT he remembers about his days at the University and you'll probably hear, "Sam Kirkwood."

"What impressed me was his outstanding character as a teacher and humanitarian," says the 1979 College of Biological Sciences graduate, who took Kirkwood's biochemistry class in 1977. "He reached beyond academics *per se* and would engage in discussion of general moral and ethical dimensions. What struck me was the vivaciousness of his humanity."

It may seem like a surprising answer from a neuroscientist, whose days are spent in research labs and whose scientific passion lies in the cellular realm. But Tuszynski, who also graduated from the University's Medical School in 1983, seems not to lose track of the bigger context of his work.

After completing a residency at Cornell, Tuszynski went on to the University of California at San Diego for a Ph.D. Today, still at UCSD, the physician-scientist is an associate professor of neurosciences and director of the Center for Neural Repair, and he has been making news recently with his research on using nerve growth factor (NGF) to restore aging brain cells to youthful vigor. That research holds promise that NGF can help prevent or reverse cell death in a variety of conditions, including Alzheimer's and Parkinson's diseases and spinal cord injury.

"It is highly speculative to even think about at this point, but it may be possible to reverse the effects of aging in certain systems of the brain." *Mark Tuszynski*

"Contrary to earlier dogma, the brain is constantly undergoing change and remodeling," Tuszynski says. "As a matter of fact, there's very little cell death as a function of normal aging. Cells just become dysfunctional. They don't make everything they need to perform normally."

Tuszynski and his colleagues found that delivering growth factor to the dysfunctional cells in the brains of aging monkeys reversed the damage. As a result, they now have a grant to study the process in humans. In tests, they will take cells from people with Alzheimer's disease, genetically modify those cells to make NGF, then implant the person's own genetically modified cells to prevent or modify loss. The trial, approved recently by the Federal Drug Administration and National Institutes of Health, is expected to begin in January. "People in the trial must be in the early stages of the disease so they can provide truly informed consent," Tuszynski says. "This is a neuroprotective therapy, so we want to intervene as early as possible."

It's an exciting prospect, and there's probably no one more motivated to move it forward than Tuszynski. "The principle underlying our research may be useful in preventing or reversing cell death in a variety of conditions," he says. "It is highly speculative to even think about at this point, but it may be possible to reverse the effects of aging in certain systems of the brain."

Now running a lab of 25 people, the Canadian native says he always has been interested in the nervous system. "I wanted to do something to impact that," he says. "Having a research program in medicine seemed to be the route that was right for me."

Most of his drive, he says, is "internally generated—as it is for anyone. You have to maintain your own vision."

For Tuszynski, that vision is much broader than the research lab, and probably why he remembers his days with Sam Kirkwood so vividly. He believes, he says, that "the goal of trying to improve the human condition remains a noble goal, worthy of pursuing. We must stay focused on the need to improve the human condition."

A different way to make a gift

LOOKING FOR A WAY TO MAKE A GIFT TO THE UNIVERSITY—even establish a scholarship, fellowship, or endowed chair in your name—without giving anything away right now? Or how about making a gift to the University now for future use, and receiving a tax deduction and income payments for life that can total as much as 12 percent of your gift?

Consider making a planned or future gift. Doing so is easy; University representatives will even sit down with you and show you how. Planned and future gifts consist of money, real estate, personal property, or investment portfolios either given now or as gifts from your estate through a will bequest, IRA designation, or similar means.

"To some, planned giving might seem very technical," says Frank Robertson, associate director for planned giving with the University of Minnesota Foundation. "But we try to make the process as easy as possible for donors. We give them illustrations with flow charts and diagrams to break everything down into the simplest terms." The University will even calculate for donors, in advance, what tax deduction they will receive and—in cases where the donor chooses to create a gift annuity or charitable remainder trust through the University—what amount, or percentage of payout, they will receive each year.

"The nice thing about planned gifts is that if someone has a desire to donate, we can come up with plans that fit their needs," Robertson says.

In some cases, donors make a planned or future gift in addition to current donations. For example, Denneth and Joan Dvergsten, a Grand Rapids couple with strong ties to the College of Biological Sciences (CBS), make an annual donation to enable undergraduates to spend time at CBS' Lake Itasca Forestry and Biological Station.

Their planned gift is a scholarship for a graduating biology senior who plans to pursue a career in secondary science education and who has been accepted into the University's College of Education and Human Development, explains Denneth Dvergsten, who worked for five years doing outreach for the College of Biological Sciences after retiring from the secondary school system in Roseville, Minn.

The Dvergstens support CBS because of Denneth Dvergsten's long association with the University and the college: he did his graduate work in education at the University, then went on to develop a program in which high school students worked with CBS faculty during summer break. "We saw what a great faculty they are and their ability to encourage outstanding students to enroll in biology and then go into education," he says. "We are creating this scholarship because we consider the College of Biological Sciences to be an outstanding college."

To date, a healthy portion of private donations to the University are in the form of planned and future gifts. "Last year, planned giving was about $50 million out the total $235 million in donations made," says Robert Peterson, the foundation's director of planned giving. "Many major colleges and universities raise 20 to 40 percent of their support from planned gifts. We haven't fully made our alumni and friends aware of the opportunity for this kind of giving, but we are improving every year."

—Richard Broderick

John Noltner

Frank Robertson and Robert Peterson

To find out more, call Robert Peterson or Frank Robertson at 612-624-3333 (outside the metropolitan area, 800-775-2187), or Janene Connelly, CBS director of development, at 612-624-7496.

Donors to the college during fiscal year 2000

1930s

Dr. Claude H. Hills
Mary J. & James L. Jensen
Max A. & Erika E. Lauffer
Dr. Edgar P. Painter

1940s

Dr. Mary M. Grula
Dr. Richard W. Luecke
Dr. Bernard O. Phinney
Dr. Frank W. Putnam
Dr. Thomas S. Reid
Max L. Schuster

1950s

Aaron W. Burchell
Dr. Milton H. Fischer
William H. Harrison
Robert C. Hodson
Arthur A. & Martha K. Johnson
Marjorie & Bruce Larson
Rex E. Lovrien
Marco Rabinovitz
Dr. Orlando R. Ruschmeyer
Melvin P. Stulberg
Dr. C. Ivar Tollefson
Dr. Robert C. Wong

1960s

Dr. Wayne A. Bough*
Kathleen G. Fahey
Dr. David R. Foreman
Dr. Frank B. Freedman
Dr. Edgar E. Hanna Jr., Ph.D.
Drs. Richard N. & Meredith S. Hill
Dr. Gordon L. Houk
Dr. Julie Ann C. Jarvinen
Dr. Sally B. Jorgensen
Dr. Richard J. & Patricia L. Kirschner
Dr. A. Linn & Margaret P. Bogle
James G. Mackie
Dr. Robert E. Muller
Amy Oganeku
Larry J. Salmen
Dr. Jon E. Sanger
Beverly L. Schomburg
Rev. John E. Schroeppel
Dr. Marlys J. St. Cyr
Marcia M. Tholen
Eileen M. & Thomas J. Welna
Dr. Jeanette A. Wiltse

1970–1975

Gary A. Ackert
Joan S. Anderson
Robert L. Anderson*
Philip A. Balazs
Dr. William E. Berg
Monika R. Burau
Dr. Lillian P. Burke
Dr. Alan E. Comer
Michael F. Coyle
Jacquelyn M. De Guise
Dr. Gary L. Dillehay
Dr. Terry G. Domino
Caroline A. Donakowski
Carole N. & James F. Drake Jr.
Timothy S. Dunsworth
Dr. Allen E. Eckhardt*
Susan M. & Mark E. Edstrom
John M. Eibert Jr.
Mark A. Einerson
Dr. Gunnar J. Erickson
Dr. Roger H. Erickson
Jan Ellen Fowler
Dr. John E. Fredell
Dr. Carl E. Frasch
Jeffrey D. Gabe*
Dr. Thomas S. Gerst
Nancy K. & John P. Harvat
Dr. Stanley E. Hedeen
Dr. William C. Henke
Dr. John W. Hiemenz
Dr. Yui Tim Ho
Dr. Robert J. Hofman*
Dr. Jeffrey P. Houchins
Dr. Scot W. Hutton
John E. Iverson
Dr. George L. Jacobson
Bradley P. Jahnke
Dr. Dagmar L. Johnson
Dr. Amy D. Keppel*
Dr. Todd R. Klaenhammer
Arlo S. Knoll
Rodney L. Kuehn
Dr. James T. Langland
Dr. Arlene T. Larson
Juliet C. Lilgaroth
Margitta G. Lindberg
Karl J. Ludescher
May So-Ying & Alec Yen Lui*
Daniel O. Lynch
Dr. Beverly A. Mains*
Dr. Karen A. Malatesta
Stephen J. Maxson*
Dr. Judith W. McIntyre
Dr. Mary J. Milroy
Dr. Robert J. Mork
Dr. John T. Mundahl
Darby M. & Geraldine M. Nelson
Daryl E. Nelson
Deborah A. Nelson
Douglas A. Nelson
Timothy R. Nelson
Patricia G. & Douglas R. Nelson
Dr. Gary L. Nelsestuen
Randi L. Nordstrom
Dr. Frank Q. Nuttall
Dr. Thomas P. Officer*
James J. Pearson
Dr. Larry Puckett
Dr. John J. Reiners Jr.
Clare L. Ritter*
Dr. Michael D. Rohwer
Dr. Terry R. Roth
Susan V. Schauer
Dr. Lolly J. Schiffman
Gary B. Silberstein
Carmel & Duane Skar
Kathryn L. Steinberger
Shelley A. Steva
Constance J. Stieger
Michael K. Stock
Larry B. Sundberg
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Dr. Mary Jane Thomassen
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1996–2000

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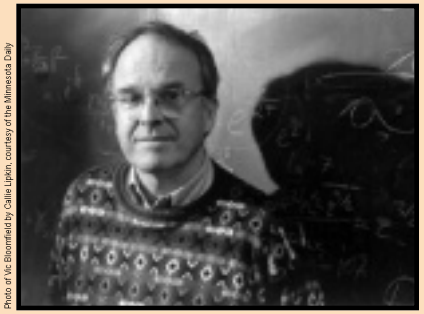

Photo of Vic Bloomfield by Callie Lipkin, courtesy of the Minnesota Daily

The Victor Bloomfield Graduate Fellowship in Molecular Biophysics is the result of a generous donation by Vic Bloomfield, associate dean of the University's Graduate School and vice provost for research. "I wanted to use some of the money that came to me from my mother's estate to endow a fellowship that would reflect her belief in the importance of higher education, in an area that I feel is of great interest and importance and in which I have had such a rewarding career," says Bloomfield, who is also a biochemistry professor. The fellowship fund is eligible for matching funds from the Graduate School's 21st Century Graduate Fellowship Endowment program, which matches endowments of $25,000 or more for designated graduate fellowships.

Photo of Elmer Birney courtesy of the Bell Museum of Natural History

Friends, colleagues, and family of the late Elmer Birney have donated more than $25,000 to support a graduate fellowship in the Department of Ecology, Evolution, and Behavior (EEB). This outpouring of support has made the fund eligible for matching funds from the Graduate School's 21st Century Graduate Fellowship Endowment program, doubling the impact of each dollar donated. The first Elmer C. Birney Fellowship in EEB, to be awarded in summer 2001, will provide an EEB graduate student a stipend enabling the recipient to pursue research. Congratulations and thank you to all who have made donations to this fellowship!

Tom Walsh

A September visit to CBS' Lake Itasca Forestry and Biological Station by 21 freshmen who live in Biology House was funded through a generous donation from Denneth and Joan Dvergsten.

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Paul Germscheid

CBS scholarship and fellowship recipients, along with donors to the college, gathered at the CBS Recognition and Appreciation Dinner, November 1 in the McNamara Alumni Center, University of Minnesota Gateway. (L to r) Jacqueline Chan, recipient of the Lavell Henderson Award; Elizabeth Head, recipient of the Stanley Dagley Memorial Scholarship; and Pamela Pineda, recipient of the Richard C. Nelson Memorial Scholarship.

* First-time donors to the College. **Boldface** indicates membership in the University of Minnesota Alumni Association/Biological Sciences Alumni Society.

A good time was had by all

NEARLY 160 PARTICIPANTS ENJOYED SPECTACULAR FALL WEATHER, interesting and fun biology programs, and two days of camaraderie and good food at the 2000 CBS reunion weekend at the Lake Itasca Forestry and Biological Station September 29–October 1.

1

Kathryn Hanna

2

Kathryn Hanna

3

Carol Gross

4

Nancy Rowe

5

1: CBS alumnus Don Beimborn leads a hike to Bear Paw Point.

2: Retired aquatic biologist Dale Chelberg gathers aquatic organisms.

3: CBS alumnus Brian Anderson and his son, Paul, look at microscopic aquatic organisms.

4: CBS retiree Henrietta Miller and her husband, Phil, take a pontoon-boat tour of Lake Itasca showcasing loons, an egret, and an eagles' nest.

5: CBS alumna Michelle Anderson introduces a great horned owl to Raptors program participants.

Nancy Rowe

College of Biological Sciences
University of Minnesota
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