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

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Big-picture biology

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

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.

“So 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. In fact, explains Tilman, could be shared by terrestrial ecosystems around the world as much as it is now, and more nitrogen, spewed into the atmosphere by human activity, settles into soil.

“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 quackgrass 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 nitrogen 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 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.

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.

Fool of health and blind to one eye, Lindeman arrived at Cedar Creek in the late 1920s 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 wide-mile Fish Lake. The bogs harbor hordes of insectivorous pitcher plants, which survive in nitrogen-poor bog mats by upending the usual animals—eats—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 in 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.

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

affec 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 1,322 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 analysis 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.

“When the effect is similar to the reason why a mutual fund containing many different types of stocks 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.”

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.”

But 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 precious as well like comes from undisturbed ecosystems,” he says. When an ecosystem fails to deliver this...
Agriculture. Agricultural practices have consumed the huge, manifold power of fossil fuels. It will be painful,” says Tilman.

The nitrate-laden well water points up nitrogen economy of the terrestrial world,” says Tilman. “We’re on a course to quadruple it by 2050, a 140 percent increase in per capita consumption will cause massive extinctions of species unless... fourth commandment for in the future. “We need 10 more commandments for 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.

“Think of the time-honored saying: ‘Graveyards are 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,” says Abdel. “I can remember it distinctly. I was like, ‘This is definitely the place where I want to be. I love this place.’ And I’ll give a lot of that credit to CBS.”

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Not your father’s master’s degree

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.

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 undergraduate 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 as atypical as 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.

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 bringing 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 courses 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 biotechnology-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 legal 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 the program—a niche that the MBS program fills perfectly.

For more on the MBS program, go to wwwbios.umn.edu/biolink/mbs.html.
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 of Natural History.

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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.

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

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.

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 wall of the egg had become substantially thinner over time, and 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.

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 60 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.

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.”

This article was reprinted (with updates) with permission from Imprint, the magazine of the University of Minnesota’s Bell Museum of Natural History.
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. Giddy Gopher presented the award certificate to CBS dean Bob Edle and hosted a pizza lunch buffet for the marchers and other contributors in October.

University researchers have received a $2.97 million grant from the National Science Foundation to study ecosystems that have been invaded by non-native species, notably corn lilies in Time and Space.” will take a holistic approach to examine pristine 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.

Transitions
Biochemistry, molecular biology, and biophysics (BMBB) professor David Bezneh, who has been appointed head of that department.

James Underhill, professor emeritus of zoology and curator of fishes at the Bell Museum of Natural History, has been elected to the Council of the Mycological Society of America.

James Underhill
James Underhill, professor emeritus of zoology and curator of fishes at the Bell Museum of Natural History, has been elected to the Council of the Mycological Society of America.

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

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 Extraordinary.

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 is also 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.

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: $130 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.
From the president

David Ditcher (B.S. ’80, M.S. ’90), who was profiles in the spring 1999 Frontiers, is currently doing breast 2007 in Filipino. He served for cancer research in the University of Illinois and 8 years on the editorial board of and postulated … and have decided to start at the smallest and level of activity, with events open to alumni at a more casual look at biology. For our first such event, held in October, we invited neighboring CBS alumni to the new Woodworth Health Campus in Wood- for an update on CBS expansion by Dean Elde, followed by a presentation, tour, 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 Orchid: How We Love ‘Em and Why We Kill ‘Em,” with presentations prepared by authorities on how to not do the latter, Febru- ary 8 in Richfield.

Another new move by CBS will be to start bringing experts to campus to meet our un- dergraduates on an informal basis. This is possible; the Carlson School of Management invites hundreds of nonacademician to the classroom each year. Several internal and additional viewpoints developed from this discussion add value to a college education. Our first expert talk will be December 1, when Dr. Daniel Damesich, chair of the Depart- ment of Obstetrics and Gynecology at the Mayo Clinic, will discuss population models for hyperandrogenic females and answer questions about how he blends re- search, clinical practice, and daily life.

A swell start, but I challenge you. Do you have ideas for casual events or know of speak- ers 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 func- tions, please contact Paul Germscheid at 612-624-3752 or pgermscheid@cbs.umn.edu. We would be happy to have BSAS support the ex- panded presence we want for our alumni, both current and future.

Christina Biggs (B.S. ’90, 2nd from left) and her family were among the marchers in the CBS parade unit at U 2000 at the State Fair at August 23.

Class notes

CalendA-er of events 2001

Tuesday, January 9
BSAS board meeting, 342 Gortner Lab, 5:30 p.m.

Tuesday, January 16
Legislative Briefing, McNamar Alumni Center, University of Minnesota Gateway, 5:30 p.m.

Thursday, February 8
BSAS board meeting, 342 Gortner Lab, 5:30 p.m.

Friday, March 2
CBS Career and Internship Fair, McNamar Alumni Center, University of Minnesota Gateway, 11 a.m.-3 p.m.

Wednesday, March 23
“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 Master Program celebration, McNamar 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
UNAA annual meeting and celebration, location and time TBA

For the complete college calendar, go to cbu.umn.edu/cgi-bin/calendar/calendar.pl.

For a list of biological seminars at the University of Minnesota, go to cbs.umn.edu/college_info/seminar.html.
ASK MARK TUZYNISKI 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 humanitari- an,” 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 dimen- sions. What struck me was the virulencia 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 neurosurgery and director of the Center for Neural Repair, and he has been making news recently with his re- search 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.

“Contrary to our initial hypothesis, the brain is constantly undergoing change and remodel- ing,” 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 time, 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. Theral, 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 Alzheimer’s,” says Tuszynski. “The principle under- lying our research may be useful in pre- venting or reversing cell death in a variety of conditions,” he says. “It’s 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 in- terested in the nervous system. “I wanted to do something to impact that,” he says. “Having a research program in medicine seemed the route that was right for me.” Most of his drive, he says, is “internally generated—as 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 hu- man condition remains a noble goal, worth- thy 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.

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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’s 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.”

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The Dvergstens support CB S 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

To find out more, call Robert Peterson or Frank Robertson at 612-624-3333 (outside the metropolitan area, 800-775-2187), or Janene Connolly, CBS director of development, at 612-624-7496.
Fellowship Endowment program, which matches endowments of matching funds from the Graduate School’s 21st Century Graduate Research Endowment. “I wanted to use some of the money that came to me from my mother’s estate to endow a fellowship that physics is the result of a generous donation by Vic Bloomfield, who is also 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 provost for research. “I wanted to use some of the money that I received from my mother’s estate to endow a fellowship that fellowships, and friends, and colleagues, and the 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 matching of support made it possible for candidates to be awarded in 2001, will provide an EEB graduate student a stipend enabling the recipient to pursue research. Congratulations and thank you to all who have donated to this fellowship!”
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: 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.