Fall 2004

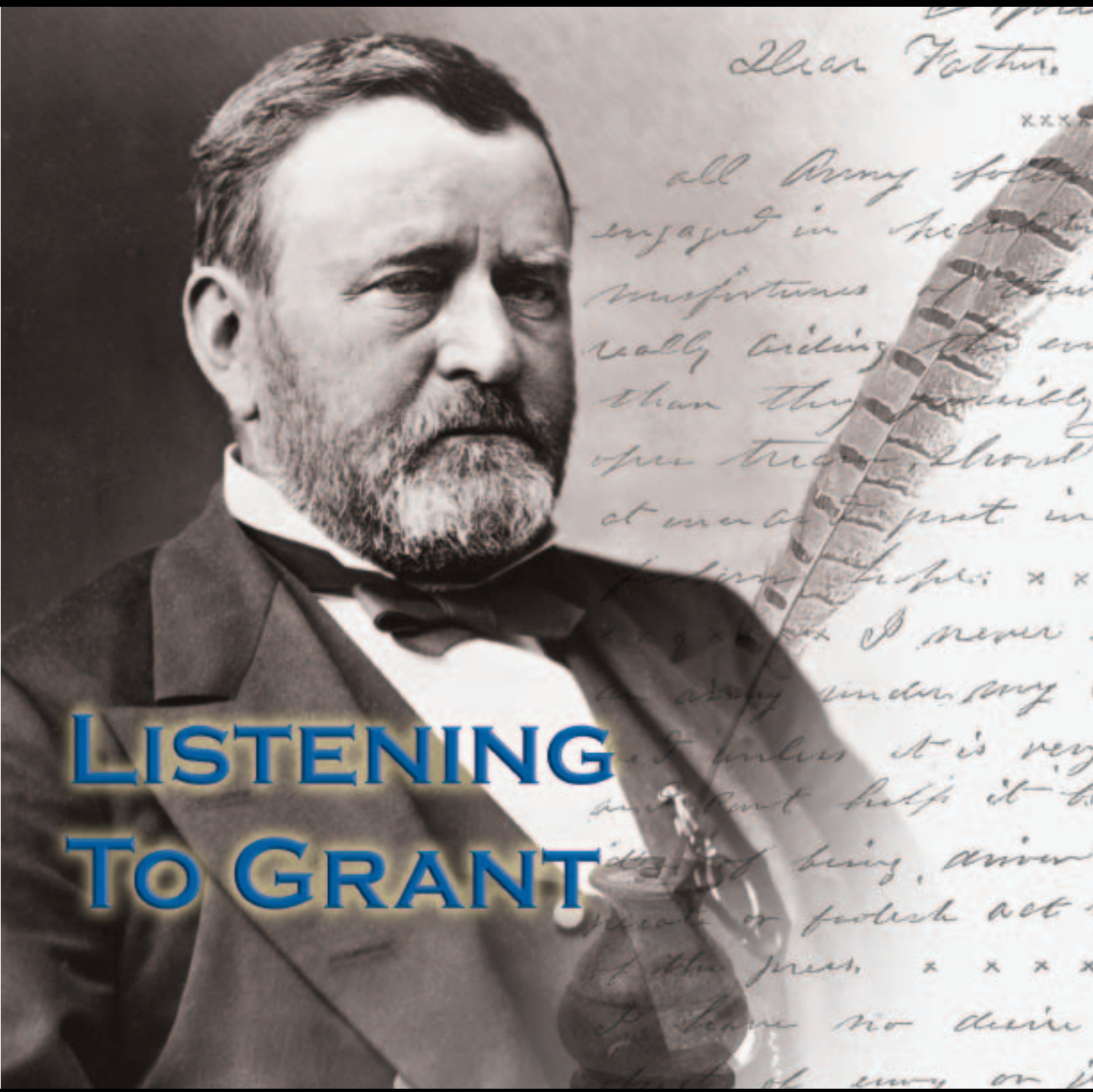
Fall 2004

PERSPECTIVES

FALL 2004

RESEARCH AND CREATIVE ACTIVITIES

SOUTHERN ILLINOIS UNIVERSITY CARBONDALE



LISTENING TO GRANT

ALSO: STOPPING POWER ✠ INTO THE WOODS ✠ FEEDING AFGHANISTAN

This issue of *Perspectives* celebrates a major anniversary: the 40th year that a much-lauded editorial project, the Papers of Ulysses S. Grant, has been headquartered at SIUC. By making available the key writings of an American military hero and president, this far-reaching endeavor, led by history professor John Y. Simon, has given historians and the public a fuller picture of the Civil War, 19th-century politics, and Grant as a person. One of the top U.S. awards in history, the Lincoln Prize, was given to Dr. Simon this year in recognition of the Grant project's special achievement.

Other research featured in this issue touches on aspects of our environment—from forest management to fuel cells to fish populations in the Mississippi River—and our connection to other nations, represented here by a project to revitalize agriculture in Afghanistan. But to kick things off, we momentarily come to a halt with "Stopping Power," an update on brake materials research by SIUC's Center for Advanced Friction Studies.

The diverse research accomplishments of **all** of our faculty recently boosted SIUC to #100 (up from #104) in the National Science Foundation's annual ranking of public universities by research and development expenditures—another step toward our goal of being among the top 75 public research universities by SIUC's 150th anniversary in 2019. We are proud to count ourselves among this select group of institutions committed to the synergy of research and education.

John A. Koropchak
Vice Chancellor for Research
and Graduate Dean

Southern Illinois University Carbondale

www.siuc.edu

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Associate Vice Chancellor for Research and Director, Research Development and Administration
Prudence M. Rice

Perspectives • Fall 2004

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PERSPECTIVES

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SOUTHERN ILLINOIS UNIVERSITY CARBONDALE

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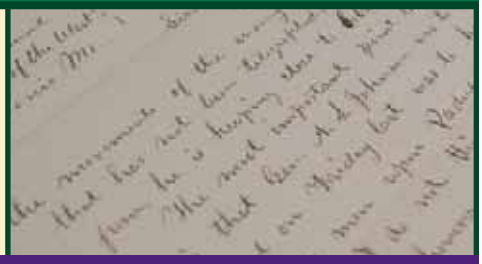

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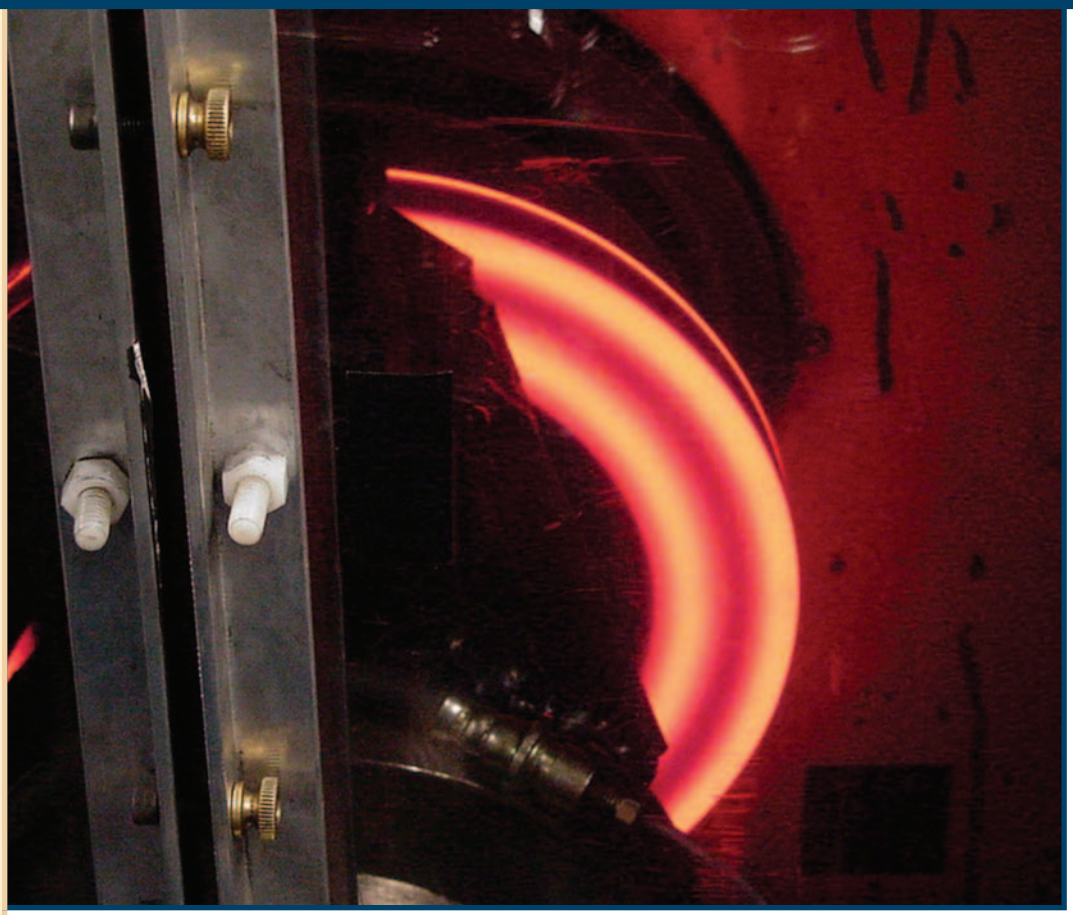


Friction testing of a Formula 1 brake rotor. ***Image courtesy CAFS.***

STOPPING POWER

The race is not to the swift, but to those with the best brakes, says Peter Filip.

Filip, director of the Center for Advanced Friction Studies (CAFS), and mechanical engineering professors Jarlen Don and Ajay Mahajan were in the pits—literally—for the practice sessions of the Gran Prix USA at Indianapolis this year.

Their job? Gathering information to improve brakes for Formula 1 race cars.

"A lot of Formula 1 races are won because the driver can go full throttle and he knows that he'll be able to stop if he needs to," Filip says. "If he doesn't have that confidence, he starts to brake earlier [in the turns], and then he loses."

In a new $400,000-per-year research program, Don, Mahajan, Filip, and staff researchers Poh Wah Lee and Tod Policandriotes will help two well-known Formula 1 sponsors improve brake efficiency and wear resistance. Some Formula 1 races are so demanding that brake rotors must be replaced once or twice per race.

"That can be done by the pit crew in approximately seven seconds," Filip says, "but when you're driving 300 kilometers an hour, seven seconds is a lot."

The SIUC team was in Indianapolis to learn more about the Formula 1 cars, observe racing conditions, and talk to drivers and technicians.

"If you want to model performance and predict wear under real conditions, you have to look at the interaction of a tremendous number of parameters," Filip says.

"For example, you have cooling vents (in the rotors), you have the wings (that hold the wheels down), you have the brake geometry, you have the location of the calipers, you have the stiffness of the system. These are all parameters we were checking while we were there."

The team also gathered data on operating temperatures and other conditions in the practice sessions and during the race.

A National Science Foundation Cooperative Research Center with 14 affiliated faculty in different specialties, CAFS teaches students by involving them in interdisciplinary materials research for braking and other friction applications. Its work is partially funded by 19 companies that make aircraft and automotive components, and it does research for all the major aircraft brake manufacturers.

Historically, much of the center's emphasis has been on carbon-carbon composites, used in brakes for airplanes, race cars, and high-end passenger cars. (They are so named because they have tough carbon fibers embedded in a carbon matrix.) But CAFS also works with other composites that have friction applications.

Some of the composite materials used to make brake rotors and linings have as many as 30 components. "We help the industry understand how those ingredients behave in those formulations, so that they can make educated decisions in developing new materials," Filip says.

For example, the Ohio Aerospace Institute chose CAFS to assess the performance of recently developed ceramic composite rotors from several top U.S. and European aircraft brake manufacturers.

"We looked at frictional behavior, such as the coefficient of friction (essentially, braking power), wear, vibration, and noise," Filip says of this work, which was completed in fall 2003. "We explained the scientific basis of performance—what's actually going on and why certain materials perform better than others."

The findings, some of the U.S.

companies told him, improved their competitiveness by narrowing the gap between U.S. and European manufacturers.

"Manufacturing [of brakes] has been a trial-and-error approach," Filip says. "The center has brought a lot of science to bear" to help the industry improve its products.

"Typically the development of one brake lining takes between six months and five years," he adds. "Often, a company develops a brake and it works in the laboratory, but you put it in the car and it experiences difficulties.

"We have the technology to develop a new pad within one month. That's a significant contribution."

Many luxury cars now boast carbon-carbon composite brake rotors infiltrated with tough ceramic particles to better resist wear. CAFS is working with Porsche to develop brake linings compatible with such rotors. "The idea is never to have to replace the pads," Filip says.

At CAFS, faculty, students, and staff researchers use dynamometers and other equipment for friction testing of materials in the lab. Polarized-light, electron, and atomic-force microscopes allow them to analyze wear and to determine how the microstructure of a composite affects performance. And collaborations with national research laboratories, such as those at Brookhaven and Argonne, give them access to synchrotrons and other specialized equipment for high-tech analyses.

With extensive data on friction materials' properties and behavior, SIUC engineers and scientists are devising better composites, better lab testing protocols, and better computer programs to model how materials will perform in real life. That translates into better products for consumers and savings for industry.

For instance, CAFS gave one automaker an alternative to downhill brake testing.

"We analyzed the brakes after the downhill drive and designed a new test in the laboratory which generates the same friction forces," Filip says. "They save a tremendous amount of money."

As a brake lining rubs against a rotor to stop a vehicle, the two surfaces interact with each other mechanically and chemically. That interaction produces what's called a friction layer between the two. The composition, thickness, and other properties of the friction layer determine the brake's effectiveness and wear rate.

Filip recently developed a better way to model the performance of polymer matrix composite brake linings. These composites, used in passenger car brakes, are a mix of brass chips, petroleum coke, vermiculite, and other substances in a phenolic resin matrix.

To see how the constituents were behaving and interacting during braking, Filip friction-tested the materials against a standard-type cast iron rotor at high and low speeds. Then he analyzed the friction layer at the microscopic level.

The results allowed him to better model friction and wear properties for these types of composites so that companies can improve them. Filip's analysis was named by the Institution of Mechanical Engineers as the best paper in automotive technology published worldwide in 2002.

Something CAFS is testing with race cars may hold promise, down the line, for other vehicles. Filip, mechanical engineering professor Ed Hippo, and their students have developed a way to incorporate nanotubes—extremely strong, extremely small carbon tubes whose walls are only one atom thick—into carbon-carbon composites. Friction-testing of this new material, Filip says, produces "so little wear, we can't even measure it."

A leading car company recently tested rotors made of the nanotube-modified composite.

"We know how the material behaves in the lab," Filip says, "but in real life it may behave slightly differently. If you'd like to model and understand a material, you have to get as close as possible to the real world."

Now Hippo and Filip are analyzing the rotors to see if they gave improved performance. If so, they'll extend their research. Different types of nanotubes have different properties; Hippo and Filip will be searching to achieve the highest performance at the lowest price.

If CAFS has its way, brakes will become ever better performing—and brake jobs will become a thing of the past.

For more information: Dr. Peter Filip, Center for Advanced Friction Studies, (618) 453-1166, filip@siu.edu.

—Marilyn Davis

ENERGY-EFFICIENT

Two major energy-related research projects just underway at SIUC will contribute to fuel efficiency and a cleaner environment.

The first aims to build and commercialize a lower-emission, more powerful, more fuel-sparing diesel engine based on a mono-valve design. Engines now have two or four valves to take air in and out of each cylinder; the work at SIUC will fine-tune the use of a single valve for that purpose.

Peoria-based Caterpillar Inc. has donated two U.S. patents, several foreign patents, and $85,000 in associated funds to support the project. The timing of the research could not be better, since the Bush administration recently approved new rules to cut diesel-powered machine emissions by 90 percent over the next 26 years by combining new diesel engine technologies with reduced sulfur content in diesel fuel.

Suri Rajan, a professor of mechanical engineering and energy processes who is leading the project, says a mono-valve engine design could offer several advantages, including continuous maximum operating efficiency at all engine speeds. He anticipates that mono-valve engines will be smaller and lighter but deliver a faster response.

Rajan expects that designing, building, and testing a prototype will take a couple of years. That includes time to develop various mechanical components such as controls to make engines reach peak performance.

Undergraduate and graduate students will participate in the research and development project, and the manufacture of the prototype engine will take place in the mechanical engineering department's fabrication shop and engine laboratory.

If the prototype is successful, Rajan estimates it may be another few years before the engine could be commercially available. The technology could ultimately have applications for large trucks and other diesel machinery, such as road graders, farm equipment, and locomotives. While Caterpillar is most interested in four-stroke diesel engine applications, the patent rights also cover two- and four-stroke gasoline engines, which power everything from small lawn mowers to automobiles.

Meanwhile, a $369,446 grant from the U.S. Department of Energy is funding a second new energy-related project, this one on improving solid oxide fuel cells.

Fuel cells are electrochemical devices that convert a fuel, such as hydrogen, directly into electricity. They'll be part of our energy future because they're clean, fuel-efficient, and quiet.

So-called solid oxide fuel cells offer a key advantage over other types: they can run on any hydrocarbon fuel, from pure hydrogen to gasified coal. Unfortunately, they operate at temperatures around 1000°C. For use in vehicles, rather than just power plants, they need to run cooler.

Engineers now are developing solid oxide fuel cells that can operate at 650 to 800°C, an acceptable range for engines. But the new cells, made with new materials, will require new interconnects—the components that link individual fuel cells into stacks in order to boost power levels.

That's where the SIUC research comes in. Rasit Koc, a professor in

Pellets of titanium carbide, an advanced ceramic, made with a metal binder. New fuel cell interconnects made of a similar formulation are being designed at SIUC and tested at Argonne National Laboratory. *Photo courtesy Geoff Swift.*

mechanical engineering and energy processes, previously has developed interconnects for standard solid oxide fuel cells. For the new generation of fuel cells, he is now developing interconnects using titanium carbide–based composite materials.

An expert on fabricating advanced ceramic materials, Koc patented a process in 1995 for making very-high-quality titanium carbide powder at low cost. He'll combine this ceramic with other materials to make the new composite interconnects.

Titanium carbide fits the bill because it is highly conductive yet durable under harsh operating conditions, such as high heat and oxidation. That combination is hard to find, says Koc.

The project is a collaborative effort with David Carter of Argonne National Laboratory. Koc will develop and test the composite ceramic materials under simulated conditions at SIUC. The most promising materials will be tested at Argonne in actual fuel cells, then fine-tuned back at SIUC.

The research grant comes through DOE's Solid State Energy Conversion Alliance program, whose goal is to develop and commercialize affordable solid oxide fuel cells for transportation applications by 2010.

For more information: Dr. Suri Rajan, Dept. of Mechanical Engineering and Energy Processes, (618) 536-2396, rajan@siu.edu; Dr. Rasit Koc, Dept. of Mechanical Engineering and Energy Processes, (618) 453-7005, kocr@siu.edu.

—Pete Rosenbery; Marilyn Davis

FISH STORY

An undergraduate student's inventory of shoreline fishes in the Middle Mississippi River shows a marked shift in fish populations in just the past 20 years.

Diane Zeman, a senior in zoology, won a 2003 Undergraduate Research Award to conduct the study, carried out at three locations near Grand Tower, Ill. Zeman's work repeated a 1983 master's thesis project by SIUC student Michael Klutho that was one of the few studies to look at fish populations along the shores and in the backwaters of the Middle Mississippi (the stretch between the Missouri River at St. Louis and the Ohio River at Cairo). Most fisheries research focuses on commercial and sport fish living in the main river channel.

"Shoreline fish are a whole different fauna," Zeman says. "It's important to look at them too" to monitor ecosystem changes.

With guidance from zoology professor Brooks Burr, Zeman used seines to collect fish every two weeks from March through November 2003. She recorded data on species; water temperature, flow, and stage; time of day; and habitat type. Then she compared her findings with Klutho's.

Fish species specialized for muddy backwaters are disappearing from this stretch of the river, she found, and carnivorous fish species that locate their prey by sight are increasing.

Diane Zeman and Sean Kerwin use a seine to collect fish in the Mississippi River near Grand Tower, Ill.
Photo courtesy Diane Zeman.

Those changes are due largely to changing conditions far upstream. Decades of dam building on the Missouri River has caused sediment to settle out into reservoirs rather than be carried downstream. Hence the Middle Mississippi, which gets much of its sediment load from the Missouri, is less turbid than it used to be.

On the plus side, the fish communities Zeman sampled were more abundant and diverse than in 1983. She turned up more than four times as many fish as Klutho did, and also more species (53 versus 46). Several species have extended their ranges into the Middle Mississippi because the water is clearer, she says.

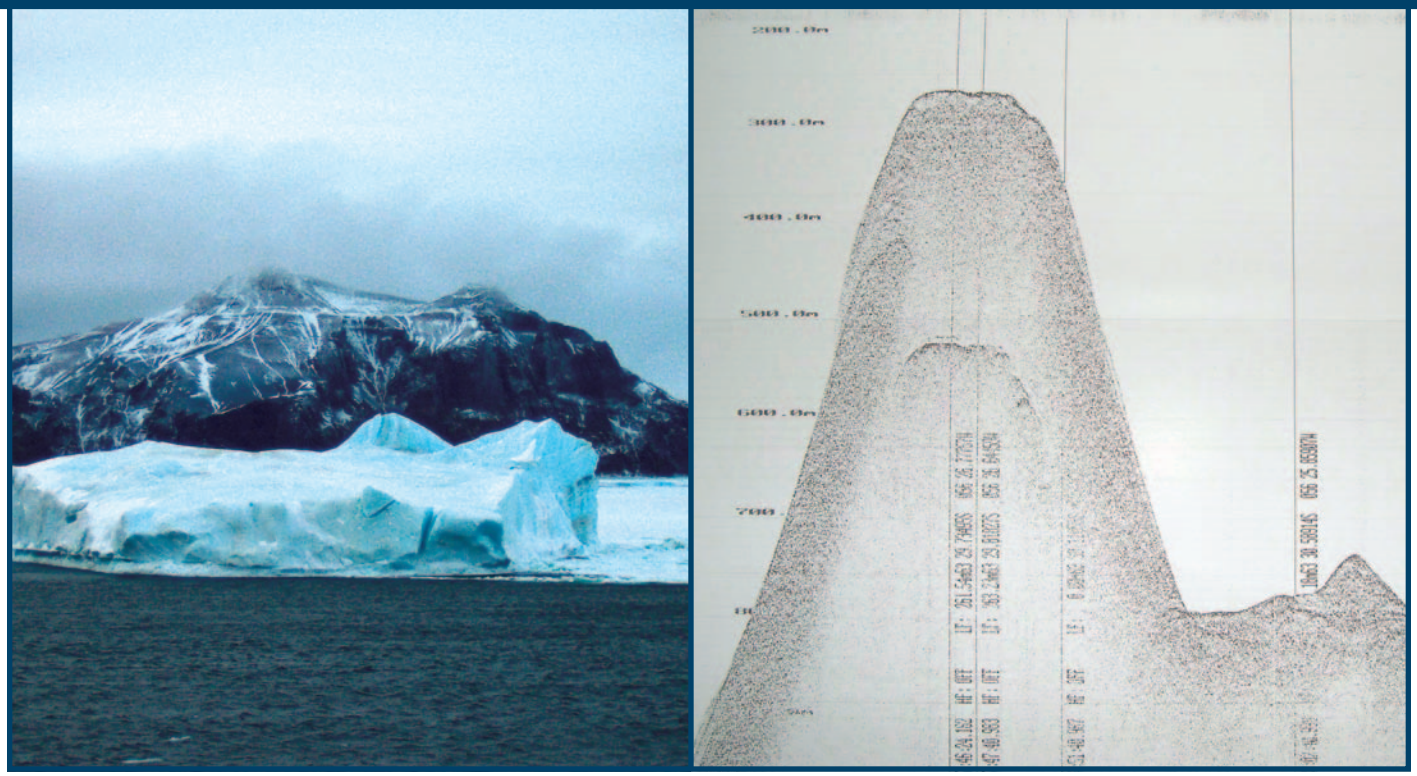
Two of the new species, however, were Asian carp—introduced exotics. "Unfortunately, they're here to stay," Zeman says. And several native fish species seem to have disappeared from the Middle Mississippi, including two types of chub common 20 years ago.

The bottom line? Human activities can cause big changes in river ecosystems—whether for better or for worse—in a surprisingly short amount of time. Studies like Zeman's, which help us understand these changes, are important for planners and conservationists.

"Humans have more of an impact on river systems than most other things do," she says. "It's not always detrimental. But it's important that we preserve our freshwater resources, and fish are good indicators of water quality."

Diane Zeman's study won first place in SIUC's 2004 Undergraduate Research Forum. She is now a master's student in zoology. For more information, contact her at (618) 453-4113 or dianez@siu.edu.

—Marilyn Davis



Left: The Antarctic Sound. Right: A bottom profile of the newly discovered underwater volcano. *Images courtesy Scott Ishman.*

HOT FIND IN A COLD PLACE

Two SIUC geologists were part of a scientific team that recently discovered an active, previously unknown volcano on the sea floor off the Antarctic Peninsula.

Associate professor Scott Ishman and graduate student Phillip Szymcek were among scientists from six U.S. and Canadian universities who verified the volcano's existence this past April. The National Science Foundation, which funded the research, formally announced the discovery in May.

The as-yet-unnamed volcano is in an area known as the Antarctic Sound, on the eastern side—and near the tip—of the peninsula (the continent's long, skinny arm). The volcano stands 2,300 feet above the sea floor; its top is roughly 900 feet beneath the ocean surface.

The volcano's significance is its youth. While there are historical accounts of volcanic eruptions on the western side of the Antarctic Peninsula, Ishman says, "all of the known volcanic rocks on the eastern side are at least two million years old or older. This volcano isn't related to those older rocks; it is a sign of renewed activity on the eastern side."

According to the NSF, the discovery explains historical reports from mariners of discolored water in the area, which can be caused by volcanic material.

The team used a bottom-scanning video recorder, rock dredges, and temperature probes to survey the sides and crest of the submarine peak. The probes revealed slight warming of the water, and the dredges recovered fresh, basaltic rocks—a clear sign of volcanic activity.

In addition, the video showed dark rock toward the top of the volcano that was devoid of sea life, another indication of very recent lava flows. "Some of the freshest rock we recovered may have been just a few months old," Ishman says.

Rather than having a central vent that gives rise to explosive lava flows, the volcano appears to release its lava through fissures similar to those of the shield volcanoes of Hawai'i, Ishman explains.

Further study will enable volcanologists to determine how deep the source of the magma is within the earth's mantle. That will help them reconstruct the evolution of the Antarctic Peninsula.

The discovery was serendipitous. The expedition team, led by Eugene Domack of Hamilton College, left April 16 from Chile to continue its investigations of Antarctica's Larsen Ice Shelf. Large sections of this ice shelf have disintegrated in the past decade, and the research team is studying the causes and nature of the breakup.

On this particular expedition, however, icy seas prevented the team's research vessel from reaching the Larsen area. The team decided instead to try to confirm the volcano's existence, whose presence was hinted at in sonar maps of the sea floor they had made during a January 2002 research trip.

Ishman and his students have been working to get a good picture

of climate change in Antarctica since the last ice age, roughly 12,000 years ago. Their research, featured in the Fall 2002 issue of *Perspectives,* will help scientists determine the extent to which ice melting in Antarctica is due to global warming caused by humans or to natural climate cycles.

For more information: Dr. Scott Ishman, Dept. of Geology, (618) 453-7377, sishman@geo.siu.edu.

—Pete Rosenbery; Marilyn Davis

WORKINGMAN'S POET

The first collection of poems he wrote in graduate school he titled "No, Mom, It Doesn't Pay Well." But David Bond's mother can consider him a success nonetheless.

Bond was the only writer to snag an Illinois Arts Council Literary Award in both 2003 and 2004. The IAC annually makes 10 such awards for works by Illinois writers that appeared in Illinois literary publications in the previous year.

This year, Bond won $1,000 for his poem "At the Wellness Center," published by the *Spoon River Poetry Review.* His 2003 award-winning poem was published in the poetry journal *RHINO*.

Currently the manager of interlibrary lending at SIUC's Morris Library, Bond has held jobs as a substitute teacher, a newspaper reporter, and, for 17 years, a warehouse manager for an underground coal mine. At age 44 he began working part-time on an MFA in creative writing from SIUC. By the time he graduated in 1998, the coal mine had shut down.

Bond has been publishing his poems in literary magazines nationwide since the early 1990s. As an undergraduate he had majored in English, but back then was more interested in writing short stories. After reading books in the late 1980s and early 1990s by SIUC poets Rodney Jones, Allison Joseph, and Lucia Perillo (all of whom have been featured in this magazine), Bond was inspired to go in another direction.

"I guess I really came back to school to talk to somebody about poetry," he says.

The IAC awarded Bond a $7,000 Artists Fellowship in 2001, the same year his self-published book, *Colors,* came out. He was the featured Illinois poet in the Summer/Fall 2003 issue of the *Spoon River Poetry Review,* one of the nation's most respected literary magazines.

He has given poetry readings and workshops at several universities and his work has been showcased as part of Chicago Public Television's Arts Across Illinois series.

Much of Bond's free verse concerns everyday experience, from blue-collar labor to his love of the Midwest. He says he investigates "the creative force of work and the workplace" in his poetry.

For more information: David Bond, Library Affairs, (618) 453-1162, dbond@lib.siu.edu.

—Marilyn Davis

FINAL NOTES

A labor of love begun several years ago by two SIUC music professors has enlarged the repertoire for classical singers.

A New Anthology of Art Songs by African American Composers, compiled by pianist Margaret Simmons and soprano Jeanine Wagner, was published this year by Southern Illinois University Press.

Art songs, performed by one singer with piano accompaniment, unite music and poetry. They were first written in the 19th century, by German composers such as Schubert and Brahms. The genre has been continued by 20th-century composers, including contemporary African-American composers—but the works of the latter have been hard to find and neglected by anthologists.

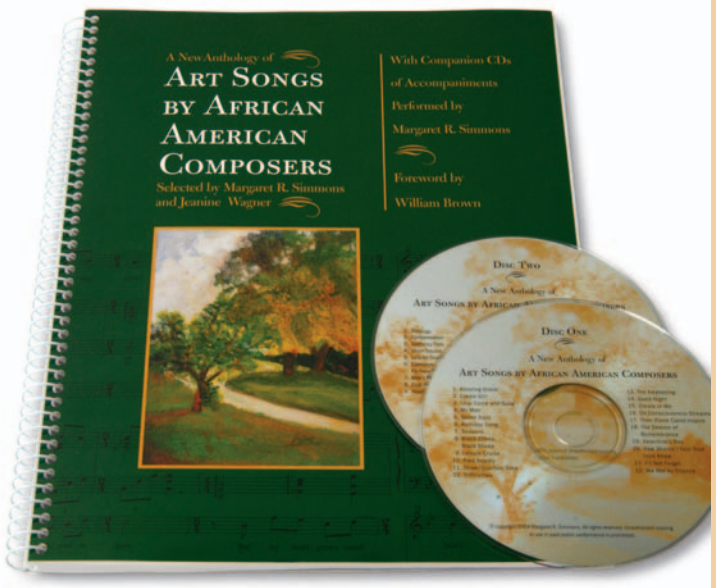
Simmons and Wagner dug through archives, contacted composers for material, sifted through the songs they came up with, and presented some of them in concert—research described in the Spring 1998 issue of *Perspectives.*

The finished anthology presents 39 pieces for voice and piano by 18 composers. Two companion CDs feature accompaniment tracks for all the selections, performed by Simmons.

All of the works were written since 1968. Biographies are included of the composers, nearly half of whom are women and some of whom are lesser-known or emerging artists. Jazz and spirituals are dominant influences in many of their works, expanding the horizons of the art-song repertoire.

For more information: www.siu.edu/~siupress.

—Marilyn Davis



RESEARCHSURVEY

Brian Klubek inoculates a bag of soybeans with a mix of three bacteria to boost yields and reduce fungal disease.

SOUPED-UP BEANS

Brian Klubek's twist on an old crop management technique is capable of boosting soybean yields an astonishing 15 to 29 percent in a good year, but he's not satisfied.

Now the SIUC soil microbiologist is trying another twist, hoping to make those yields more reliable while fighting fungal disease in soybeans as well.

The management technique, called inoculation, involves coating soybean seed with bacteria that churn out nitrogen, a mineral the plants need to be highly productive.

Inoculation works well in fields that have not been planted to soybeans for a long time. But fields where farmers grow beans year after year host native populations of nitrogen-producing bacteria that often reach the roots first.

These native strains are more aggressive, crowding out the laboratory-inoculated strains, but they aren't as effective at providing the soybean plants with nitrogen.

In order to give his nitrogen-producing bacteria an edge, Klubek turned to another soil bacterium, *Streptomyces kanamyceticus,* that makes its own antibiotic.

"The antibiotic doesn't kill the native bacteria—it just slows them down a little," he says.

After developing strains of nitrogen-producing bacteria that tolerate exposure to the antibiotic, Klubek and former master's student Amelia Gregor began inoculating soybean seed with both the nitrogen-producing bacteria and the antibiotic-producing bacteria.

The microbe combo turned out to be a dynamic duo. In field tests a few years back, Klubek and Gregor achieved soybean yield increases of 15 to 29 percent with it.

In 2002, Greg Kurwicki, a Nashville, Ill., farmer who had read about Klubek's work, asked if he could use the combination in a demonstration plot on his land. "The inoculated soybeans out-yielded the other varieties he was testing, even though Ma Nature was not very good to us in 2002," Klubek says.

"He got a 17 percent increase in yield. While most of his [soybean] varieties were averaging 21 to 22 bushels per acre—that's how dry it was that year (typical yields for Southern Illinois are 40-45 bushels per acre)—the ones he inoculated with my bugs produced 28 bushels per acre."

Still, Klubek's inoculant mix does not always perform better than standard soybeans when environmental conditions are less than ideal. SIUC test plots didn't produce yield increases in 2002 and 2003, which were very dry years.

"We have shown good root nodule occupancy [by his strain of nitrogen-producing bacteria], and an increase in leaf nitrogen content," says Klubek. "But we don't yet have the consistency we're looking for."

So he and current master's student Chad LaMontagne have begun experimenting with adding a third inoculant to the mix: another type of root-dwelling bacterium with a number of helpful habits.

"They are reported to enhance or stimulate more rapid seed germination and root development, and they're also reported to be antagonistic to fungal pathogens like SDS (Sudden Death Syndrome), which offers an additional advantage," Klubek says of these microbes.

The two researchers are testing various combinations of two of the nitrogen-producing bacterial strains Klubek developed, the antibiotic-producing bacteria, and the growth-promoting bacteria.

"As far as I know, we're the only ones using three different organisms in inoculation," Klubek says. "It's a first."

They're also adding some ingredients to the inoculant mix—sucrose, glutamic acid, and an organic complex that keeps iron soluble—all aimed at helping the microbes thrive. And they're adding a second soybean variety to the testing, to see if results obtained with the one hold true for the other.

If all goes well, the souped-up soybeans will eventually be patented and licensed for commercial sales.

For more information: Dr. Brian Klubek, Dept. of Plant, Soil, and Agricultural Systems, (618) 453-2496, bklubek@siu.edu.

—K. C. Jaehnig

SCIENCE OF TEACHING

While their pupils were relishing time off, teachers and principals from several downstate school districts were hitting the books this past summer at an educational enrichment program drawing on both public- and private-sector expertise.

The goal was to dramatically improve math and science learning among youngsters attending 10 public schools in Union, Johnson, Pulaski, and Alexander Counties in deep Southern Illinois.

Test scores show that an alarming number of pupils in these schools—some of Illinois' poorest—are falling far behind in math and science knowledge. "These schools are in a position where they've got to turn around performance to prevent sanctions" under the federal No Child Left Behind legislation, says Randy Dunn, head of the project and chair of SIUC's Department of Educational Administration and Higher Education.

The other partners in the venture are the Boeing Company's St. Louis center, Shawnee Community College in Ullin, and the Ullin-based Regional Office of Education #2, which oversees the 10 participating schools. Faculty from SIUC and Shawnee and engineers and scientists from Boeing are serving as mentors to 50 teachers and 10 principals from the targeted schools.

At a summer training institute held at SIUC, the teachers studied with math and science experts and learned about work-based learning activities from area businesses. High-school teachers also took part in hands-on research at SIUC to increase their knowledge in math and science, while middle-school teachers tested new instructional strategies on area youngsters attending the Saluki Kids Academy, which brings students to SIUC each summer for academic and cultural activities.

Meanwhile, the principals devised school improvement and academic assessment plans, learned how to bolster faculty leadership, and brainstormed about ways to involve parents in their children's education.

Shawnee Community College and the Boeing Co. also have hosted activities for the participants.

This fall, teachers are incorporating what they've learned into their classroom lessons and meeting regularly to discuss their progress with their summer mentors, who also are helping them tailor instruction to meet the Illinois State Learning Standards.

Dunn hopes the yearlong program, formally known as the Southern Illinois Teacher Quality Collaborative, will provide "meaningful jumps" in student performance and achievement. A $320,000 Illinois Board of Higher Education grant is funding the efforts.

For more information: Dr. Randy Dunn, Educational Administration and Higher Education, (618) 536-4434, rdunn@siu.edu.

—Paula Davenport

KUDOS

▲ Jason Barabas

▲ Dubravka Ban

▲ Jonathan Wiesen

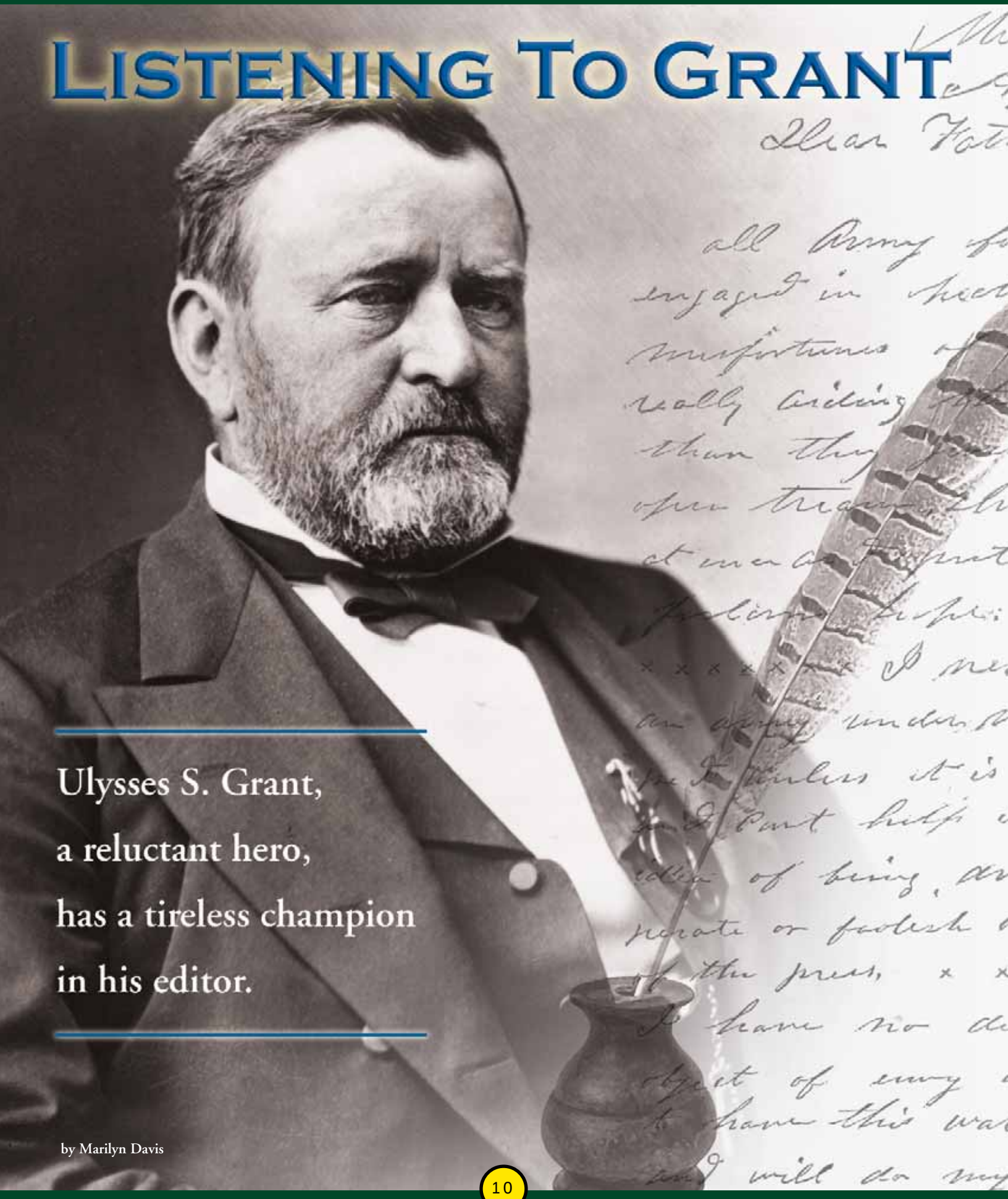
• The Robert Wood Johnson Foundation's Scholars in Health Policy Research Program has awarded a two-year post-doctoral fellowship to Jason Barabas, an assistant professor of political science. Barabas will work at Harvard University's Center for Basic Research in the Social Sciences. He plans to study how the mass media present information about health care in the United States and how that affects public opinion on health care policy.

• Germany's Alexander von Humboldt Foundation has awarded research fellowships to assistant professor of mathematics Dubravka Ban and associate professor of history Jonathan Wiesen. Ban's area of research is representation theory, which has applications in physics and chemistry. She will work at the Mathematics Institute of the University of Muenster. Wiesen will do research at the Center for Comparative European History (Free University of Berlin) for his second book on public relations and propaganda in Nazi Germany.

• The National Sea Grant College Program has awarded a two-year, $30,000 fellowship, one of only five given nationwide, to doctoral student Jesse Trushenski. Her research involves improving the immune systems of aquaculture fish species through diet.

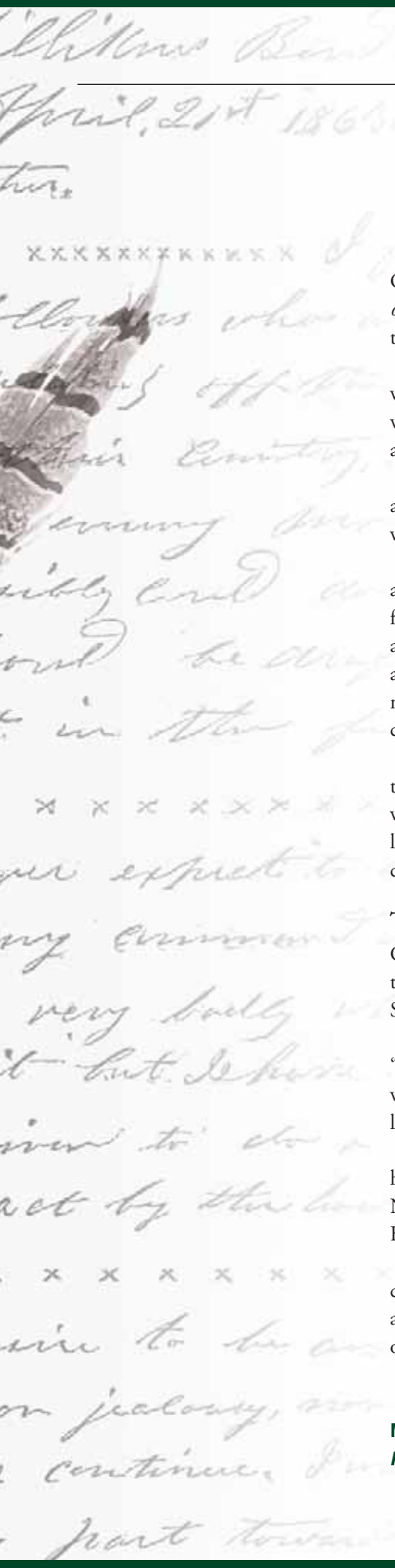
• Famous venues: Pianist Heidi Louise Williams had her New York City debut at Lincoln Center in April, and CELLIOLAPIA, a trio that includes pianist and composer Frank Stemper, performed at the Kennedy Center in Washington, D.C., this past August as part of the Performing Arts for Everyone series.

Listening To Grant



Ulysses S. Grant,
a reluctant hero,
has a tireless champion
in his editor.

by Marilyn Davis



Historian John Y. Simon has spent his career immersed in the words of an American icon. As a result of keeping company with Ulysses S. Grant, he knows the life, the family, the friends of this singular man. He knows his values, his character, his satisfactions and disappointments. Above all, he knows his penmanship.

Simon, who wrote his dissertation at Harvard on Congress and the Civil War, is an authority on Grant and Abraham Lincoln and the time in which they lived. In 1962 he began editing *The Papers of Ulysses S. Grant,* a massive project that has contributed much to our understanding of American history by publishing Grant's military and presidential papers, correspondence, and other documents.

The pairing of editor and subject has proved to be a most felicitous match. Earlier this year, Simon was recognized with a Lincoln Prize for Special Achievement for the project, which has completed 26 volumes to date of a planned 34 or so. The award, administered by the Lincoln and Soldiers Institute at Gettysburg College, is one of the most prestigious a U.S. historian can receive.

"It is inconceivable that any historian would write on the Civil War without having these volumes at hand," the award jury said. "John Y. Simon has been an ambassador to the academic and public world, demonstrating the quality of Civil War scholarship."

For many years now, Simon has been one of the "go-to" guys for commentary on Grant, Lincoln, and the Civil War. He has been a consultant to PBS as well as Hollywood, the National Endowment for the Humanities as well as state and local historical societies. He has spoken at dozens of colleges and universities; been a commentator on National Public Radio, C-SPAN, and the History Channel; and even lectured aboard the *Mississippi Queen,* during a Civil War seminar. He is in demand to furnish forewords and essays for books on the era and has edited many collections of articles. All this, of course, is in addition to teaching history at SIUC.

When Kevin Kline was preparing to play Grant in *Wild Wild West*, he called Simon to find out what the president had acted and sounded like. Kline later sent Simon an autographed still from the movie with his thanks inscribed at the bottom. The framed photo, in which a costumed and bearded Kline looks almost a dead ringer for Grant, hangs on Simon's office wall. "It was a terrible movie," Simon confides, "but it wasn't his fault; he's a very good actor. He was a delight to talk to."

The Grant project was born out of a burgeoning interest in Civil War history. The Civil War Centennial Commissions of Illinois, New York, and Ohio established the Ulysses S. Grant Association in 1962 to publish Grant's papers. They named Simon, who was then teaching history at Ohio State University, as executive director and editor.

"I'd always been interested both in documents and in the period in which Grant lived," he says. "I've always thought that if I had been born earlier, I would have edited the Lincoln papers, but they were done by the time I grew up. I sort of fell into the project of doing the Grant papers, but it was a logical one."

The Grant Association began at the Ohio Historical Society, but moved to SIUC in 1964. It is headquartered in Morris Library, tucked away in several windowless cubbyholes on the third floor. The National Historical Publications and Records Commission, the National Endowment for the Humanities, and SIUC fund its work.

In its 40 years on campus, the project has accumulated more than 100 file cabinets full of photocopies of Grant documents—some 250,000 items in all, a sea of words. The originals, Simon explains, are "all over the country and all over the world." Many are in the National Archives and the Library of Congress, but many are in other libraries and museums and in private hands.

Left: A portrait of President Ulysses S. Grant by Civil War photographer Mathew Brady. Middle: A letter Grant wrote to his father during the war. *Library of Congress, Prints & Photographs Division.*

"The collecting phase went on for the first few years, and our first volume appeared in 1967, which is about par for the course for a project like ours," Simon says. "But the collecting never really stops.

"We still get new tips on where things are. We find all sorts of things by accident, or are led by one document to another that might be pertinent. Nowadays, eBay has brought a lot of stuff out of attics and made us aware of items that would not otherwise have come to our attention."

What about discoveries made too late for a particular volume?

""We have not had any major discoveries, but we have had minor ones," he says. "It's inevitable for this type of project.

"We originally put those in what I called the Drawer of Shame—things we missed. But it's more than one drawer now, and we're already planning a supplement volume." Still, he says with a wry smile, nothing has turned up after the fact that has caused him "any intense grief."

Indeed, the Grant project has been lauded by critics for its consistently high quality. Simon gives much of the credit to his staff of editors—currently William Ferraro, Aaron Lisec, and Dawn Vogel—and to the graduate and undergraduate students who assist them, doing everything from proofreading to library research. (Lisec and Vogel both started with the project as graduate students.)

▲ **John Y. Simon with some of the Grant Association's holdings. *AP/World Wide Photos.***

"The work we do is sometimes a mystery to the public," says Simon. "Congressmen will say, 'We don't want those documents edited, we want them published just the way they were written.' They don't understand that good documentary editors share that goal.

"What we do, we hope, is like an art restorer who's concerned about presenting the original painting just as it was created. But that's not always easy, and there are [editorial] questions that come up along the way.

"For example, crossed-out words: do we drop or include them? We've always included anything that was crossed out in the original document, because it does give some clue as to what people were thinking.

"We don't make a big deal about correcting spelling, punctuation, and grammar. People are really far better at reading documents [from other eras, or with mistakes] than some editors give them credit for. Anyone who goes to the mall sees all these ampersands on door signs and attractive misspellings, like 'lite' beer. That doesn't need a translation. It isn't necessary to spell it correctly in brackets to communicate to the public."

Beyond tracking down documents, the chief editorial challenges lie in deciphering handwritten documents, deciding which merit inclusion (it would require far too many volumes to print them all), and researching and writing copious explanatory notes.

"We've certainly learned how to read Grant's writing, and that of most of his good friends, very well," says Simon, "which isn't a talent to be sneezed at, because there are a lot of people who can't cope with 19th-century handwriting. Some handwritings are just plain tough. In cases where bad handwriting is complicated by paper deterioration, we will spend a lot of time trying to figure out just what somebody wrote."

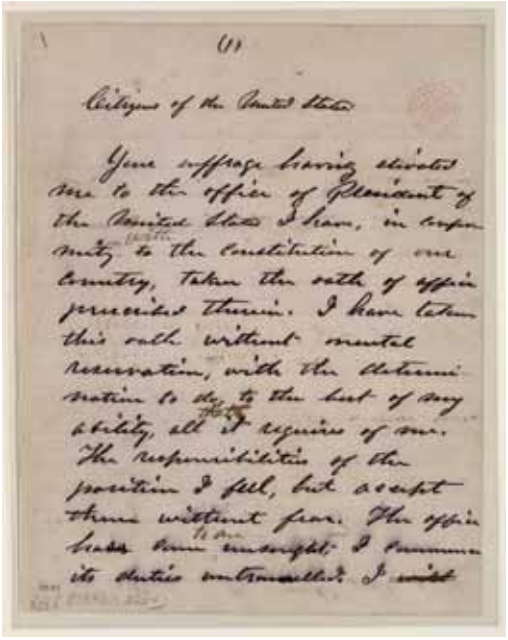
Letters from Grant during his campaigns in the Mexican-American War caused many Excedrin moments: they were in so-called "criss-cross writing." To save on scarce paper and expensive postage, Simon explains, correspondents would fill up their sheet of paper, then give it a quarter-turn and fill it up again.

Simon's intent has been to publish anything with historical or personal significance. "Everything [included] has represented my vision of what I wanted in this edition," he says—and not just the letters and other documents that Grant wrote, but those he received as well.

Modern documentary editing places considerable emphasis on incoming letters, which put the primary figure's own letters in context, Simon explains. Incoming correspondence is especially valuable where the presidency is concerned, he says.

"People write to the president who wouldn't write to anyone else. In Grant's case, we have letters from former slaves, from Indian chiefs, from women, from Unionists in the South who had been victims of the Ku Klux Klan, from just ordinary Americans who are impoverished and desperate—people who aren't well known in history at all—as well as having correspondence from the well-to-do and influential. We really open a window on American society by printing a great number of these incoming letters."

Simon's expertise makes him in demand as a consultant to other editorial projects, including *The Papers of Jefferson Davis* and *The Legal Papers of Abraham Lincoln.* He has headed the Association for Documentary Editing and the Illinois Association for the Advancement of History and has served on countless advisory boards.



Whereas Simon's career has been shaped by both choice and duty, Grant's was shaped almost entirely by the latter. It's fitting that he began his memoirs with the proverb "Man proposes; God disposes," Simon points out. "He didn't think that he had chosen his careers, but that they'd been chosen for him. He had wanted to be a teacher, a farmer, a financier—everything that blew up."

He certainly never wanted to be a soldier, but his father shipped him off at age 17 to West Point, a place he detested. Among his few consolations there were his talent at mathematics (at one point he planned to be a math professor) and the fact that he could borrow novels from the library.

He served with great bravery in the Mexican-American War, a conflict he considered "aggressive and unwarranted" on America's part, Simon wrote. He married Julia Dent in 1848 and resigned his army commission in 1854 to try to support his growing family by farming. But setbacks eventually led him to take a job as clerk in his father's leather-goods store in Galena, Ill.

When the Civil War began, he volunteered his services out of a sense of obligation. "Nobody particularly wanted him until the governor of Illinois gave him a chance with an unruly regiment that he whipped into shape," says Simon. Despite his own trepidation (see sidebar p. 14), Grant quickly distinguished himself, winning key victories at Fort Donelson, Shiloh, Vicksburg, and Chattanooga.

Grant's approach to his military campaigns was aggressive; he wanted to keep moving. Like Lincoln, "he felt it was important to win this war quickly," Simon says. "He seemed to be aware that more men died of disease than died of wounds in battle, and the longer the war lasted the more men died. Furthermore, the task of the North was to put down the rebellion before it got tired of trying to do it."

Grant also understood that changing conditions and new technologies—the telegraph, the railroad, new weapons with a greater range—required new military tactics. The other side realized that too, but Grant had the edge as an innovator.

In his war orders, as in all of his writing, Grant was concise, direct, and clear. "Usually there's a great deal of miscommunication in wartime—people not being very clear about what they want done, or not clear about the geography," says Simon. "There are cases during the Civil War where commanders lose track of who's where. But there's no case in which we have reason to believe that a written order of Grant's was misunderstood."

Grant was no glory-monger. At Appomattox he treated Lee as an equal. He refused to march into Richmond in triumph. He squelched the raucous celebrating of his men, reminding them that the Rebels were once again their countrymen.

Grant was pressed hard to accept the Republican nomination for the presidency in 1868. Though he disliked politics and public speaking, he felt obligated to run, and was unfortunate enough to win.

Proceeding like a military man, he made key appointments without consulting with party leaders. "The idea of playing politics as president he thought demeaned the office," says Simon. "He made some very wise appointments and some very poor ones—both probably as a result of being pigheaded about it."

Page one of the manuscript of Grant's first inaugural address (1869). "The responsibilities of the position I feel, but accept them without fear," he writes. *Library of Congress, Manuscripts Division.*

A Mathew Brady photograph of General Grant encamped in Virginia, 1864. Background image: Grant's last message to Congress (*courtesy SIUC Special Collections*).

Grant in His Own Words

"I would have been glad to have had a steamboat or railroad collision, or any other accident happen, by which I might have received a temporary injury sufficient to make me ineligible, for a time, to enter the Academy [West Point]. . . . A military life had no charms for me." (from the *Personal Memoirs of Ulysses S. Grant*)

"Even if the annexation itself [of Texas] could be justified, the manner in which the subsequent war was forced upon Mexico cannot. . . . The Southern rebellion was largely the outgrowth of the Mexican war. Nations, like individuals, are punished for their transgressions." (*Memoirs*)

"As we approached the brow of the hill from which it was expected we could see Harris' camp, and possibly find his men ready formed to meet us, my heart kept getting higher and higher until it felt to me as though it was in my throat. . . . When we reached a point from which the valley below was in full view I halted. . . . The marks of a recent encampment were plainly visible, but the troops were gone. My heart resumed its place. It occurred to me at once that Harris had been as much afraid of me as I had been of him. This was a view of the question I had never taken before; but it was one I never forgot afterwards." (*Memoirs*)

"During the night [at Shiloh] rain fell in torrents and our troops were exposed to the storm without shelter. I made my headquarters under a tree a few hundred yards back from the river bank. My ankle was so much swollen from the fall of my horse the Friday night preceding, and the bruise was so painful, that I could get no rest. . . . Some time after midnight, growing restive under the storm and the continuous pain, I moved back to the log-house under the bank. This had been taken as a hospital, and all night wounded men were being brought in, their wounds dressed, a leg or an arm amputated as the case might require, and everything being done to save life or alleviate suffering. The sight was more unendurable than encountering the enemy's fire, and I returned to my tree in the rain." (*Memoirs*)

"There are no fixed laws of war which are not subject to the conditions of the country, the climate, and the habits of the people. The laws of successful war in one generation would insure defeat in another." (from John Russell Young, *Around the World with General Grant,* 1879, about the lessons of the siege of Vicksburg)

"I felt like anything rather than rejoicing at the downfall of a foe who had fought so long and valiantly, and had suffered so much for a cause, though that cause was, I believe, one of the worst for which a people ever fought, and one for which there was the least excuse." (*Memoirs*, about winning the Civil War)

"Mistakes have been made. . . . I leave comparisons to history, claiming only that I have acted in every instance from a conscientious desire to do what was right. . . . Failures have been errors of judgment, not of intent." (from Grant's last message to Congress, 1876, in reference to the scandals that plagued his presidency)

"It seems that one mans destiny in this world is quite as much a mystery as it is likely to be in the next. I never thought of acquiring rank in the profession I was educated for; yet it came with two grades higher prefixed to the rank of General officers for me. I certainly never had either ambition or taste for a political life; yet I was twice president of the United States. If any one had suggested the idea of my becoming an author, as they frequently did, I was not sure whether they were making sport of me or not. I have now written a book which is in the hands of the manufacturers. I ask that you keep these notes very private lest I become an authority on the treatment of diseases. I have already too many trades to be proficient in any." (from a note to his doctor in 1885, two weeks before Grant's death)

Grant's loyalty to his appointees often outweighed his judgment. His second term in particular was marked by scandal and corruption—though never on the part of Grant himself. (Indeed, his honesty was such that his advisors told him to avoid newspapermen, Simon notes.)

As president, Grant ran into opposition over many issues, especially his efforts to enforce civil rights laws. He agreed to stand for reelection, Simon explains, only because "he had been bitterly attacked, and he wanted some sort of vindication. But he did turn down the people who wanted to nominate him for a third term, which he could very easily have had."

"I never wanted to get out of a place as much as I did to get out of the Presidency," Grant reflected after leaving office. He later advocated a six- or seven-year presidential term with no eligibility for reelection.

Grant's presidential reputation hit a low point between the two world wars but has begun to rise in recent years, as historians take a fresh look. His presidential documents, says Simon, "repay reading even now. One I like to call people's attention to is the one where he asked for a constitutional amendment to provide for separation of church and state."

Faced with the depression of 1873, Grant proposed sponsoring some public works to give people jobs, but his own party panned the idea. "Grant listened to those people and unfortunately missed his chance to be the first New Deal president," Simon jokes. "But his instincts could sometimes be dazzlingly right."

Simon hopes to see the Grant papers to their conclusion. "We have a preliminary treatment of the rest of the Grant correspondence, so now we're working on refining it—getting the annotations in, getting these documents into some sort of coherent whole," he says. "It's not an easy job, but we can see the end of the project from where we sit."

Dawn Vogel runs the office, prepares typescripts, and does much of the proofreading. William Ferraro is working on documents from the 18-month world tour that Grant and his wife made after leaving the White House. And Aaron Lisec is working on documents from the 1880s.

In those later years, an investment swindle drove the Grants into debt. To earn money, Grant agreed to write some magazine reminiscences, which at first were "very dry," says Simon. "The editors teased personal details out of Grant—they made him conscious of the fact that readers wanted to know what he thought about the events [he was relating]."

Grant managed to adapt his style, and the magazine articles became quite popular. In 1884 Grant developed throat cancer, and his last endeavor, as he lay dying, was to write his memoirs in order to secure his family's financial future.

He succeeded: the *Personal Memoirs of Ulysses S. Grant,* published posthumously, sold spectacularly well. "They're well-written and candid, with a sense of humor and a great deal of equanimity," says Simon. "They treat others very fairly. They're an American classic, much admired by a host of literary figures." That would surely astonish Grant, who never considered himself a writer.

Simon plans to use the completed *Papers* to provide annotations for a new edition of the *Memoirs.* "It will help amplify what's in the *Memoirs* and at certain points even correct it," he says. As the Grant Association's own last act, this project must wait until all of the correspondence has been edited. "One mess at a time," Simon quips.

He has not lost his enthusiasm for Grant.

"He's important to know, and there's always more to find out," he says.

"It has been an opportunity for me to spend time with a spectacular figure in American history." •

For more information: Dr. John Y. Simon, Executive Director, Ulysses S. Grant Association, (618) 453-2773 or jsimon@lib.siu.edu.

▼ Grant working on his memoirs 10 days before his death in 1885. *Library of Congress, Prints & Photographs Division.*

Growing Season

Agriculture is one focus of reconstruction efforts in war-ravaged Afghanistan. The key: cultivating a new corps of professionals to help Afghan farmers make up lost ground.

by Marilyn Davis

Farmers in Afghanistan are burdened by a bushelful of problems.

An irrigation system in disrepair. Fields that harbor unexploded mines. A shortage of supplies. An antiquated university system, meaning scant educational assistance and agricultural techniques that haven't been updated since the 1970s.

All are legacies of some 25 years of war and the repressive policies of the Taliban, and all are stumbling blocks to restoring the robustness of Afghanistan's agricultural sector. Add in the cumulative effects of several years of drought, and the picture of what Afghan farmers are facing is daunting indeed.

Afghanistan once did quite well for itself agriculturally, and it has the capability to be more than self-sustaining in terms of food production, says Oval Myers. But it desperately needs a helping hand.

John Santas, an associate director of international agricultural programs at the University of Illinois, and Myers, a not-so-retired professor of plant genetics at SIUC, are heading a new project funded by the U.S. Agency for International Development to revitalize agricultural education in Afghanistan as part of postwar reconstruction efforts.

"If we expect Afghanistan to ultimately walk alone, it has got to have its educational system built back up," Myers said in a December 2003 Associated Press interview about the new USAID project, whose goal is professional development of Afghan agriculture teachers and researchers.

◂ Left: A cornfield at Darul Amaan Research Station on the outskirts of Kabul, Afghanistan. The ruins of the presidential palace, destroyed in the Russian war, are in the background. ▸ Right: Northwest Frontier Province Agricultural University in Pakistan (top) and Kabul University in Afghanistan (bottom) are partners with USAID in the new educational enterprise. ***All photos courtesy Oval Myers and Abdul Qayyun Khan.***

For both Myers and Santas, it's a return to a part of the world they know well and an agency they know well. They were among the leaders of a long-term USAID grant project, launched in 1983, to expand the capabilities of Northwest Frontier Province Agricultural University in Peshawar, Pakistan. "Our role was to take it from being a small provincial university to a regional university," Myers says.

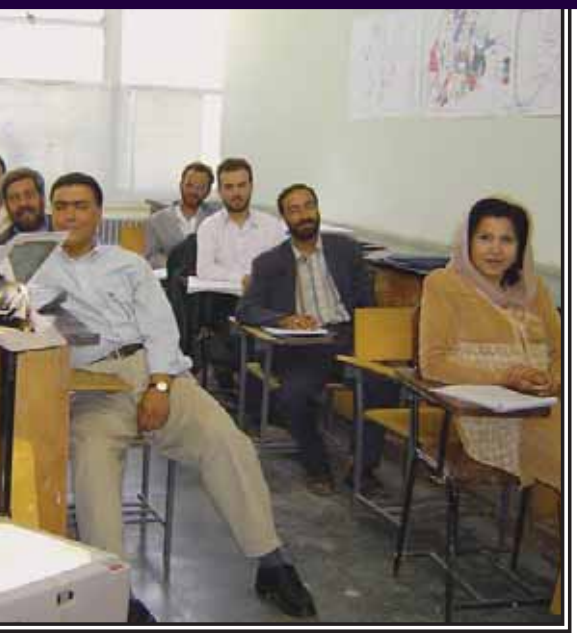
The $62 million project, officially called Transformation and Integration of the Provincial Agricultural Network (TIPAN), modernized the curriculum, constructed new buildings, integrated agricultural research stations into the university, developed outreach services for farmers, and gave some 150 faculty graduate education in the United States.

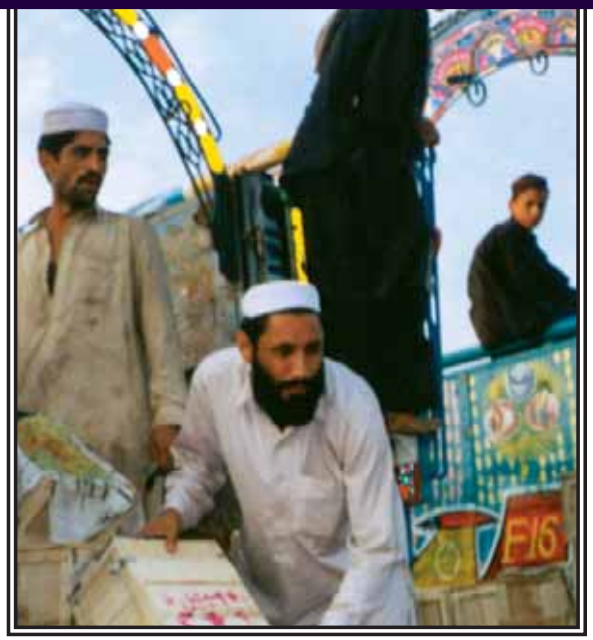
Although TIPAN came to a premature end in 1994, when U.S. legislation barred aid to Pakistan, the university continued to flourish. Now, under the guidance of Santas and Myers, some of its faculty and researchers are training Afghans in up-to-date agricultural methods. It was a natural choice for USAID to turn to the university, and to Santas and Myers, for help in achieving some of its goals in Afghanistan: Peshawar is only a day's drive east of Kabul via the Khyber Pass.

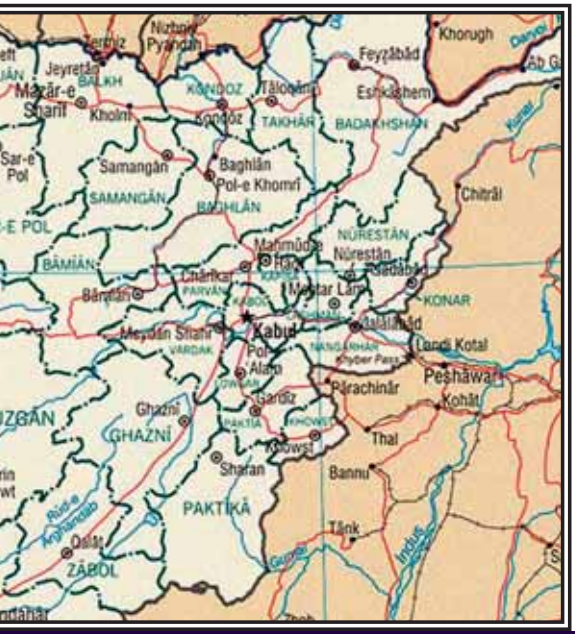
The new USAID training project began in August 2003 with three month-long, hands-on short courses taught at Peshawar on irrigation and water management practices, enterprise development skills, and crop storage and marketing. "These were considered the most important to get started with," Myers says. Several more courses, covering such topics as food preservation, orchard management, animal nutrition, and integrated pest management, were held this year.

The participants have included Afghan ministry workers, university teachers, personnel with nonprofit organizations, and agricultural industry representatives. "It's a train-the-trainers concept," Myers explains. "These people will work directly with the farmers, who need to know how to improve production practices using whatever resources they've got to work with. They've gone essentially 25 years without a viable extension service."

Some 230 Afghans, both men and women, have attended one or more of the short courses. The hope is that eventually thousands of farmers across the country will receive training from these and future personnel taking the courses, many more of which are planned for the next few years. The project will continuously evaluate the success of the outreach efforts.







Most of the agriculture faculty remaining at Afghan universities only have bachelor's degrees—and many of their teachers likewise only had bachelor's degrees. They need more advanced knowledge, in areas ranging from horticulture to animal husbandry, sustainable water use to agricultural economics. Thus, with funding from the project, 10 Afghan agricultural faculty, five each from Kabul University and Nangarhar University, have begun master's-degree work in Peshawar. They will be the first of many master's candidates, Myers hopes.

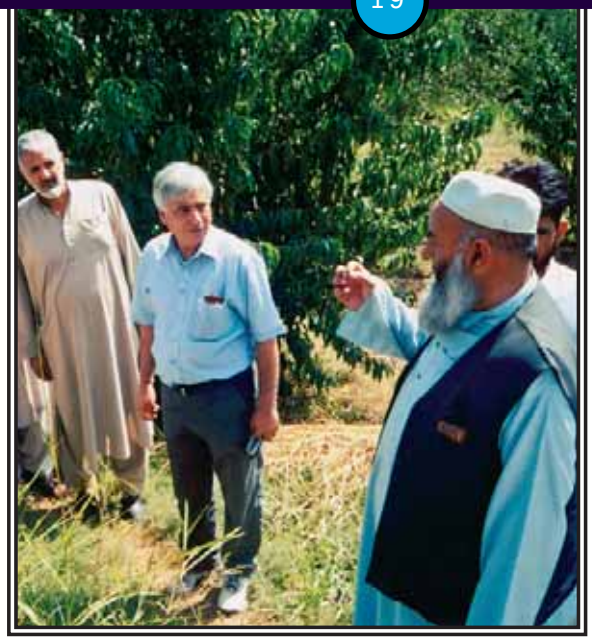
"We're trying to upgrade their capability to train their own people," he says.

A research program pairing Afghan scientists with Pakistani mentors also is part of the training project. Several Afghan agricultural scientists from research institutes in Kabul and Jalalabad have begun collaborative research with Pakistani colleagues at the Cereal Crops Research Institute in Pirsabak and at a second agricultural research station in Mingora. This "twinning" program, as it's called, is slated to expand to include additional researchers and research areas in the years ahead.

USAID has committed nearly $1.9 million to help fund the training through 2007. The grant is officially to the International Arid Lands Consortium, a group of universities and research institutes of which the University of Illinois is a member. Another $400,000 in USAID money was received in 2004 via the Afghan government's Rebuilding Agricultural Markets in Afghanistan Program.

The field office director in Peshawar, Abdul Qayyun Khan, is a former USAID veteran who previously worked with Myers and Santas in Peshawar. Khan did a preliminary needs assessment on short courses to offer, and the three men met in October 2003 with representatives from Afghan government and nongovernment agen-

Clockwise from lower left: Map detail showing Kabul and Peshawar; Oval Myers (left) with the director for research of Afghanistan's agriculture ministry; an agribusiness class in session; visiting a wholesale produce market in Peshawar as part of a class on post-harvest marketing; grapevine establishment at an agricultural experiment station near Kabul; a Pakistani orchard owner addressing participants in an enterprise development class (the man in western dress is project field director Abdul Qayyun Khan); a discussion of peanut farming and irrigation near Peshawar.



cies to do long-term planning about activities. Mohammad Agha Jabarkhil, the project's assistant training coordinator, is based in Kabul; he and Khan are coordinating day-to-day details of the project, from advertising the courses to making travel arrangements for participants.

Besides having personnel trained to assist them, Afghan farmers need other help, too—help that will require an infusion of outside assistance, both in funds and materials. For example, Afghanistan must rely on irrigation for 85 percent of its farmland. Repairing the irrigation system, which had been deteriorating for years and was seriously damaged by military operations, is "probably the major reconstruction problem," Myers says.

Developing and maintaining other infrastructure needed for agriculture—from roads to storage facilities for exports—also will be crucial. Livestock herds must be built back up. Supplies of seed, fertilizer, and herbicide are needed. The country must not only boost production to feed its own people, but must redevelop outside markets.

"They need to develop their internal markets, but, particularly on the borders, they need to export their excess," Myers says. Pakistan is Afghanistan's top trading partner, which is one reason that it was willing to be part of the USAID effort.

With some 21 million acres of land under cultivation, Afghanistan has about the same amount of cropland that Illinois does. Afghan farmers grow a wide range of crops—wheat, corn, barley, cotton, nuts, fruits, and vegetables. (Contrary to popular misconceptions, only about 1 percent of land is in opium poppy production, although that has been increasing and is a serious concern.)

One of the few crops not grown in Afghanistan is that mainstay of Illinois agriculture, soybeans. But a second project with which Myers is involved may change that.

Nutrition and Education International, a U.S.-based nonprofit organization focusing on improving nutrition in Afghanistan, is experimenting with growing soybeans there as a high-quality protein source. Balkh University provided some farmland near Mazar-e-Sharif, a city in northern Afghanistan, for the experiment, and the Ministry of Agriculture and Animal Husbandry also is involved with the project.

Michael Schmidt, a soybean breeder and associate professor of plant science at SIUC, supplied two Carbondale-bred varieties of beans suitable for the latitude and climate. (Like Southern Illinois, the region has hot, humid summers and cool winters.) So far, says Myers, reports have it that the varieties are growing well.

A soybean expert from way back, Myers is serving as a production consultant on the research project, which is also testing several other soybean varieties provided by Stine Seeds, a major soybean company. He will return to Pakistan and Afghanistan this fall to work with the USAID project, but then will travel to Mazar-e-Sharif to check on the harvest and give seminars on soybean production.

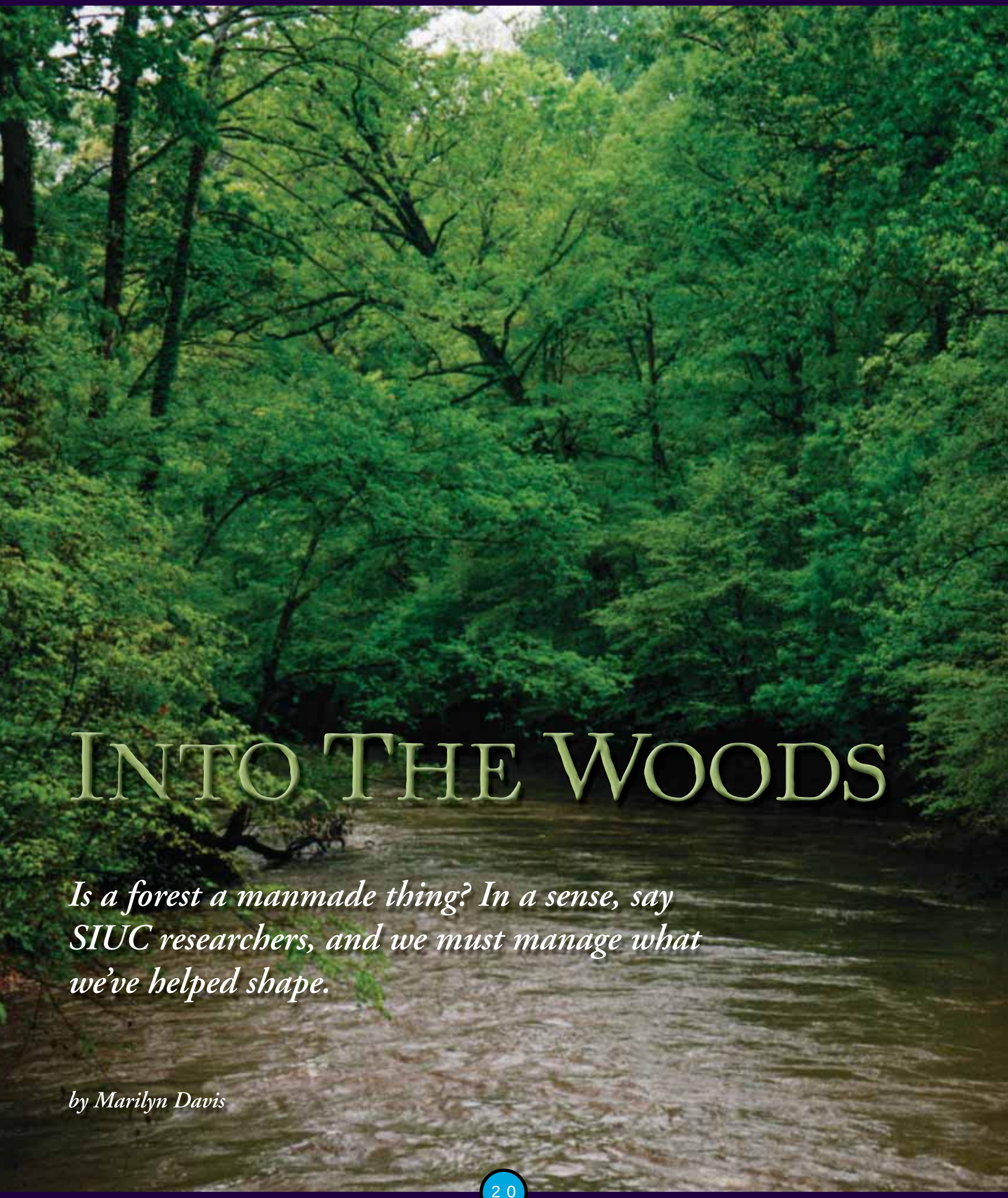
The soybean project looks promising enough that the agriculture ministry is eager to expand it to several locations throughout the country, which will require selecting bean varieties appropriate for different regions.

Myers is optimistic about the ability of both projects to help Afghan farmers improve production after years of political instability, war, and government neglect. With the Taliban out of power, he says, there is "a great hunger for knowledge" among the Afghan people—men and women alike.

"They are a very entrepreneurial people," he says.

"If there's an opportunity, they take it." •

For more information: Dr. Oval Myers, Dept. of Plant, Soil, and Agricultural Systems, (618) 453-2496, omyers@siu.edu.



Into The Woods

Is a forest a manmade thing? In a sense, say SIUC researchers, and we must manage what we've helped shape.

by Marilyn Davis

The notion of "the forest primeval" exerts a powerful pull on the imagination. We would like to think of the forests in which we hike and hunt as places untouched by humans.

But it isn't so, at least not in much of the United States. "The idea of the untouched forest is a myth all across the country," says Charles Ruffner.

Ruffner, an assistant professor of forestry, studies land-use patterns and ecological conditions over time to understand how old-growth forests have developed and how they can be conserved. His research, and that of others, indicates that the oak-dominated forests of the eastern United States, such as those in Southern Illinois, have been shaped by human activities such as clearing and burning for thousands of years.

John Groninger, an associate professor of forestry and a silviculture (tree cultivation) expert, says of eastern forests, "Disturbances like clearing, grazing, and burning were the rule, not the exception."

How do researchers know that?

Dendrochronology—tree ring analysis—tells them not just growth rates and ages of trees, but also the fire history of a site (fires leave their trace on surviving trees). Field experiments help confirm what tree species do best in the face of disturbances such as fires. Archival research into early historical accounts reveals much about how Native Americans and early European settlers used the forest.

"There's good evidence about fire being used by Native Americans to clear plots in the forest for agriculture, to lower insect populations, and to favor species used for hunting and gathering," says Jim Zaczek, an associate professor of forestry who specializes in forest ecology.

Oak seedlings perish in heavy shade and need a relatively open forest understory, with canopy gaps letting in light. They are well adapted to the fires that once held down the density of competitor tree species. Oaks store more energy in their roots than many other types of trees do, and if seedlings or saplings are affected by fire, they resprout vigorously. Mature oaks also regenerate well after fires, logging, or blowdowns from high winds: they sprout very well from stumps, and the increased light helps them outcompete other species.

As a doctoral student at Pennsylvania State University, Ruffner did dendrochronological studies of old-growth oaks from sites in Pennsylvania and Maryland. Their growth rate, he discovered, was fastest after disturbances in the form of fire and logging of nearby trees. Both types of disturbances resulted in more light and less competition for nutrients.

Today, however, oak-dominated forests in the eastern United States are not in good shape, according to Ruffner, Zaczek, and Groninger. They say that, paradoxically, the forests have been hurt by being left alone, and that if we want to conserve them we must actively manage them.

"Considering their history, just letting these forests go without any type of proactive management doesn't constitute stewardship," Groninger says. "It's neglect."

Maintaining and restoring oak forests will be even more of a challenge because other ecological changes over the past few decades haven't been oak-friendly. Those changes include unnaturally high deer populations and the introduction of rapidly spreading nonnative plants, trees, and insects.

"People need to be more educated about the condition of the forest and the consequences of lack of management," Ruffner says. "We know the impacts of past land uses, and we know how we got where we are today.

"We're after forest sustainability."

Ruffner places much of the blame for the decline of oaks in eastern forests on the "Smokey the Bear syndrome": the notion that forest fires are always bad.

The U.S. Forest Service began its highly successful fire suppression campaign, with Smokey at the helm, in the early 1940s. "Fires were seen as reducing forest value and productivity," Ruffner explains. "But by the 1960s and 1970s, foresters were seeing shifts in species, and by the 1980s it became apparent that fire suppression had come back to haunt us."

With the new emphasis on fire prevention and firefighting, fire-susceptible tree species like sugar maple and beech, which thrive in the dim light of undisturbed forests, began shading out oak seedlings. As a result, many eastern forests have few young oaks today to replace the aging ones. When mature oaks die, young maple trees in the forest midstory are shooting up to take their place.

In 1997 Zaczek, Groninger, and Jerry Van Sambeek of the Forest Service's North Central Research Station inventoried the trees in Kaskaskia Woods. This 18-acre old-growth remnant stand in Southern Illinois' Shawnee National Forest has been protected from fire and other disturbance since 1933. Comparing their results to those of a 1935 Forest Service inventory done on this stand, they found that the number of oaks had plummeted and that sugar maples accounted for 60 percent of the trees, up from 20 percent. They also found that the number of tree species growing there had dropped from 26 to 20.

Ruffner, Groninger, and master's students Trevor Ozier and Saskia van de

Bottomland hardwood forest in the Cache River State Natural Area, Johnson County, Ill. *Photograph by Stephen Rogers.*

▲ **Top: The Saluki Fire Dawgs clear vegetation to create a fuel break for a prescribed burn in Pope County, Ill.** ***SIUC photo by Russell Bailey.*** **Bottom: A burn in progress at SIUC's Touch of Nature Environmental Center. A fuel break is at left.** ***Photo courtesy Charles Ruffner.***

Gevel recently surveyed hundreds of forest monitoring plots set up at Trail of Tears State Forest some 20 years earlier. They determined that the number of oaks in these plots, which had experienced no fires in that time period, also had dropped dramatically. "What I found shocking was that it was happening so quickly," Groninger says.

James Fralish, a professor emeritus of forestry at SIUC, has documented succession by sugar maples at many other sites in the Shawnee, and the same pattern is occurring in many other eastern forests.

Is this development undesirable? In the end, that depends on what we want our forests to be like. But Ruffner, Groninger, and Zaczek say that it has environmental disadvantages. "The forest will remain," says Groninger, "but it will become something different."

Oaks are a keystone species in eastern forests, meaning that they support many other species directly or indirectly—from deer to small mammals to migrating neotropical songbirds. As oaks decline due to reduced disturbance, certain other species are likely to decline as well. "Generally, biodiversity goes down as sugar maple and beech replace oak," Ruffner says.

Zaczek explains that maples "tend not to be as important in supporting wildlife. Oaks drop seed in the fall, just before the dormant season, when many animals need a food source.

"A proportional loss of oaks leads to a proportional loss of other native species that depend on them. There are so many interrelationships out there. If we accept the loss of oak, we have to accept the loss of other things, some of which we may not anticipate or entirely understand."

Some species have already suffered from lack of disturbance in the changing forests.

To take one example, ruffed grouse have gone locally extinct in Southern Illinois in part because they need the cover and forage provided by young tree stands in regenerating areas. To take another example, timber rattlesnakes, which play an important role in the environment because of the number of rodents they eat, are declining because they need openings in the forest canopy to maintain their body heat.

Ruffner, a fire ecologist, has another concern about the switchover from oaks to maples. When forests go for decades without burning, they fill up with fuel—dead wood, thick duff (decaying vegetation on the ground), and choked understory growth. Such conditions set the stage for catastrophic wildfires that ravage forests.

The need for fuel reduction is most critical in the drought-afflicted western states, which have seen many such fires in recent years. Despite our wetter climate, however, Southern Illinois experiences dry spells too. Sugar maples are more drought-susceptible than oaks and will add proportionately more to the fuel load during dry years, Ruffner says. He worries that an extended drought could result in damaging wildfires in this region, where so many people live in close proximity to forestland.

Smokey the Bear ("Only YOU can prevent forest fires") remains a useful warning symbol for the public. Too often, catastrophic fires get started due to carelessness with cigarette butts or campfires. What the forest needs instead is the right kind of fire in the right place at the right time. Prescribed burning, a tool that foresters are increasingly using for land management, treats a site for restoration purposes under specific conditions, so that the fire does not get out of control or burn too hot.

Each year Ruffner teaches a popular course that allows students to gain their "red card": national certification as wildland firefighters. Those students, called the Saluki Fire Dawgs,

help battle forest fires in the West each year. But they also serve as Ruffner's fire crew to carry out prescribed burns for regenerating oak on public and private land in Southern Illinois.

The Fire Dawgs help Ruffner collect data on oak regeneration patterns in burned areas of the forest, and they're working with him to develop fuel models: standardized classifications of forest fuel based on the types and quantities of burnable foliage. Knowing an area's fuel model can tell foresters how hot a fire could get and how fast it could spread—information crucial in controlling prescribed burns.

There are 13 commonly used fire models in the United States, but most were developed out West. With funding from the U.S. Forest Service, Ruffner and his students are now working on fuel models specific to Southern Illinois for land managers' use.

At several sites throughout the region, Ruffner and Groninger and their students are comparing the effects of repeated prescribed burning, selective cutting, a combination of the two, and no treatment. The research is funded by the Illinois Department of Natural Resources and the Wild Turkey Federation.

The team has found that for effective oak regeneration, burns must encompass at least 50-60 acres. "We started with 5-acre plots, but the deer just moved in and ate up all of the oak seedlings," Ruffner says. "The larger the treatment area, the more we overcome the deer's appetite."

Prescribed burns aren't always sufficient to restore succession by oaks rather than by maples, that project has shown. Fire has been suppressed for so many decades that maple trees often are big enough to survive the burns. That's why the researchers are also studying the effectiveness of thinning the forest in some areas, by cutting trees less than 10 inches in diameter to give oak seedlings a chance to get going.

Some areas, they say, may require larger-scale cutting to maintain an oak-dominated forest. "There are places we shouldn't touch, but cutting down some trees can be part of regenerating a forest," says Zaczek. He, Groninger, and Ruffner concur that, done judiciously, logging in eastern forests can be a plus both for long-term forest health and for local economies.

The issue of forest management is not restricted to public lands, which account for just a fraction of eastern forests. As Ruffner notes, Illinois boasts some 4 million acres of forest. The Shawnee, the only national forest in Illinois, has less than 3 percent of that acreage.

"How private landowners manage their own land is really critical," Groninger says, especially since private timber stands are much more likely to be logged at some point. Since some tree harvesting in eastern woodlands would be beneficial, and in places crucial, for conserving or regenerating oak forests, this offers an opportunity to combine ecological restoration with badly needed economic development, the three researchers say.

Helping landowners maintain their oak forests for periodic timber harvesting can create jobs while being good for wildlife. It also would reduce the need for importing wood from countries where uncontrolled logging is resulting in environmental degradation.

But it needs to be done right. Harvesting trees in an ecologically sound way, with an eye to oak regeneration rather than one-time profit, is what makes the enterprise sustainable. It's economically and environmentally prudent for the long haul—and, says Groninger, "If it makes economic sense, a lot more people will do the right thing ecologically."

▲ **Top: Maples fill the understory in this old-growth oak forest in Pennsylvania.** ***Photo courtesy Jim Zaczek.***
Bottom: During a tree inventory at Touch of Nature, Brian Bolser uses an angle gauge to tally trees of a certain size while Julie Shutt records data. ***SIUC photo by Russell Bailey.***

▲ **Top: John Lhotka uses a small tractor fitted with a disc harrow to incorporate acorns into the soil on a private woodlot in Saline County, Ill. *Photo courtesy Jim Zaczek.* Bottom: Chestnut oaks in Southern Illinois. *Photo by Dan Spivey.***

The SIUC researchers' focus, however, is not on timber production but on conserving oak-dominated forests and restoring them where they have been destroyed for decades. On such sites, planting is essential because no seed bank remains to regenerate the trees.

In a joint project, Groninger and Zaczek are evaluating the status of The Nature Conservancy's efforts to restore 1,000 acres of floodprone farmland in the Grassy Slough area of Southern Illinois to bottomland oak forest. And in a project funded by the U.S. Department of Agriculture (USDA) and Black Beauty Coal Company, Groninger and his students are experimenting with different types of tillage and herbicide treatments to see which work better for forest restoration on reclaimed mine land.

Zaczek recently remeasured oak trees planted 16 years ago in a Pennsylvania experiment comparing the survivability of acorns and different types of nursery stock under various cultivation techniques. The goal was to see what kind of stock would get trees as quickly as possible to four or five feet tall, a height threshold where the chances of survival go way up because it is above deer browsing. "The first few years are critical," Zaczek says.

Among other things, he found that one-year-old oak seedlings from nurseries don't survive much better than acorns do; two-year-old potted stock does best but is too expensive; high-quality two-year-old bare-root stock (no soil ball around the roots) is the best all-around choice; and intensive culturing (such as top-cutting the seedlings before planting, which can result in higher growth rates) helps, but not significantly. Zaczek and his students also have worked extensively with oak propagation techniques needed to produce nursery stock.

The USDA has funded other research by Zaczek to improve acorn survivability for oak regeneration. At various upland and bottomland forest sites in Southern Illinois, he and graduate student John Lhotka used a small tractor with a disc harrow to incorporate acorns a couple of inches into the soil in the fall. That protected the acorns from being eaten, drying out, or freezing because of lack of snow cover.

Incorporation made a huge difference the next spring, they found. Up to 14 times more acorns germinated with the treatment than without it. The more acorns that germinate, the more seedlings that will survive being browsed by deer.

The tractor also knocked down many of the maple saplings on these sites, which will give the oak seedlings a better chance to survive to midstory height. The midstory must have enough oak trees to outcompete maples for a place in the canopy as the big oaks die off.

Zaczek would like next to test the use of incorporation followed by prescribed burns. "We've found that when acorns germinate on the soil surface, they won't resprout if a fire comes through," he says.

Regenerating oak forests, he warns, "may be a several-step process, and it may not be cheap." Especially where public lands are involved, people must be patient: "Forests are not pleasant to look at in the first few years after logging or burning."

Or, as Groninger puts it, "Forests develop over time periods that are inconveniently long for people. Our frame of reference is too small."

He adds, "Our hope is to maintain diversity—to maintain the oak ecosystem in at least certain areas so that our options will be open for the future." •

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A Gangster's Life and Times

Southern Illinois bootlegger Charlie Birger (center, sitting on car roof) and his gang at Shady Rest. Photograph courtesy of Gordon Pruett.

In the small coal-mining towns of Williamson County (Ill.) during Prohibition, rivals duked it out over criminal enterprises ranging from bootlegging to gambling. Charlie Birger, the most charismatic of these outlaws, ran several speakeasies and brothels in the 1920s. His gang and the Shelton gang teamed up to fight competition in their territory by the Ku Klux Klan. By 1926, however, he and the Sheltons had a falling-out that led to escalating violence, including the bombing of Birger's infamous roadhouse, Shady Rest, in 1927.

This stormy chapter of Southern Illinois history came to a close when Birger was convicted of murder and hanged in Benton in April 1928—the last man to die on the gallows in Illinois. Hundreds of people jammed the streets to see the spectacle. Eyewitness accounts say that Birger grinned and joked with officials. His last words? "It's a beautiful world."

David Kidd, who works for SIUC's Broadcasting Service, told the tale in a recently aired documentary, "The Legend of Charlie Birger." This WSIU-TV production, which was funded in part by a $10,000 Illinois Humanities Council grant, has received several honors, including a bronze Telly award, a Videographer Award of Excellence, and one of only two Certificates of Excellence in multimedia given by the Association of Illinois Museums and Historical Societies in 2004.

Kidd and his team interviewed eyewitnesses and regional historians and scoured the region for photographs and other artifacts. They also reenacted scenes from Birger's life, using local actors and musicians and filming in venues across Southern Illinois. Their work, the association said, "is an excellent example of how communities can come together to tell a common story."