

Fall 2008

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Features work by John Groninger and Cody Considine, Michael Madigan and Marie Asao, Matthew Schlesinger, Ike Mathur, Sharon Peterson, and other researchers.

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# perspectives

F / 08

RESEARCH and CREATIVE ACTIVITIES

## THROUGH AN INFANT'S EYES

*LEARNING TO MAKE  
SENSE OF THE WORLD*



ALSO INSIDE...

**Arsenic and Old Life / By the Numbers / Healthier Lives for Healthier Kids**



**Our readers may have noticed** how often undergraduates make up part of a featured research team. Undergrads have done research in our own back yard—the Shawnee National Forest—and as far away as Antarctica. They often find these experiences transformative (e.g., see the video at [www.siu.edu/~msc/recent\\_scholars.html](http://www.siu.edu/~msc/recent_scholars.html)), and their contributions are invaluable.

SIUC has developed a robust portfolio of research programs for undergraduates. REACH (Research-Enriched Academic Challenge) provides students small grants to carry out their own project under a faculty mentor's guidance. The federally funded McNair Scholars Program includes a research institute to help prepare first-generation-college/low-income and underrepresented minority students for doctoral study. Our new Saluki Research Rookies Program will involve high-achieving *freshmen* in research (see page 6). Although not strictly a research program, SIUC's unique undergraduate assistantship program annually enables well over 100 students to conduct research with faculty. Finally, many undergraduates are introduced to research as student workers on grants.

This issue describes how a faculty member and a McNair Scholar designed a research/outreach program to prevent Type 2 diabetes in youngsters; nearly two dozen undergraduates have helped with this project. Several other articles also feature undergraduate accomplishments or note undergraduate involvement. To learn about some other recent student research activities, visit [www.siu.edu/~reach/tabloid.html](http://www.siu.edu/~reach/tabloid.html).

We consider research the highest form of teaching/learning, and we are committed to offering that opportunity to as many of our students as possible. It enriches their future. To that end, we are working toward establishing an endowment to support undergraduate research. Friends of the University will hear more about this effort as it evolves.

**John A. Koropchak**  
Vice Chancellor for Research and Graduate Dean

**Southern Illinois University Carbondale**

[www.siu.edu](http://www.siu.edu)

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**Prudence M. Rice**

**Perspectives • Fall 2008**

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For information about the research program at SIUC, visit [www.siu.edu/~ovcr](http://www.siu.edu/~ovcr), or contact John A. Koropchak, Vice Chancellor for Research and Graduate Dean, (618) 453-4551, [koropcha@siu.edu](mailto:koropcha@siu.edu), or Prudence M. Rice, Director, ORDA, (618) 453-4531, [pmrice@siu.edu](mailto:pmrice@siu.edu).

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# contents



## DEPARTMENTS

### 2 Research Survey

Saving Savanna / Legacies / WaterWork for Afghanistan / Born to Ponder / Pressure Point / Raking in Rewards / Newbies with a Cause / Emmy Champs / Crossing Borders / Cooler Cribs / A Framingham for Kids / Helping Those Who Served

### 24 Kudos

25 **Sight Lines:** A River Runs Through It

# 6



## COVER STORY

### 12 Through an Infant's Eyes

How do babies learn to interpret what they see? How does the world begin to make sense?

## FEATURES

### 10 Arsenic and Old Life

SIUC scientists confirm the existence of an ancient, previously unknown form of photosynthesis.

### 16 By the Numbers

A globally known finance professor takes a global view.

### 20 Healthier Lives for Healthier Kids

A faculty member and her students work to prevent Type 2 diabetes in youngsters.



## SAVING SAVANNA

Flame plus cow usually equals nothing more than a tasty burger, but when it comes to saving one of the nation’s few remaining savannas, that combination might prove more than a value meal.

Research at the Kankakee Sands, a Nature Conservancy preserve straddling the Illinois-Indiana state line near Kankakee, suggests that burning and grazing could work together in maintaining black oak savanna ecosystems, which require a

tricky balance of trees and grasslands to be at their best.

“Because of their open conditions, these areas are very rich in flowers and other vegetation, birds, and animals,” says John Groninger, the forestry professor who supervised the research.

“Without fire, they become overgrown with trees, which provide too much shade for other vegetation to grow. But we found that the areas that burned enough to maintain a somewhat open structure

still had undergrowth coming in. It looks like grazing is the missing element.”

Covering roughly a third of the Kankakee Valley, the Kankakee Sands region is a legacy of the last ice age when floodwaters from prehistoric lakes left behind gravel and sand as they roared through. Swept by the wind, the sand formed dunes, which offered some protection to fast-sprouting, drought-tolerant black oaks springing up in the protected swales.

Over time, this unusual

blend of oak and grass became home to, among other species, redheaded woodpeckers, regal fritillary butterflies, plains pocket gophers, yellow wild indigo, and orange fringed orchids, all of which nowadays struggle to survive.

“Savannas are like prairies with scattered trees,” says Cody Considine, a restoration ecologist with The Nature Conservancy who has based his master’s thesis on his research in this area.

“Because some species require savanna habitat, this

area is critical for many unique plants and animals. Redheaded woodpeckers, for example, can't live in closed canopy forests or open prairies. They need a mix of grassland and trees."

Over the years, development and row crops have destroyed the once-plentiful savannas, reducing millions of acres throughout the Midwest to little more than a few thousand. The Kankakee Sands area contains the largest concentration of black oak savannas not just in the Midwest, but in the country. Maintaining what's there and adding to it plays a crucial role in protecting the plants and wildlife that depend on this type of habitat.

Fire has always served as a key player in keeping these savannas relatively open. But too much fire harms more than it helps.

"The larger trees can survive, but younger trees are often killed," Considine says. "Even if they can re-sprout, with frequent fires the saplings are unlikely to grow into trees."

Considine decided to track the fire history of four sites in the Kankakee Sands by sectioning some tree trunks and analyzing their fire scars. That information would suggest how often managers could perform prescribed burns to maintain openness without killing the younger generation. His idea worked—up to a point.

"The areas that were turning into forest were the ones that had been burned the least, and the more open areas were the ones that had been burned the most," Considine says.

But there was a problem. "Fire intervals of less than two years maintain the open structure but absolutely no regeneration takes place," Considine says. "When all the larger trees die, you'd have a shrub prairie, not a savanna."

"But with intervals over three years, the savanna turns into forest. That's where grazing comes in. We're speculating that you wouldn't have to burn as much to maintain that open structure while still regenerating trees."

Grazing removes grass and other fuel that makes fire burn hotter, upping the survival odds for the younger trees. Bison used to perform that task; cows could do it now.

"With our background in forestry, we're used to cattle being a destructive force as far as

mature trees go," Groninger says. "But we're learning that under certain conditions, they can play an important role in the regeneration process. If we can find ways of producing cattle under conditions that sustain natural areas, we could maintain both rural economies and preservation activities."

Further research awaits funding and students with an interest in performing it. But Considine, who's finished his thesis, isn't waiting. He and his fiancée have bought a tract of land near Dixon. They'll be burning land and running cows and learning how it all works out.

—K. C. Jaehnig

For more info: Dr. John Groninger, Dept. of Forestry, [groninge@siu.edu](mailto:groninge@siu.edu).



Left: Black oak savanna in northeastern Illinois.  
Above: A cross-section of a tree trunk reveals scars left by fire.

Photos courtesy John Groninger.

## Legacies

Every item in the permanent collection of the University Museum at SIUC has a story—not only about what it is, but also about how it came to the collection.

Now, a \$149,962 federal grant from the Institute of Museum and Library Services is helping the museum make those stories more accessible to the public.

The grant, written by curator Lori Huffman, will allow museum staff to standardize and improve the collection records database, making entries as complete as possible. Information could be as basic as the birth and death dates for a given artist, or might be full research annotations. For example, records for the museum's notable Melanesian collection will include annotations from the late Philip J.C. Dark, a former SIUC anthropologist and a leading authority on tribal arts, who donated the artifacts.

"The purpose... is to make certain that knowledge about a donation is not dependent on any individual's recollections," says Dona Bachman, University Museum director. "All information about an object will be housed in an accessible place—the database—for generations to come."

Ultimately, the museum will proceed with digital imaging in order to share the collection online.

—Andrea Hahn

For more info: Lori Huffman, [curator@siu.edu](mailto:curator@siu.edu).

## WATER WORK FOR AFGHANISTAN

Afghanistan's farmers, struggling to grow crops with very little water, will get some help over the next three years from SIUC and three other American universities.

A \$20 million federal grant will enable agriculture faculty from SIUC, Colorado State University, New Mexico State University, and the University of Illinois at Urbana-Champaign to work with their counterparts at four regional Afghan universities and with government ministries and other agencies on a project called Afghanistan Water, Agriculture, and Technology Transfer, or AWATT. The grant is funded by the U.S. Agency for International Development.

Even before its series of wars destroyed so much of Afghanistan's water-related infrastructure, water was scarce there. In recent years, rainfall has grown more meager, and forests, which help stave off drought, are being cut down. At the same time, Afghanistan's growing population and rebounding economy are requiring more water.

AWATT aims to develop a national water management plan, determine the best means of increasing the country's ability to grow crops, foster agricultural research and outreach, and design policy changes related to access and use of land and water.

While New Mexico State faculty will administer the grant, SIUC will play a key role because only it and UIUC have worked with farmers and faculty there.

AWATT will begin at Balkh University in the northern city of Mazar-e-Sharif and at Nangarhar University in the eastern city of Jalalabad, later moving to Herat University in the western city of Herat and Kandahar University in the southern city of the same name.

SIUC professor emeritus Oval Myers, who has more than five years of experience in Afghanistan (see [www.siu.edu/~perspect/04\\_fall/afghanistan.html](http://www.siu.edu/~perspect/04_fall/afghanistan.html)), says, "Our contribution will be in working with them and other agencies to determine how best they can utilize the resources they have to improve their water conditions."

SIUC's team will take on a major part of the project's training and outreach. Workshops will focus on such topics as irrigation, soil conservation, use of local plant and seed varieties, use of vegetation to protect rivers and watersheds, natural resource management, and reforestation. Research and demonstration plots are also part of the mix.

The project also includes development of a watershed model, which will provide the data needed for recommendations on policy changes regarding water use and agricultural production while taking into account local customs, traditions, and Islamic values.

—K. C. Jaehnig

For more info: Dr. Oval Myers, Dept. of Plant, Soil, and Agricultural Systems, [omyers@siu.edu](mailto:omyers@siu.edu).

## BORN TO PONDER

SIUC philosophy professors Randall Auxier and Doug Anderson make a statement just by being part of the Open Court Publishing Co.'s Popular Culture and Philosophy series ([www.opencourtbooks.com](http://www.opencourtbooks.com)).

The two recently edited one of the latest releases in the series, titled *Bruce Springsteen and Philosophy: Darkness on the Edge of Truth*. Besides Auxier and Anderson, 12 other scholars (Springsteen fans all) contributed essays to it. Other books in the series include *The Simpsons and Philosophy*, *Hip Hop and Philosophy*, and *Star Trek and Philosophy*.

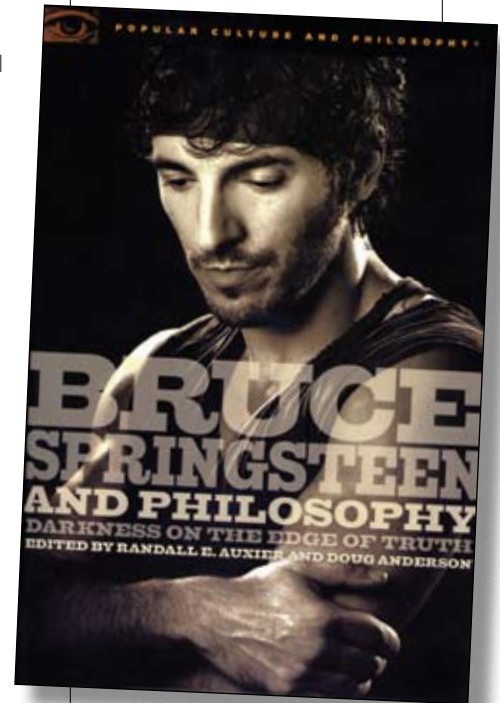
So what's the statement?

Besides affirming the value of various pop icons, the series makes the case that philosophy can and should have something to say about pop culture, and that pop culture has something to say back—that pop culture, sometimes quite deliberately, communicates philosophical ideas and concepts. In short, philosophy is a living thing.

Many academic philosophers consider dabbling in popular culture controversial, not on a par with "real philosophy." But Auxier and Anderson agree that the book series offers a way to introduce real philosophy to a general audience.

It's a place where philosophers can use examples

from current culture to discuss philosophical ideas seriously. The discussion may begin with Bruce Springsteen, but then delve into a discussion about the actual



definition of philosophical "pragmatism," or differing concepts of freedom, or Springsteen's manifestation of Socratic concepts.

"The people who read these books tend to be well-read, and enthusiastic about the subject," Auxier says. "They have an intuition that something is going on with the subject more than what is on the surface."

Open Court Publishing Co. also publishes the Library of Living Philosophers, a series produced by SIUC and edited by Auxier.

—Andrea Hahn

For more info: Dr. Randall Auxier or Dr. Doug Anderson, Dept. of Philosophy, [drauxier@siu.edu](mailto:drauxier@siu.edu) or [dra3@siu.edu](mailto:dra3@siu.edu).



## PRESSURE POINT

You know that lightheaded, dizzy feeling you get when you stand up too fast? With the help of a machine built from a sewer pipe, Juliane Hernandez can make you feel just like that when you're lying flat on your back.

Why would she do that, you might ask. Hernandez, an exercise physiologist and kinesiology professor at SIUC, uses this machine and others in studying how our bodies regulate our blood pressure from one heartbeat to the next.

Despite its importance to human health, scientists have difficulty studying blood pressure because in this instance the animal models on which they generally rely don't work. "With rats and dogs, 70 percent of their blood volume is at or above the level of their hearts when they're standing up," Hernandez says. "With humans, 70 percent of their blood volume is below their hearts."

Hernandez's lower-body negative-pressure chamber (a.k.a. the sewer pipe) uses suction to pull blood from the upper half of the body to the lower half, causing blood pressure to fall and mimicking what happens when we stand. The dizzy feeling occurs as the brain reacts to the loss of blood volume and the resultant drop in blood pressure.

"Some people experience this to a detrimental degree—they pass out," Hernandez says. "Why doesn't this happen to everyone all the time? Because most of us have reflexive responses that help get blood back into the brain within a second or two—we regulate our blood pressure."

Hernandez is focusing on the physiological processes involved when people compensate for the drop caused by standing. Because her pressure chamber allows her to control the flow of blood so completely, she can record minute pressure changes in arteries and veins as the heart beats. She also can track, beat to beat, what happens in the heart and the brain as the volume of blood changes.

"If we can understand what causes blood pressure to reset to that higher point, we might then be able to understand the mechanisms causing high blood pressure in general," Hernandez says.

Scientists do know that age and physical inactivity play a role. "As we age, the blood vessels [are] stiffer, less stretchy," Hernandez says. "It takes more pressure to

circulate the blood through that smaller opening."

While we can't change our age, we can boost our physical activity, and that affects blood pressure almost instantly. "After one bout of exercise, your blood pressure will go down to a lower point after you've cooled down than it was when you started," Hernandez notes. "If you don't exercise the next day, it will probably go back up, but over the long haul, exercise will bring your resting blood pressure down."

With those effects in mind, Hernandez is also looking at how age and fitness affect the body's ability to regulate its own blood pressure. She's running her tests on young folks and old ones, athletes and couch potatoes, and comparing

their physiological responses. She's also interested in looking at the responses of different races, as African-Americans generally have more problems with high blood pressure than do members of other groups.

Increased understanding of the mechanisms of blood pressure regulation will help doctors as they prescribe medications, particularly for older people, Hernandez says. "For example, we know that exercise alters blood pressure, which suggests it also changes what's needed in a prescription," she notes.

"If we understand how those changes progress, we can treat not just for the immediate condition but for the long term."

—K. C. Jaehnig

For more info: Dr. Juliane Hernandez, Dept. of Kinesiology, [juliane@siu.edu](mailto:juliane@siu.edu).



Kinesiology students Allison Jurgens, Amy Phegley, and Eric Spenner help Juliane Hernandez demonstrate her lower-body negative-pressure chamber, which she uses to study how people regulate their blood pressure.

The chamber was designed by Hernandez's father, an aeronautical engineer.

### RAKING IN REWARDS

What started out as a project for a design class earned Ryan Jansen much more than a grade.

Jansen's design, "The Rake N' Take," won first place in the 2008 Eye for Why - Dyson Student Design Competition. The national contest challenges students to re-envision an existing product, correcting any shortcomings in it.

Jansen improved on a lawn-care staple, the rake. Observing how often people raking their lawns had to bend over to pick up the leaves, he decided to find a way to take that time-consuming nuisance out of the raking process. His design uses a combination handle to operate a rake that clutches the leaves rather than merely moves them.

The project was conducted in faculty member Walter Hargrove's class in the School of

Art and Design. The assignment: enter a new design in a contest. Jansen, a senior, entered the International Housewares Student Design Competition, where he won an honorable mention.

He entered the Dyson competition as an afterthought. His winning design earned him \$5,000, a trip to New York City, media interviews, and a meeting with inventor James Dyson (famous for his bagless vacuum cleaners). His advisors, Hargrove and Steve Belletire, won \$2,000, which they donated to the School of Art and Design.

Jansen will now represent the U.S. in an international-level competition. He has

**Right: Ryan Jansen with his newly improved, award-winning rake.**

a patent pending on his invention and says he has several options for marketing the product.

—Andrea Hahn



### Newbies with a Cause

Freshmen are joining in the hands-on research usually reserved for upperclassmen, graduate students, and faculty under a new SIUC program.

Called the Saluki Research Rookies Program, the initiative will give the new students a chance to experience the excitement of discovering new knowledge while introducing them more quickly to the nuts and bolts of their chosen majors.

"We were looking for a way for the University to engage freshmen in research," says program director Julia Spears in the Office of Research Development and Administration. "We've seen there are huge benefits, both personal and academic, when a student gets involved in a discipline like this. It brings to life what they're learning in the classroom and helps them make connections" with faculty and more-experienced students.

For several years SIUC has developed more research opportunities for undergraduates through such programs as REACH (which provides them small research grants), the federally funded McNair Scholars Program (which includes research to prepare first-gen-

eration/low-income and underrepresented minority students for doctoral study), and undergraduate assistantships, many of which are research-oriented. Research Rookies is another such effort.

John Koropchak, vice chancellor for research and dean of the graduate school, says getting students involved in research early on motivates them, stimulates curiosity and original thinking, and provides valuable experience.

Spears, who also directs SIUC's McNair program, says one reason she pushed for the program was feedback from those students, who are upperclassmen: "They would always say how they wished they could have gotten into something like (McNair Scholars) sooner."

After an orientation this fall, 18 students chosen for the first class of Research Rookies were paired with faculty mentors. Together each duo is designing a research project for the student to conduct in spring under the mentor's direction. Students will receive an initial \$150 book allowance and earn a \$350 scholarship if they successfully complete the program.

—Tim Crosby

For more info: Dr. Julia Spears, ORDA, [jspears@siu.edu](mailto:jspears@siu.edu).

## EMMY CHAMPS

*alt.news 26:46*, a half-hour alternative TV news magazine produced by SIUC students, received seven professional Emmys this past October at the 2008 National Academy of Television Arts and Sciences Mid-America Regional Chapter Emmy Awards in St. Louis. The program has now earned a total of 23 professional Emmys—21 from the Mid-America Regional Chapter and two from the Chicago Midwest Chapter—as well as several national student Emmys.

“It is clear we have established a dynasty; *alt.news* has been winning professional Emmys since 2001,” said Jan Thompson, an associate professor of radio-television who also serves as the show’s faculty adviser.

The quirky series, based in the College of Mass Communication and Media Arts and aired by the University’s PBS station, WSIU, is created mostly by undergraduates in radio-television and cinema & photography. As its web site explains, it “includes

short form documentaries, live music performances, short films, and anything else that is too obscure for the 5 o’clock news.”

Students winning awards this time around were Timothy Wilkerson, James Milner (who graduated in May 2008), Jonathan Gravatt, Sean Brown, and Scott Blair. Five other students were nominated.

Brown and Wilkerson were honored overall for *alt.news* in the magazine program category. Wilkerson’s segment “Don LaFontaine: The Voice,” which won in the arts/entertainment-program feature category, profiled the famous voiceover professional who narrated hundreds of movie trailers. The piece gained national attention from media outlets after LaFontaine’s death this past September. Other winning segments were “Angola Prison Rodeo,” in the human interest-program story/feature category, and “Body Worlds,” in the science/environment category. Students also net-

ted awards in the director/post-production, on-camera talent/performer-host, and writer/spot length categories.

In all, *alt.news 26:46* (the numbers refer to the program’s running length) received 14 nominations in 11 categories. Nearly 750 entries in 85 categories competed for nominations. The Mid-America chapter comprises television markets primarily in Arkansas, Illinois, and Missouri, as well as surrounding designated market areas.

“There is no other student-produced program in the nation that has consistently won awards in professional competition,” said Gary Kolb, dean of the College of Mass Communication and Media Arts. “They are the best.”

Thompson “should be commended for her outstanding work with these students, and encouraging them to raise the bar, continually,” said Phylis Johnson, associate professor and interim chair of the Department of Radio-Television.

“The students in *alt.news* never cease to amaze me with their incredible talent and drive. These awards capture the professionalism and creativity underlying the mission of *alt.news*.”

—Pete Rosenbery

For more info: [www.altnews2646.com](http://www.altnews2646.com) or Dr. Jan Thompson, Dept. of Radio-Television, [janione@siu.edu](mailto:janione@siu.edu).

## Crossing Borders

SIUC gets its fair share of Fulbright Scholars, but this fall it could be accused of being selfish.

This semester, the University is playing host to 52 Fulbright Scholars—graduate students and faculty members. The foreign scholars represent 28 countries and are the largest such group on campus in recent memory.

The number is about 50 percent higher than the norm. In addition to 36 continuing scholars, 16 new ones began their stays this fall.

“The fact that we have such a large number of Fulbright Scholars may reflect a growing positive international reputation for our graduate programs,” says John Koropchak, vice chancellor for research and dean of the graduate school.

“It is certainly beneficial...to have these high-quality students, targeted for leadership, attending the University. Our students, faculty, staff, and the region also benefit from the opportunity to interact with people from other countries.”

Carla Coppi, interim director of International Programs and Services, says many in the current group of scholars at the University represent regions typically underrepresented in the past, such as Latin American, the Caribbean, and Africa. Scholars are usually geared for top administrative positions in their home countries.



## COOLER CRIBS

Coal mining can be backbreaking and dangerous work. But a new technology invented by SIUC researchers will make it easier for miners to ensure their safety as they brace the roofs of mines.

The new method involves simple, but specially designed stackable, composite wood braces, technically called crib elements, that are lighter and stronger than the conventional wood timbers used by miners for centuries to create crib support columns. Yoginder Paul Chugh, professor of mining and mineral resources engineering, devised the components with the help of several others.

Called Atlas crib elements, they're made of a mix of readily available hardwoods. Each element employs a main horizontal board with shorter boards nailed on both sides at both ends. Because the horizontal pieces are thinner than in standard systems, the crib elements are 35 to 40 percent lighter than the traditional 6-inch-square cribbing timbers miners use now, making them easier to handle and stack. But the wood grain orientation of the Atlas cribs yields stronger support columns.

The shorter boards nailed to the ends of each crib element typically measure 6 by 8 inches, so the contact area—where the weight is actually borne—is equivalent to standard systems. But the end boards are cut and positioned so that their grain runs vertically between the roof and the floor of the mine.

“When you compress wood in a parallel direction it is very, very soft,” Chugh says. The grain of the horizontal piece is parallel to the load, but when the grain of the end pieces is axial to the load, the strength of the component is about four times greater.

For example, a traditional crib support column about 6 feet high will compress 12 to 14 inches under 70 tons of load. The same size column made of the new components will compress

6 inches or less under about 115 tons of load.

The new design also makes it easier to circulate air around the support columns, which should cut down on one of a mine's biggest operating costs: diluting methane and circulating fresh air to breathe. The new cribbing system takes up 41 percent less area than existing ones and may be up to 50 percent more efficient in terms of airflow, Chugh says.

The lighter weight also means lighter work for the

miners charged with building the support structures. Several former miners—Harrold Gurley, John Pulliam, and Bill Bell—worked with Chugh on the project with that in mind. The new crib elements weigh 18 pounds, about half what a traditional cribbing timber weighs, meaning that miners can also work faster.

“Sometimes miners have to carry the timbers a couple of hundred feet before stacking them,” Chugh says. “So this will be easier on their backs.”

The crib elements, which are being patented by the University, come in several sizes with various numbers of contact areas that allow for different cribbing configurations, depending on the situation. A six-point configuration, for example, can carry 195 tons while a nine-point one should take about 300 tons of load.

The Illinois Clean Coal Institute (ICCI), the National Institute of Occupational Safety and Health, and SIUC have contributed funds for field demonstrations since April 2008. ICCI recently granted \$44,000 more for demonstrations in different mining environments. Several mines have been testing the supports, using them to brace critical stability points or bad roof areas. Several local sawmills are putting in bids to manufacture the crib elements, which they could then sell under license to mines throughout the Midwest.

—Tim Crosby & Marilyn Davis



**John Pulliam, researcher in mining and mineral resources engineering, demonstrates the ease with which miners can handle a new cribbing support system designed by Yoginder Paul Chugh and colleagues.**

*Photo by Tim Crosby.*

For more info: Dr. Yoginder Paul Chugh, Dept. of Mining and Mineral Resources, [chugh@engr.siu.edu](mailto:chugh@engr.siu.edu).

## A FRAMINGHAM FOR KIDS

One thousand Southern Illinois children and their families will benefit from enhanced health care and knowledge thanks to the expansion of a landmark national children's research project into Johnson, Union, and Williamson counties.

The National Children's Study (NCS) is the largest study ever conducted on the health and development of children. Enrollment begins at or even before conception, and participation continues until the children reach age 21. Researchers collect information about the children's genetics, physical environment, and social environment in order to learn more about the development, prevention, and treatment of health problems. The study, expected to last 25 years, will involve 100,000 children at dozens of sites nationwide.

SIUC's Center for Rural Health and Social Service Development (CRHSSD) is collaborating with Saint Louis University School of Public Health, the principal investigator for the Southern Illinois study site, and Battelle Memorial Institute on a \$13 million contract from the National Institutes of Health, the Centers for Disease Control and Prevention, and the U.S. Environmental Protection Agency for the first five years of work here. Other partners are the SIU School of Medicine, the SIU Edwardsville School of Nursing, Saint Louis University School of Medicine, and Washington University School of Medicine. CRHSSD

will receive \$3.12 million for its role in the study.

The NCS "will be one of the most important contributions to human health in history," says James Teufel, principal investigator for the SIUC subcontract and director of research for CRHSSD. "It will give us a better understanding of positive and negative influences on human health and development." The idea is similar to that of the ongoing Framingham Heart Study of adults, which began in 1948 and has revealed much vital information about the causes of heart disease.

Besides monetary incentives, participants will receive many free health care services. Included will be screenings before and after birth for congenital disorders, physical and mental functioning, diabetes, obesity, asthma, and various other conditions, including injury susceptibility.

The first goal within the expansion site is building awareness and laying the groundwork for the study. Recruitment of families will probably begin by early in the third year of the project and be complete by year seven.

CRHSSD's role includes informing the public, engaging community and hospital involvement, recruiting participants, and conducting birth visits. CRHSSD will also work closely with Battelle as its personnel conduct home and clinic visits, screenings, and other activities for the NCS through a field of-

fice the company plans to establish in the region.

To find participants, Dr. Kyaw Naing, associate professor of family and community medicine in Carbondale, will promote the NCS with the region's family medicine practitioners who deliver babies. Dr. Ricardo Loret de Mola, chair of the Department of Obstetrics and Gynecology at the SIU School of Medicine in Springfield, will do likewise, as well as providing scientific advice to assure proper collection and compilation of birth data. Both are board-certified physicians.

Teufel notes that currently some 93 percent of Johnson, Union, and Williamson county births take place in Memorial Hospital at Carbondale or at Heartland Medical Center in Marion. Both of these hospitals, as well as two in Missouri and two in Kentucky that serve the region, support the project. As a result, participants will be able to receive care from their preferred providers.

The NCS, says Teufel, will help answer health questions "that could not be addressed without a study of this magnitude." Its estimated total cost is \$3.2 billion—the largest monetary investment in a study of children's health in history.

—Christi Mathis

For more info: Dr. James Teufel, CRHSSD, teufel@siu.edu

## Helping Those Who Served

A \$100,000 grant from the Illinois Department of Veterans' Affairs has allowed the SIU School of Law to start a program to assist veterans in their disability claims appeals with the U.S. Department of Veterans Affairs.

Second- and third-year law students will provide free legal services to veterans who cannot afford or do not have access to legal representation in appealing service-connected disability claims.

The Veteran's Legal Assistance Program, modeled after the John Marshall Law School's Veterans' Legal Support Center and Clinic in Chicago, will give students hands-on experience while helping others.

The initiative "allows us to provide expertise and services to a population that has been underserved—and that is very consistent with [our] goals," says law school dean Peter Alexander.

John Lynn, the law school's assistant dean for administration, anticipates students working on disability claims from World War II veterans up to current veterans appealing decisions to the Board of Veterans Appeals. He expects the largest caseload will come from veterans with National Guard and Reserve units in rural areas who return home from Iraq or Afghanistan after fulfilling their military service.

—Pete Rosenbery

For more info: Dr. John Lynn, School of Law, johnlynn@siu.edu.

# Arsenic And Old Life

*Arsenic has been a favorite of poisoners through the ages.  
But for certain bacteria with an ancient lineage, it's the stuff of survival.*



*by Tim Crosby*

Of all the processes on earth, photosynthesis is perhaps the most important to sustaining life. The means by which organisms convert sunlight into chemical energy—food—is a well-understood system. Scientists know what goes in, what goes on, and what comes out.

But two researchers at SIUC were part of a team that recently proved science still has a lot to learn about this critical, ubiquitous process. Their discovery was startling enough that the leading journal *Science* published the findings last August.

Michael Madigan, a professor and Distinguished Scholar of microbiology, and doctoral student Marie Asao worked on a multi-disciplinary team examining a microorganism found in Mono Lake, an alkaline lake in California. The team also included aquatic microbiologists from the University of Georgia and Duquesne University and geochemists from the U.S. Geological Survey.

The study involved a type of bacteria found in hot springs on the shore of Paoha Island in Mono Lake. These bacteria appeared to use an atypical substance to achieve photosynthesis. Within a year, Madigan and Asao showed that what the USGS had discovered was actually an ancient form of photosynthesis not previously known.

The USGS called Madigan because of his expertise with photosynthetic bacteria and his more than 30 years of studying organisms that live in extreme environments, such as the Antarctic or hot springs. Mono Lake contains several hot springs and has a high pH level.

“Last summer, the USGS scientists had found this hot spring that contained a microbial mat, which is a thin structure containing various bacteria. These bacteria appeared to be photosynthetic,” Madigan says.

More than that, however, the bacteria appeared to be onto something new in the photosynthesis area.

To carry out photosynthesis, an organism must use the sun’s energy to “fix” carbon dioxide—that is, take it in and mix it with something else. In green plants, this additional substance is water. Plants split the water molecules, take some electrons, and mix them with the carbon dioxide to make cell material. Chemically, this process is called a reduction.

Water, in this instance, is known as a “donor” because it donates electrons during the reduction. But considering how widespread photosynthesis is on earth, the list of such known electron donors is almost absurdly small. Green plants use water only, producing oxygen as a byproduct, while previously known photosynthetic bacteria, which cannot split water, use a few reduced sulfur compounds or reduced iron.

Madigan’s team, however, was able to expand this list, proving that these bacteria from Mono Lake were actually using a form of arsenic as an electron donor to achieve photosynthesis. The

**Left: Mono Lake in California.**

**Right: Samples taken from a red microbial mat yielded (bottom image) bacteria that can carry out photosynthesis with only carbon dioxide and arsenic. Photos courtesy Ron Oremland; electron micrograph by Marie Asao (color added).**

finding will have a great impact on further research, as it opens an entirely new vein for exploring photosynthesis.

“The significance comes when you look at how widespread arsenic is in nature,” Madigan said. “It’s present in a lot of ground water and a lot of other things, so it could be driving photosynthesis that we’ve never been aware of until this discovery.

“Arsenic isn’t as common as water, which green plants use as an electron donor, but our findings reveal a much greater diversity in photosynthesis, which is the most important process on earth. We’re all dependent on it for life,” he says.

The USGS team had suspected arsenic might be involved and had conducted some simple field experiments on site that appeared to confirm their hypothesis. Madigan and Asao set out to prove it.

“When you do field studies like this, they’re not absolutely controlled and unequivocal experiments because you don’t know everything that’s in there,” Madigan says. “You’re not working with a pure culture.”

Back in Madigan’s laboratory at SIUC, Asao isolated the organism by growing a culture from one single cell. They then subjected the culture to a series of tests, injecting substances such as hydrogen sulfide (a common electron donor for photosynthetic bacteria) and arsenite, a form of arsenic, and exposing it to light.



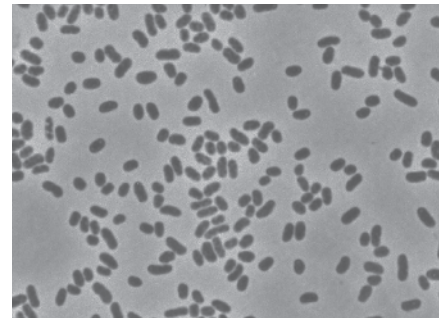
“We demonstrated the organism could grow in culture with just carbon dioxide and arsenite, which proved the process seen back at the lake,” Madigan says.

They also conducted molecular characterization of the organism’s genes, which gave them a strong idea about its family tree. They could tell, for instance, the organism was related to a genus of bacteria already known to exist in such alkaline environments.

“Where it got its ability to use arsenite for photosynthesis, we don’t know,” Madigan says. Scientists at Georgia and Duquesne also conducted genetic analyses confirming these results.

While the discovery is new to science, it isn’t a new process. To the contrary, Madigan says evidence in the geologic record points to this type of photosynthesis existing billions of years before oxygen existed on earth. Finding the Mono Lake organism was sort of like discovering a living dinosaur at the microbiological level.

“Photosynthesis was invented by bacteria and only picked up by green plants and algae later on, where it was expanded and made more complex,”



Madigan says. “This is an ancient form of photosynthesis. There are still little habitats on earth where these organisms can survive and we kind of stumbled into one.”

Much of what scientists know about green plant photosynthesis they learned by studying the simpler processes involved with such organisms. This discovery will have a lasting impact, Madigan says.

“It expands our knowledge of the diversity of photosynthesis and the kinds of organisms and types of processes that can be driven by light energy.”

*For more information: Dr. Michael Madigan, Dept. of Microbiology, [madigan@micro.siu.edu](mailto:madigan@micro.siu.edu).*

# THROUGH AN INFANT'S EYES

*LEARNING TO INTERPRET THE WORLD VISUALLY IS  
A KEY DEVELOPMENTAL STEP FOR BABIES.  
HOW DO THEY DO IT?*



*by Marilyn Davis*



The first time their baby reaches for an object, parents are delighted. Before long, they're entertaining their infant by playing a rudimentary version of hide-and-seek, making a favorite toy disappear and reappear.

That simple activity helps their child in the process of making sense of the world—the ability to perceive things, to focus attention, to realize that an object still exists when it's temporarily hidden, to remember and think about an object when it hasn't been in sight recently. All are connected with learning.

Babies can distinguish colors at two to three months, reach for an object at roughly three months, and track a moving object at about three to four months. By six months, most understand that an object can be temporarily hidden and, given enough information, can anticipate where it will emerge. By two to four years old, a child's short-term visual memory is about as advanced as it will get, although we develop new strategies for remembering information as we get older.

How do babies and toddlers acquire these capacities? Matthew Schlesinger, an associate professor of psychology, studies brain development to find out. "Attention, memory, and perception are linked together," he says, "and I'm studying the brain processes underlying them."

Behavioral psychologists have devised many tests of how babies of various ages interpret visual phenomena. Schlesinger shows me one, usually given at ages two to four months: a simple video of a blue rectangle with two green bars projecting from the top and bottom. The green bars are aligned and they move back and forth along the rectangle in synchrony. Babies will watch this motion for several minutes until they get bored, a state called habituation.

At that point, they're shown two more videos. In both, the blue rectangle is gone. One video shows a solid green rod moving back and forth in its original place.

The other shows empty space where the rectangle was, so that the baby sees two green segments moving. As the babies scan these videos, testers track their eye movements. The key questions are where the babies direct their attention in each video and for how long.

segments had perceived the original video the way most adults would: as a solid bar moving behind the rectangle. Babies who don't had not mentally "filled in" the bar.

As babies get older, Schlesinger says, "more and more of them will [assume] a solid green rod" in the original test. "How

***DATA FROM SCHLESINGER'S MODELS COMPARED TO THE TESTING RESULTS "CAN HELP YOU SEE A CONNECTION BETWEEN THINGS THAT YOU WOULDN'T HAVE IMAGINED FROM THE TESTING DATA ALONE."***

"A child will generally look longer at something unexpected," says Schlesinger. He terms it a novelty reaction; others call it a violation-of-expectations reaction. The assumption is that babies who look longer and more often at the two separated

can we explain that change?"

In another video test, a train is shown moving down a track. A small box then appears in front of part of the track, hiding the train for part of its journey. By the age of six months, most babies don't seem



**With age, more and more babies interpret the rod-like segments the same way an adult would—as a solid bar moving behind the blue rectangle. Researchers have devised many such video experiments to test babies' visual development and understanding.**



**Matthew Schlesinger with his research team (from left): master's student Joe Geeseman, senior Catrina Bowen, senior Eric Greenlee, junior Josh Chin, and master's student Jillian Mayer.**

surprised to see the train reappear at the edge of the box. But if a subsequent video shows an object on the track before the box comes down over it, and the train still reappears at the edge of the box, most babies—based on their visual tracking and attention span—do seem surprised.

“Experimental work is very descriptive of the process of development over months,” Schlesinger says. “But we don’t know what makes those changes possible.

“My role is how to figure out what developmental brain mechanisms might be responsible. There are brain development disorders in which this capacity is disrupted. I want to help build a model that explains the normal process of development as well as atypical processes, which might be applicable to attention disorders or learning disabilities.”

**Y**ou’ll only occasionally find babies in Schlesinger’s lab, however. Instead, you’ll find computers equipped with sophisticated software that allows him to simulate how babies learn and develop. Colleagues such as psychologists Dima Amso (Cornell

University) and Scott Johnson (UCLA) send Schlesinger their data from behavioral tests with babies. He uses computer models to help interpret what’s happening in the brain and to suggest future experiments.

Schlesinger can take a scene shown to a baby, load it into his computer, and—based on what is already known about mammals’ visual systems—run software to estimate

***OVER TIME, THE INTERPLAY OF BEHAVIORAL TESTING AND MODELING GIVES THE RESEARCHERS A BETTER UNDERSTANDING OF HOW VISUAL ATTENTION AND EXPECTATIONS DEVELOP AND BECOME MORE SOPHISTICATED.***

the attention-getting value of each aspect of the scene. That then allows computer predictions of where a baby is most likely to spend time looking.

What constitutes “attention-getting”? Certain neurons in the brain are sensitive to line edges and to foreground/background differences, for example. Others are dedicated to detecting color, movement, brightness/contrast, and other visual phenomena. These different sensitivities are called optical filters. They’re a function of the occipital lobe, which is the first part of the brain to process the light hitting the retina. Each amounts to a sort of “map” of the scene based on one characteristic.

“There are many different maps of the original scene in the occipital lobe,” Schlesinger says, “and these are integrated into a single, unified map in the parietal lobe, which directs attention.” Similarly, the computer can combine the maps into a representation of the scene. “We’re simulating the view of the world from the infant’s perspective,” he says.

Schlesinger then runs models to see how well they correspond to infants’ actual eye movements—where the babies looked and for how long. The closer the simulation matches those, the better he can pinpoint the brain processes involved. It may sound simple, but it’s a complicated mathematical process.

Data from his models compared to the testing results “can help you see a connection between things that you wouldn’t have imagined from the testing

data alone,” he says. Models also can inspire new experiments. “You can use a model with a new stimulus to predict an infant’s behavior” before it’s tried experimentally, Schlesinger explains. “If it’s confirmed, it means the model is doing a good job. If not, I need to refine it. As we learn more, we’ll modify the model.”

“Models also can provide new behavioral hypotheses and inspire new experiments that wouldn’t come about through behavioral studies alone, because many times modeling predictions are counterintuitive. They challenge the popular view.”

Over time, the interplay of behavioral testing and modeling gives the researchers a better understanding of how visual attention and expectations develop and become more sophisticated. Which optical filters come into play as a baby gets older? Together, behaviorist and modeler can tease out pathways in the brain and discover how brain structures are maturing. “We talk as a group about what brain pathways or mechanisms we think are developing that make [a particular] capacity emerge,” Schlesinger says.

In turn, changes in brain structures give babies the tools to develop new capacities for visual perception, attention, and memory. “Brain structures make [these capacities] possible, but you need experience to activate them. And experience helps those brain structures to grow and mature,” Schlesinger says. “It’s a feedback loop. Experience—one’s expectations and beliefs—can influence where attention is directed, and where you pay attention plays a very important role in how visual perception develops.”

Schlesinger and his team of graduate and undergraduate research assistants do behavioral experiments as well—occasionally with babies, but usually with college students. Studies of adolescents and adults, he says, can help researchers

understand some of the results from tests with babies. They also allow him and his team to study the developmental process at different points in time and with additional variables.

For example, master’s student Joe Geeseman focuses on the relationship between the perception of moving objects and sound. “It’s an extension of the idea of vision and attention,” Schlesinger says. One of Geeseman’s experiments found that students watching a video in which a ball bounces back and forth across a screen misjudge the moment of the bounce if they hear a sound slightly before it—even if they’re told to ignore the sound.

In another experiment conducted by master’s student Jill Mayer, an object containing a letter passes behind a screen. When the object reappears, students are asked to identify whether the letter is a different one or the same. Interestingly, it takes them longer to do this if the object has changed in color or shape. “The brain seems to prefer context—it makes it easier to perceive or remember,” Schlesinger says. The same may be true for babies.

Schlesinger also is teaming with fellow SIUC psychologist Reza Habib to do neuroimaging of adults taking part in such tests. In these functional MRI images, as they’re called, different parts of the brain light up under different circumstances.

Imaging can help researchers understand visual perception—“We know the parietal cortex plays an essential role,” Schlesinger says—but it isn’t sufficient. “An area lights up, but we don’t know how the information is being processed,” he says.

Rather, imaging provides another tool to solve the cognitive puzzle. Schlesinger believes in a team approach to combine evidence from behavioral testing, computer modeling, and imaging to get the most accurate understanding of how babies perceive the world—and how that shapes our ability to learn and develop.

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**Babies’ experience with their environment triggers the maturation of brain structures that allow more sophisticated visual interpretation.**

# BY THE NUMBERS

Summing up the career of one of SIUC's most distinguished

by Marilyn Davis

**The current economic crisis**, which has snaked its way from the United States to Europe, Asia, and even the Middle East, has demonstrated just how interrelated financial markets are.

But that came as no surprise to Ike Mathur, an internationally known finance expert who grew up in Pakistan, came to the United States for his education and career, has held Fulbright professorships in Finland and Portugal, recently organized a conference in Norway, and is editing a journal based in Amsterdam.

Mathur, professor emeritus of finance at SIUC, specializes in banking, corporate finance, and international finance. His research has looked at these topics in almost every region of the globe. Many of his studies have analyzed the effects of one nation's market developments on those of other nations or regions.

Mathur came to SIUC in 1977. Besides teaching and doing research, he's served stints as the chair of the finance department and interim dean of the College of Business. He was named the college's Researcher of the Year in 1995, 1998, and 2006. He's written or co-written 14 books and more than 100 articles with dozens of collaborators, from graduate students to colleagues in the United States and abroad. He's also edited several finance journals.

He retired at the end of 2007, but only in the technical sense. He continues to teach courses and do research, and in January 2008 he became managing editor of the *Journal of Banking and Finance*, an international research publication rated among the top five finance journals.

**M**athur earned his doctorate in marketing. But a research assistantship with a finance professor late in his doctoral coursework swayed his interests. After graduating, he did research in both fields, but slowly shifted toward finance.

"What I really liked about finance was that it had no softness in it," he says. "If you want to advertise a particular product, do you do direct mail, door-to-door sales, TV, radio? There's no optimal answer; it depends on the circumstances. Finance, I found, was just like mathematics: mostly there are very concrete, objective answers to particular problems, and I found that intriguing. If you're doing good work in finance, you need a good support field in mathematics."

Mathur has worked with SIUC mathematician Salah Mohammed, for instance, in the area of option pricing, the right to buy or sell some asset. Say you have a car for sale for \$5,000. An interested buyer might want you to hold the car for her for a couple of days so she can check out other cars. But that denies



you the chance to accept another offer in the meantime. So the prospective buyer offers you a \$200 premium for the option to buy the car within 48 hours. “It’s mathematically rigorous, but there’s a way we can figure out what the right price is for this option,” Mathur says.

better pursue their goals.” For some, that means purchasing consumer goods, but for others it also means giving to charity. Maximizing shareholder wealth maximizes social welfare in the United States and other countries as well, Mathur argues.

“Every year *Forbes* magazine does a survey

“One strand of my research deals with how institutions internationalize,” he says. “The conventional wisdom is you either go overseas and start from the ground up or you buy foreign institutions. But strategic alliances and joint ventures are generally more successful and profitable modes of expansions into foreign markets. You can limit your capital investment and you’re able to look for complementary skills or assets.” U.S. firms, he explains, have the technology and the managerial and production experience, while foreign firms have the local resources and the all-important connections.

In the mid-1980s the People’s Bank of China invited Mathur to give some lectures for senior managers. At the time, U.S. businesses could go into China only by way of joint ventures. “That got me interested in joint ventures, because the average U.S. manager wasn’t well versed in Chinese culture and how to build connections,” Mathur notes. The experience resulted in one of his 14 books, *Strategies for Joint Ventures in the People’s Republic of China*, co-authored with Chen Jai-Sheng, a member of the bank’s board of directors. (Mathur’s other books

## Ike Mathur's research has looked at banking and finance in almost every region of the globe.

Finance focuses on managing funds, deploying assets within and across national boundaries, and raising money in different financial markets. “We look at best practices to develop theories for prescriptive strategies for firms,” Mathur says. Some of that knowledge is passed along via consulting. But the biggest influence on corporations, Mathur says, “is the way we teach finance theory to students and they implement it as they move up the ranks.”

He adds, “Many of the concepts we work on in finance have filtered over to accounting, marketing, and management.” About three years ago, in fact, he edited a special issue of the *Journal of the Academy of Marketing Sciences* about the interaction between marketing and finance.

“Thirty years ago, the chief corporate goal was to maximize profits,” Mathur says. “Today, not a single CFO would say that. They would all say the goal is to maximize shareholder wealth,” which is not necessarily the same thing. “Many studies in marketing now focus on maximizing shareholder value, which is something we deal with in finance all the time.”

Maximizing shareholder wealth is better for society, Mathur says: “Shareholders can

of how much people have in terms of wealth and how much they’re giving away. What I find interesting is how many people there are who are giving 60, 70, 80 percent of their wealth to charity.”

After a nearly 40-year career, Mathur ranks among the top 100 finance professors globally for publications. That seems fitting, given his strong interest in international finance.



include several on European finance and a number of textbooks.)

Mathur and two co-authors received the 2006 Outstanding Article award from the *Journal of Financial Research* for their study “The Use of Acquisitions and Joint Ventures by U.S. Banks Expanding

two other people set up a model with a historical context, and when we tested it with historical data (using longer time returns than the previous researchers used), it showed that capital asset pricing does have validity.”

The previous researchers used monthly

Another interest of Mathur’s is developing models to put a value on human life. The idea sounds abhorrent—yet juries are asked to make awards for loss of life and need a means to do so. “The conventional wisdom is that we can’t place a value on life. When it comes to [the people we love], we would say that their value is priceless,” Mathur says. “But we can look at the costs and benefits involved in consumption activities, the riskiness of occupations, and so forth, and can actually assign values to those.”

Mathur was only the second person in the nation to give testimony in court in this area. Based on his “loss of value of life”

## Maximizing shareholder wealth maximizes social welfare in the United States and other countries, Mathur says.

Abroad.” Joint ventures have turned out to be a “great way” for financial institutions to expand their reach, he says.

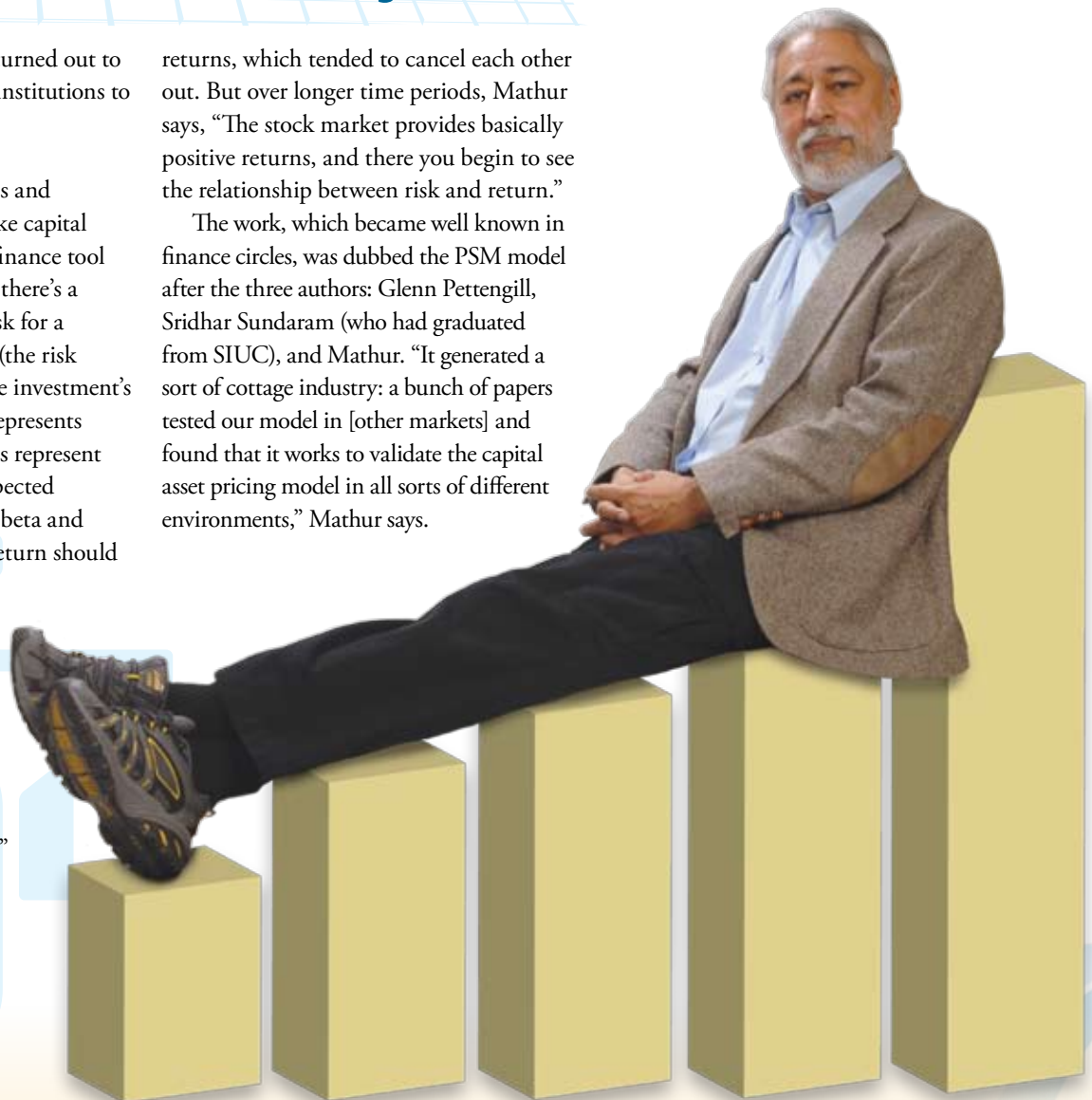
Much of Mathur’s work tests and develops financial models. Take capital asset pricing, a longstanding finance tool based on the assumption that there’s a direct relationship between risk for a particular type of investment (the risk measure is called beta) and the investment’s expected return. A beta of 1 represents average risk; higher beta values represent higher risk but also higher expected returns. The model calculates beta and prices assets so that risk and return should be in equilibrium.

In 1992, however, two researchers argued that beta in fact wasn’t a good indicator of risk—that there was no relationship between beta and returns.

“Something seemed not quite right about the research,” Mathur says. “In 1995 I and

returns, which tended to cancel each other out. But over longer time periods, Mathur says, “The stock market provides basically positive returns, and there you begin to see the relationship between risk and return.”

The work, which became well known in finance circles, was dubbed the PSM model after the three authors: Glenn Pettengill, Sridhar Sundaram (who had graduated from SIUC), and Mathur. “It generated a sort of cottage industry: a bunch of papers tested our model in [other markets] and found that it works to validate the capital asset pricing model in all sorts of different environments,” Mathur says.



report, a settlement was awarded to the family of a woman who died in a car crash. “Since then I’ve testified many times as an expert witness on the value of life,” he says. “I do a lot of personal injury and medical malpractice work as a consultant.”

**F**inancial models generally incorporate risk aversion as part of the equation. “But what if for some time our behavior is not rational? What happens if we’re not risk-averse?” Mathur says. Such behavior on the part of consumers and financial institutions resulted in the high-tech stock market bubble that

burst in 2000, and the recent subprime mortgage morass, which has ballooned into a lending crisis across the globe. housing prices. “Now we’re looking at organizational forms in real estate financing,” Mathur says. The most common are limited partnerships and real estate investment trusts (REITs, which are not subject to federal tax if 90 percent of the profits are distributed to shareholders). But he and Ebrahim found that “the optimal form for organizing real estate is an UPREIT: an umbrella partnership real estate investment trust, which combines the most desirable features of the other two.”

Their findings, he says, “suggest that subprime mortgages and defaulted

of \$125 billion, with another \$125 billion slated for large regional banks. The rest of the \$700 billion bailout was still not settled.

Mathur is actually more optimistic about the situation now than he was in spring 2008. “I don’t think we will gravitate toward a 1930s-type depression,” he says. “The federal government is better equipped now to handle [a crisis], and there’s better cooperation among central banks. [Investors] don’t like uncertainty, and government action is reducing uncertainty. If you’re going to be in the stock market for another five to 10 years, you’ll probably be OK, and [some people will want to make] judicious investments in the market now.”

By the time this magazine reaches your mailbox, who knows what the Dow Jones average will be. But one thing is certain. Finance professors like Mathur will be watching, analyzing, and modeling—and sharing what they learn with a new crop of students.

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## Because the government has begun taking action, Mathur is more optimistic about the current financial crisis now than he was in spring 2008.

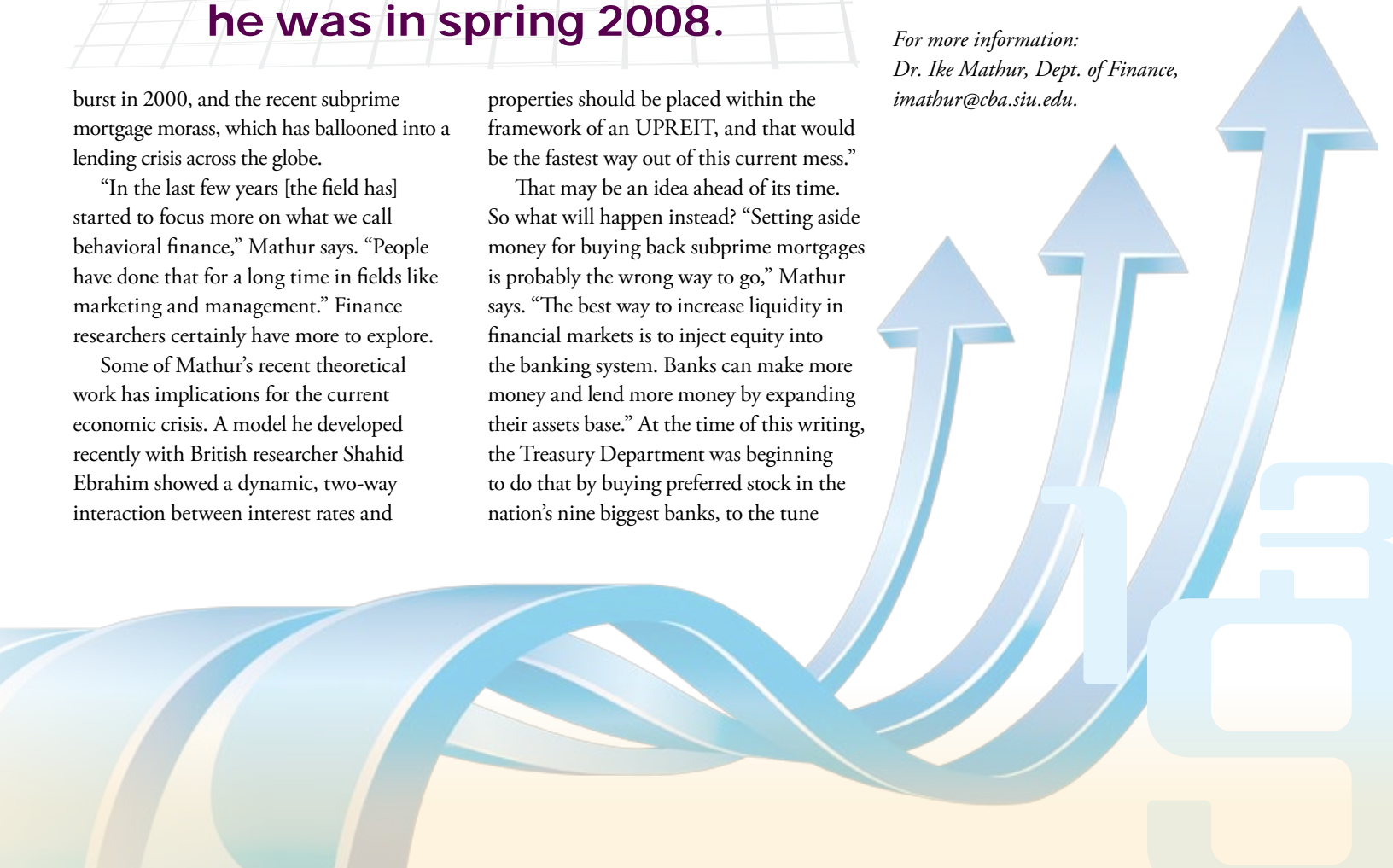
burst in 2000, and the recent subprime mortgage morass, which has ballooned into a lending crisis across the globe.

“In the last few years [the field has] started to focus more on what we call behavioral finance,” Mathur says. “People have done that for a long time in fields like marketing and management.” Finance researchers certainly have more to explore.

Some of Mathur’s recent theoretical work has implications for the current economic crisis. A model he developed recently with British researcher Shahid Ebrahim showed a dynamic, two-way interaction between interest rates and

properties should be placed within the framework of an UPREIT, and that would be the fastest way out of this current mess.”

That may be an idea ahead of its time. So what will happen instead? “Setting aside money for buying back subprime mortgages is probably the wrong way to go,” Mathur says. “The best way to increase liquidity in financial markets is to inject equity into the banking system. Banks can make more money and lend more money by expanding their assets base.” At the time of this writing, the Treasury Department was beginning to do that by buying preferred stock in the nation’s nine biggest banks, to the tune



# HEALTHIER HEALTHIER

A program to prevent Type 2 diabetes in middle-schoolers has relied on SIUC undergraduates for its success and expansion.

*by K. C. Jaehnig and Marilyn Davis*





# LIVES FOR KIDS



**He was**—no way around it—large. Yet in just a few months, the boy, a Harrisburg middle-schooler, lost about 10 percent of his body fat and could wear clothes four sizes smaller.

To Sharon Peterson, creator of the innovative program that helped that boy transform himself, the pounds he'd shed were a side benefit, but not the main point.

“We’re focusing on health outcomes, not body weight,” says Peterson, a registered dietitian, community nutritionist, and assistant professor of food and nutrition.

“While we do work with self-esteem and body image, I get my feathers ruffled when this program is perceived as one that rounds up all the kids who are overweight—that’s not what we’re about. We’re trying to help kids at risk for developing Type 2 diabetes—the kind that

used to be referred to as ‘adult onset diabetes’—build the kind of healthier lifestyle that will reduce those risks. Overweight is a risk factor, but you can develop Type 2 diabetes without being fat.”

Before she came to SIUC in 2006, Peterson’s years of private practice in the region had put faces—and bodies—to the dry statistics about rising rates of obesity and diabetes in kids. She knew there was a pressing need to address the issue. Experts disagree on the scope of the problem, but one thing is clear, she says: “As recently as 15 years ago, no one considered that children could develop Type 2 diabetes.” Now some are calling it an epidemic.

Peterson designed her program, R.U.A. Healthy Kid?, to buck those trends. She launched it with some startup funds from SIUC and the Illinois Soybean Association. The idea, she says, “had been in my brain for about 10 years—in private practice I’d

specialized in children’s nutrition, among other things,” and it was slated to be one of her top priorities as a faculty member.

You can’t change some risk factors for Type 2 diabetes. If someone in your family has diabetes, your odds increase. Type 2 incidence is higher among African, Hispanic, and Native Americans, too, although that may be due to differences in health care access or quality.

Still, most risk factors, such as physical inactivity, a high proportion of body fat, and high blood pressure, respond to changes in behavior. And because those risk factors intertwine, changes in one often affect the others.

Based on the data, her professional experience, extensive reading on behavior and motivation, and a massive search through published material about childhood obesity, Peterson decided to tackle four key areas where changes could help

“As recently as 15 years ago, no one considered that children could develop Type 2 diabetes.”

Now some are calling it an epidemic.

kids cut their diabetes risk. In addition to feeling better about themselves and their bodies, she wanted them to eat meals at home, make good snack choices, and replace “screen time” (computers, TV watching, games, texting) with some kind of physical activity.

To give them the information and skills they’d need to make those changes, she’d mix training sessions with weekly phone calls and e-mails and a newsletter. And to see if it worked, she’d collect data before, during, and after the six months the program would run.

“We are one of the first research teams in the country to intervene with this target audience,” Peterson says. “No one that we’re aware of is actually trying to intervene and measure changes in at-risk kids through a community-based program.”

Working with Harrisburg Middle School, Peterson, the school’s nurse, and master’s student Long Pham started early in 2007 looking for kids they deemed likely to develop Type 2 diabetes based on the presence of three or more risk factors. They gathered information from parent consent forms, physical measurements such as blood pressure checks, and interviews with the children themselves.

Out of 246 youngsters, they identified 54 as being at risk. “Fifty-three of them had a high body mass index (high body fat for their weight)—that’s an indicator of how strong that particular risk factor is,” Peterson notes.

In summer 2007, undergraduate Toya Wilson and Peterson developed the program details by starting with a needs assessment. They interviewed 10 willing parents about “what kind of program they would want—what kind of program they would bring their kid to,” Peterson says. The idea was to determine families’ barriers to participation and what they would perceive as beneficial.

Wilson, who has diabetes herself, did



**Above: Sharon Peterson (left) and Toya Wilson worked together to develop the Type 2 diabetes prevention program. Right: Peterson holds regular meetings with the students who assist in running and assessing the project. Far right: Children at Harrisburg take part in one of the healthy-eating education activities. (Photo courtesy Sharon Peterson.)**



the work as her research project for the federal McNair Scholars Program, which prepares first-generation-college/low-income and underrepresented minority undergraduates to go on to doctoral study. She and Peterson did a lot of brainstorming as they identified common themes in parents’ responses.

“Toya was vital...in determining what key components needed to be included to make [the program] interesting and relevant,” Peterson says.

When it came to healthy eating, for example, parents indicated lack of time, lack of money, and their children’s preference for junk food as obstacles. Another obstacle was that work schedules interfered with monitoring children’s food

intake, half of the parents said. “With that information we sought out recipes that were tasty, low-cost, healthy, and easy to prepare,” Peterson says.

Only 18 of the 54 youngsters signed up for the pilot program, but because Peterson and her team were reinventing and tweaking as they went along, “that was plenty,” she says, laughing. “And we only lost one kid (as a drop-out). I feel good about that because this is a tough age to keep interested.” The program actu-

ally ended up with 24 participants, as kids from some nearby communities came to get in on the act.

Several more SIUC undergraduates were involved by the time the six-month program began in October 2007. With their help, the program ran at the school for four hours on selected Saturday afternoons.

The youngsters rotated between different stations, where they got to exercise with fun, unusual equipment like a monster basketball and an inflatable twister-bouncer, learned about portion size and food cost (that station was developed from scratch by an undergraduate), did



hands-on food preparation where they put together and taste-tested healthy snacks, and more. At each session the researchers rechecked physical measurements and had the kids fill out questionnaires to track behavioral changes.

Parents had cited a lack of fitness programs for children and the cost of those available as obstacles to healthier behavior. So Peterson persuaded fitness centers in Harrisburg to offer programs for kids and paid the first six months' memberships for

those children from grant funds. (After seeing their kids' enthusiasm—and the results—some parents began saving for memberships, and one center is sponsoring three children for free.)

While the boy who shrank four sizes was probably the program's most notable success, all the kids made what Peterson called "tremendous progress," although you might not know that if you looked only at their weight. "Over the six months, overall body weight actually increased significantly," she says. "But these are adolescents, so they're still growing. In addition, muscle weighs more than fat.

"That's where the body analysis comes in. We found that their percent of body fat as a group significantly decreased. Their pounds of body fat as a group also significantly decreased, and their pounds of muscle significantly increased. It's exactly what we would have hoped for as far as outcomes."

It worked so well that Peterson has received \$261,000 from the Illinois Soybean Association to expand the program to kids in other Southern Illinois communities, such as Highland and Vienna. The diversity of settings will allow the team to test the program's effectiveness with kids of different racial/ethnic backgrounds, rich kids, poor kids, high schoolers, and pre-teens. They also hope to pinpoint which components of the program get the best results. They have already identified 39 fifth- through eighth-graders in Vienna whose parents will be invited to enroll their children in a program there.

"The ultimate goal is to get something tangible that we can package—a website or a curriculum or a board game or all of the above—so that we can share this throughout the state or even perhaps throughout the country with people who are concerned about the rise in Type 2 diabetes in children and want to do something about it," Peterson says.

She also stresses sustainability, though. "We're trying to build relationships and maintain contact for the long term," she says. "Our long-term vision is to develop 'hubs' throughout the region to provide ongoing intervention programs to which physicians can refer children at risk. We can envision graduates of the program returning to serve as mentors and role models."

Over the past two years, at least 20 undergraduates have volunteered time to work with Peterson—collecting and analyzing data, supervising and teaching the children, taking on short-term projects, and contributing ideas. "At any one time, there are five or six key players," Peterson says. She also now has six graduate assistants assigned to the project.

And Emily Whitney, a doctoral student in health education, is working in Harrisburg on ways to sustain and expand the program there to reach all children through the school day: in physical education classes, at lunchtime, through the curriculum, and so forth. It will form the basis of her dissertation.

She heard about the program from an undergraduate—Toya Wilson.

*For more information: Dr. Sharon Peterson, Dept. of Animal Science, Food and Nutrition, [sharonp@siu.edu](mailto:sharonp@siu.edu).*



**The School of Social Work** received the **2008 Partners in Advancing Education for International Social Work Award**, conferred by the Council on Social Work Education's Commission on Global Social Work. Six schools were nominated from among 600 degree-granting social work education programs. SIUC's program is active in numerous international initiatives and has ties with 11 universities in eight countries.

**Frank Stemper**, music professor and SIUC composer in residence, recently received his **20th consecutive ASCAP Plus award** from the American Society of Composers, Authors, and Publishers. Stemper



had premieres of new works in 2008 in the United States, Mexico, France, and Hungary.

**Daotai Nie**, assistant professor of medical microbiology, immunology, and cell biology, was recently awarded **three federal grants totaling \$1.75 million for cancer research**. Two, from the National Cancer Institute, involve prostate cancer studies; the third, from the U.S. Army, involves breast cancer metastasis.

**Two leading professional organizations** in the area of toxicology **awarded their highest rankings** to SIUC's science dean in 2008. The American Board of Toxicology named Jay Means as a diplomate, and the Academy of Toxicological Sciences elected him as a fellow. The honors certify Means as an international leader in his field.



**John Downing**, director of SIUC's Global Media Research Center, has been named to a four-year term as a **vice president for the International Association for Media and Communication Research**. Downing is a professor of media studies in the Department of Radio-Television.



**Zoology professor Chris Kohler**, former director of SIUC's Fisheries and Illinois Aquaculture Center, is the 2008 recipient of the **Excellence in Fisheries Education Award** from the American Fisheries Society (AFS), the top such annual award in North America. He also won the Stephen Forbes Award of Excellence from the Illinois AFS this year.



**Joyce Fetro**, professor of health education and recreation, has been named the **American Association for Health Education's 2009 scholar**. Her research focuses on youth development, resilience, and health risk behaviors.

**Marianne Webb**, Distinguished University Organist and professor of music, received the **biennial Edward A. Hansen Leadership Award** from the American Guild of Organists at its national convention this past June. The award recognizes her career as a concert artist, teacher, and innovator.

**The History Channel's "Modern Marvels" series** revisited SIUC recently, this time to feature research at the Center for Advanced Friction Studies (the first trip, a few years ago, was for a program on metals). The crew taped interviews for "Super Hot," a show looking at **how researchers create and study extreme temperatures**. The SIUC footage included airplane brake friction demonstrations.

# Sightlines

## A River Runs Through It



Dan Overturf (standing) and SIUC alumnus Craig Miller hang one of Overturf's photographs at O'Hare International Airport. Photo provided.

**Y**es, we've used the title in *Perspectives* before, but we couldn't resist using it again. Over the course of a year, some 1 million people will have the opportunity to see the creations of SIUC photography professor Dan Overturf as they walk through the international terminal of Chicago's O'Hare Airport. Forty photographs—a full third—of the works reproduced in the book *A River Through Illinois*, co-authored by journalist and SIUC alumnus Gary Marx, were hung there in August 2008. The prints range from 24"x48" to 24"x96" and will be displayed at O'Hare for about a year.

The book, released in April 2008 by SIU Press, was eight years in the making. Overturf's documentary

photographs are accompanied with text by Marx blending descriptions, historical notes, and the stories of people who work on and live along the Illinois Waterway: the Illinois River and the rivers and canals connecting it to Lake Michigan. Thus the book spans urban and rural areas. Exhibitions showing some of the photographs and accompanying text blocks "started many years ago," Overturf says, but he included a number of previously unexhibited photos taken in the Chicago area for O'Hare, and Marx revised some of the text.

The 42"x42" photo being hung here is captioned "Barge wheelhouse pilot entering Marseilles Lock; two-minute exposure. River mile marker 244.5, August 2001."

—Marilyn Davis