

# UMaine Today

CREATIVITY AND ACHIEVEMENT AT THE UNIVERSITY OF MAINE

MARCH/APRIL 2004

A photograph of a person wearing a red shirt, a hat, and dark pants, standing in a shallow stream within a dense, lush jungle. The person is looking down at something in the water. The surrounding vegetation is thick with various green plants and trees, and sunlight filters through the canopy, creating dappled light on the water and forest floor.

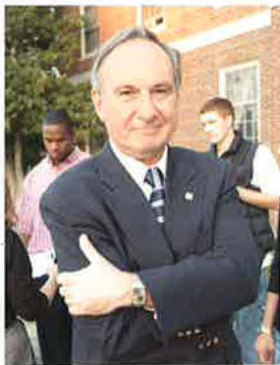
**Evolution in  
the jungles  
of Trinidad**

**Prejudice and  
punishment**

**Securing the  
home front**

## From the President

Photo by Warren Roos



**TECHNOLOGY TRANSFER** — the process of turning research-based ideas into real products — is one of the University of Maine's major contributions to economic development. Faculty research in marine sciences, engineering, psychology and other fields leads to new technologies with the potential to start new businesses or give a greater competitive edge to existing industries. Through hands-on learning opportunities in research and entrepreneurship, our students are prepared to apply their technological expertise in the knowledge-based economy.

In Maine, the university has an effective structure to support technology transfer, including the patenting and licensing of research. A case in point: last year, UMaine created six start-up companies — four of them founded by UMaine graduate students.

This type of work is also done in the Advanced Engineered Wood Composites (AEWC) Center, directed by Professor of Civil Engineering Habib Dagher. AEWC is a globally recognized leader in wood composites, conducting research leading to commercial development of the next generation of cost-effective, high-performance, wood and nonwood composite materials.

With the help of the 2003 Maine Jobs Bond, the center is expanding this spring. To date, AEWC research has resulted in numerous patents and patents-pending. Students work side by side with AEWC engineers and scientists, taking roles in world-class research and development projects.

The initiatives are all part of Professor Dagher's vision for the AEWC Center and its potential for technology transfer. At UMaine, we have recognized his outstanding achievements in this area. Earlier this year, the New England Board of Higher Education recognized them as well.

Habib is among the recipients of the prestigious 2004 New England Higher Education Merit Awards, given to a person or program from each New England state that has demonstrated innovative work and shown exceptional leadership in behalf of higher education and the advancement of educational opportunity.

In recognizing Habib's work, Maine State Sen. and NEBHE delegate Mary Cathcart noted that it "epitomizes the economic and civic contribution of America's land-grant universities." Through technology transfer, Habib Dagher and many UMaine faculty members like him make knowledge the state's most valuable and most renewable resource.

Peter S. Hoff  
President



**ON THE COVER:** In the jungles of Trinidad, University of Maine researcher Michael Kinnison and his colleagues — Andrew Hendry, David Reznick and Paul Bentzen — traverse streams to reach barrier waterfall sites where they study guppy populations and the interactions of processes driving evolution over contemporary time scales. (Story on page 6.)

Photo by Nathan Miller



**Peter S. Hoff, President**

**Robert A. Kennedy, Executive Vice President and Provost**

### UMaine Today

**Publisher**

Jeffery N. Mills

Vice President for University Advancement

**Executive Director of Public Affairs and Marketing**

Luanne M. Lawrence

**Director of Public Affairs**

Joe Carr

**Editor**

Margaret Nagle

**Contributing Writers and Associates**

Gordon Bonin, Dick Broom, Carrie Bulduc, Joe Carr, Nick Houtman, Kay Hyatt, George Manlove, Margaret Nagle, Christopher Smith, Luther Young

**Designers**

Michael Mardosa, Carol Nichols, Valerie Williams

Readers are invited to send comments to:  
[umainetoday@umaine.edu](mailto:umainetoday@umaine.edu)

Located in Orono, Maine, the University of Maine is the state's land-grant and sea-grant institution. UMaine serves its home state through its explicit statewide teaching, research, and public service outreach mission. Offering 91 bachelor's, 62 master's, and 25 doctoral degree programs, UMaine provides the most varied and advanced selection of programs available in Maine. The Carnegie Foundation for the Advancement of Teaching classifies UMaine as a Doctoral Research Extensive University, the highest classification.

*UMaine Today* is produced five times a year by the Department of Public Affairs and Marketing, University of Maine, 5761 Howard A. Keyo Public Affairs Building, Orono, Maine 04469-5761, 207-581-3744.

In complying with the letter and spirit of applicable laws and in pursuing its own goals of diversity, the University of Maine System shall not discriminate on the grounds of race, color, religion, sex, sexual orientation, national origin or citizenship status, age, disability or veteran status in employment, education, and all other areas of the university. The university provides reasonable accommodations to qualified individuals with disabilities upon request. Questions and complaints about discrimination in any area of the university should be directed to: Director of Equal Opportunity, 101 North Stevens Hall, University of Maine, Orono, Maine, 04469-5754, 207-581-1226.

The University of Maine is a member of the University of Maine System.

© 2004 by the University of Maine System.

Printing and distribution of *UMaine Today* is underwritten by the University of Maine Foundation and the Office of the Vice President for Research.

♻️ *UMaine Today* is printed on recycled paper.

**2 Prejudice and Punishment**

For the past two decades, UMaine sociologists Steven Barkan and Steven Cohn have studied the influence of racial prejudice on white Americans' views of crime and punishment. Their research shows that prejudicial views about African-Americans are associated with greater support by whites for the death penalty and harsher sentencing of convicted criminals, the use of excessive force by police, and increased spending on law enforcement.



**6 Evolving Before Our Eyes**

Most people consider evolution to be ancient history, but not biologist Michael Kinnison. Kinnison studies Trinidadian guppies — half-inch long, brightly colored inhabitants of jungle rivers — and other fish to understand the dynamics of contemporary evolution. Using modern advances in genetics, he is helping to cast new light on Darwinian theory and rewrite conservation strategies.



**9 High Anxiety**

Panic and anxiety are normal human emotional responses. However, they become debilitating disorders in people who experience "anxiety sensitivity" and develop abnormal, sometimes catastrophic apprehension about panic-attack symptoms — in essence, fear of fear. UMaine psychologists are studying anxiety disorders, including panic disorder and phobias, in an effort to find a cost-effective and drug-free, cognitive-behavioral approach to treatment.



**12 Primary Source**

The University of Maine's digital library is poised to enter a new phase when funding is secured to construct an addition and renovate Fogler Library. The expansion is indicative of the new role large libraries play today as state-of-the-art facilities with the services needed to democratically provide everyone with access to information.

**17 Securing the Home Front**

University of Maine research initiatives are contributing to national homeland security efforts. Drawing from their expertise in information technology, chemistry, environmental monitoring and structural engineering, UMaine scientists are pushing our ability to detect threats early, gather information and give an advantage to those who maintain vigilance.



**21 student focus**    **22 insights**

Chemicals in the Landscape  
Setting the Pace

Understanding Protein Transport  
Grounded in Greatness  
The Future on Paper  
Improve Cognitive Function, Reduce Strokes  
Field Experience in Honduras

Sounds of Percussion and Violin  
Dairy's First Responders  
Taking Inventory  
A New Spud in Town  
Tree Fans Unite

# PREJUDICE & punishment

Two UMaine sociologists study the link between racial perceptions and attitudes toward criminal justice

**I**n a democracy, public policy is supposed to reflect public opinion or, at the very least, to take it into account. But what if public opinion is based on attitudes that run counter to the notion that all people are created equal? What if, on some issues, public opinion is shaped by racial prejudice?

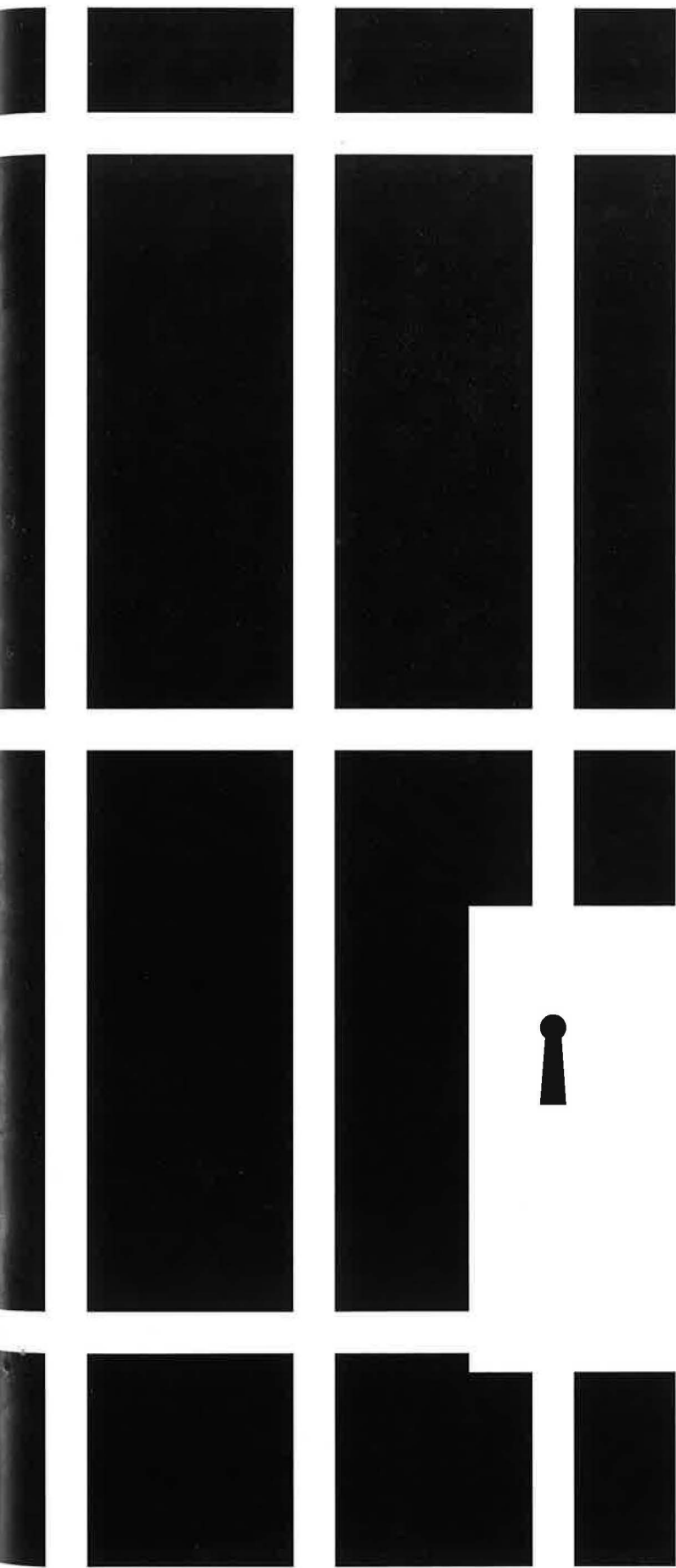
For nearly 20 years, two University of Maine sociologists have studied the influence of racial prejudice on white people's attitudes toward crime and punishment. Their most recent study, the fourth in their series on the role of prejudice in attitudes toward criminal justice, shows

**"We always suspected that prejudice might influence attitudes in a number of different areas of criminal justice, and that is just what we have found."**

Steven Cohn

that racial prejudice is often a factor in the support that whites express for increased spending on law enforcement. "Individuals may have all sorts of reasons for wanting more money spent to fight crime," note UMaine professors of sociology Steven Barkan and Steven Cohn in releasing their latest research findings. "Yet our study indicates that racially tinged views of African-American violence are an important component of white Americans' support for greater expenditures on crime control. The more that whites perceive that African-Americans are prone to violence, the more likely they are to want more money spent to reduce crime."

Barkan and Cohn also have looked at the role of prejudice in whites' support for the use of force in law enforcement, for harsher punishment



of criminals and for the death penalty. In all four studies, they found that prejudice against African-Americans is an important reason for holding punitive attitudes. In the face of such a growing body of evidence, the UMaine researchers warn that “politicians and other policymakers must be careful not to be unduly swayed by public opinion on crime, as such opinion exists in part because of the racial fears and prejudices of white Americans.”

“The statistics we use don’t allow us to assess how much of an impact racial prejudice has, but we know that it does have some impact,” Barkan says. “I believe that most people who favor harsher sanctions for criminals are not consciously prejudiced. But there is extensive psychological evidence that racial prejudice often operates unconsciously.”

**the most recent findings** by Barkan and Cohn come at a time when practices such as racial profiling and the death penalty have come under increased nationwide scrutiny. For instance, in 1999, the Clinton administration convened a conference on strengthening police-community relationships, which looked at racial profiling as one of the major causes of distrust. In 2000, the Justice Department released *The Federal Death Penalty System: A Statistical Survey (1988-2000)*, which revealed that African-Americans and Hispanics make up more than 80 percent of those on federal death row. The controversial report fueled concerns by civil rights groups about racial and geographic disparity in capital punishment cases, but prompted U.S. Attorney General John Ashcroft to testify before a House Judiciary Committee that the study revealed no racial bias in the U.S. death penalty.

Looking more deeply at the factors that color people’s attitudes toward crime policy has been the focus of research by sociologists like Barkan and Cohn. For instance, studies by sociologists over the past half-century have shown that, with the notable exception of the death penalty, whites and blacks generally agree on the severity of punishment for various types of crime. In the 1980s, Barkan and Cohn began wondering why this was so, and whether whites and blacks might have different — even conflicting — reasons for holding the same opinions.

“Our original hypothesis was that white people would hold punitive attitudes on punishment because they perceived members of racial minorities as being disproportionately criminal, and black people would hold punitive attitudes because they are the ones who are most victimized by crime,” Cohn says.

A close analysis of data from the National Opinion Research Center’s 1987 General Social Survey (GSS) told them they were on the right track. By comparing responses from whites and blacks to a number of different survey questions — and by controlling for the variables of age, gender and education — they found that blacks tend to

# PREJUDICE & punishment

favor harsh penalties for criminals because of their fear of crime, while white attitudes toward punishment are based partly on racial prejudice.

“When people agree on an issue for different reasons, we call that a false consensus,” Barkan says. “A good example of this is the opposition to pornography, both by religious conservatives and by some feminists.”

**in their second study** on the subject of race, prejudice and criminal justice, the two UMaine sociologists looked at the reasons why a large majority of white people support the death penalty. Opinion surveys consistently show far greater support for capital punishment among whites than among blacks.

Barkan and Cohn analyzed data from the National Opinion Research Center’s 1990 GSS, which included a section on racial attitudes and perceptions. Of particular interest were white people’s responses to questions about the degree to which they thought blacks were “lazy, unintelligent, desirous of living off welfare and unpatriotic.” Respondents also were asked how they would feel about having black neighbors and about a close relative marrying a black person.

The researchers then correlated responses to these questions with expressions of support for the death penalty. The results, they say, provided the first clear evidence that white support for capital punishment is associated with “antipathy to blacks and with racial stereotyping.”

Barkan and Cohn followed this study with a look at white attitudes toward the use of force by police. Again using data from the 1990 GSS, they examined the factors that cause people to support either “reasonable force” or “excessive force.” They found that racial prejudice — as indicated by stereotypical attitudes and antipathy toward blacks — is associated with white approval of excessive force, but not of reasonable force.

In their latest study, the UMaine sociologists analyzed data from the 2000 GSS to gauge the effect of prejudice on whites’ support for spending more money to fight crime. They found that whites are more likely to support such spending if they perceive blacks as more inclined to violence, but not if they perceive whites as more violence prone. This finding, they wrote, is a stark indication that

“racially tinged views of African-American violence are an important component of white Americans’ support for greater expenditures on crime control.”

In each of their four studies, Barkan and Cohn used different variables and somewhat different measures of prejudice to examine different questions, and they worked with data from three different national opinion surveys. Yet their central findings have remained remarkably consistent. All four studies show a strong link between punitive attitudes and racial prejudice.

“We always suspected that prejudice might influence attitudes in a number of different areas of criminal justice,” Cohn says, “and that is just what we have found.”

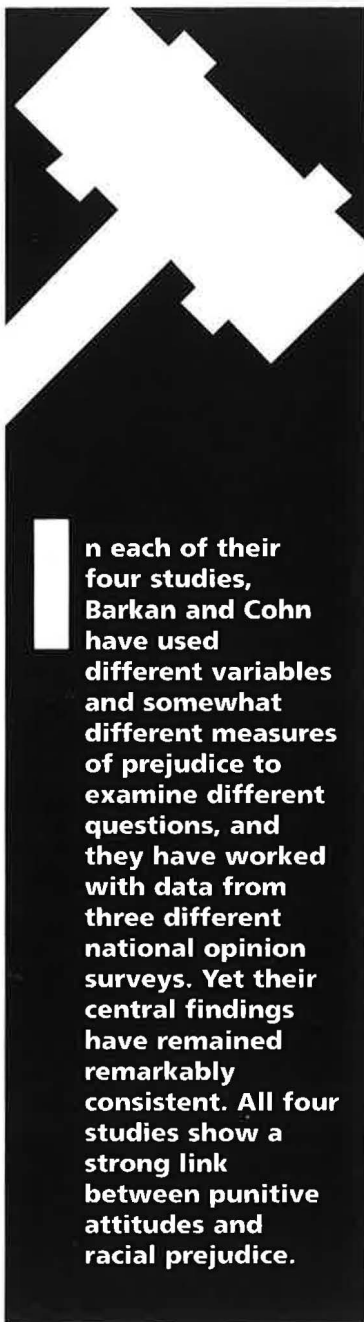
**the findings are** more than simply troubling, say the researchers. They raise important questions about the proper role of public opinion in the criminal justice arena.

“We have now done four different studies, and each time we have found that racial prejudice has an impact, even when we control for other factors that are associated with support for higher levels of punitiveness,” Barkan says. “We believe we have found a relationship that is significant, not just statistically, but for the real world of public policy.”

One of the hallmarks of democracy is that “public opinion should count for something, that leaders should take it into account,” Barkan says. “We know that public opinion has had a significant influence on criminal justice policy in this country over the years. But if public opinion rests in part on racial prejudice, then that’s anti-democratic. In a democracy, racial prejudice should not have any influence on laws and government policy.”

Barkan cites Supreme Court decisions regarding capital punishment as examples of the influence public opinion can have on the laws of the land.

“The court has said that people who are mentally retarded can no longer be executed, presumably because a public consensus has developed against that. However, the justices have ruled that, in general, the death penalty doesn’t violate the Constitutional ban on cruel and unusual punishment because, in effect, so many people still support it.



**In each of their four studies, Barkan and Cohn have used different variables and somewhat different measures of prejudice to examine different questions, and they have worked with data from three different national opinion surveys. Yet their central findings have remained remarkably consistent. All four studies show a strong link between punitive attitudes and racial prejudice.**

"But to the extent that popular support for the death penalty derives from racial prejudice, then it should not be a factor in judicial decisions," Barkan contends.

Since Barkan and Cohn began studying the impact of prejudice on public policy, the art and science of public opinion polling has come to play an immensely powerful role in politics. Candidates and lawmakers at all levels of government now rely heavily on poll results when deciding what positions to take and what policies to champion. This is part of what Cohn calls "the glorification of public opinion."

"When a politician says 'the people believe' this or that, that tends to lend a certain legitimacy to whatever stance is being taken," according to Cohn.

While it is beneficial for politicians to take public opinion into consideration, Cohn says it can be dangerous to glorify public opinion by following it unquestioningly.

"As our research has found, public opinion in the area of criminal justice rests to some extent on a non-glorious foundation."

*Dick Broom*

## ROOTS of prejudice

IT'S ONE THING to dislike someone because of something he or she has said or done. It's quite another to harbor ill feelings because of a physical characteristic, such as skin color. That's prejudice.

Of course, racial prejudice isn't really about skin color. It's about the values and character traits that people ascribe to members of other races.

Michele Alexander, an associate professor of social psychology at the University of Maine until her death last December, did significant research on the relationship among personal values, stereotyping and prejudice. In an interview last fall, she discussed the theory she developed to explain the origins of stereotypes and the functions they serve. She called it the "image theory."

"The idea is that our relationship with other groups is based on our perception of their power, goals and social status relative to ours," she said. "If we see them as presenting a threat to our political or economic power, if we perceive their goals as being incompatible with ours, or if we think their culture is less sophisticated, then



**In this country, public opinion has had a significant influence on criminal justice policy. But if public opinion rests in part on racial prejudice, Barkan argues, it's anti-democratic. In a democracy, racial prejudice should not have any influence on laws and government policy. If popular support for the death penalty derives from racial prejudice, then it should not be a factor in judicial decisions.**

we develop a stereotyped image of them. We then use that stereotype to justify how we treat them."

Alexander said prejudice of some kind — against women, the poor or certain

religious groups, for example — is found in almost every culture.

"That might be explained, in part, by what's called the social identity theory," she said. "It holds that it's not just our personal traits that make us who we are, it's also the groups we belong to. We all want to belong to groups that increase our self-esteem. The stronger we identify with one group, the more likely we are to feel prejudiced toward another."

Racial prejudice isn't a natural, instinctive trait, Alexander said. Instead, it's learned. And studies have found that it's often rooted in social history.

"In this country, race has always been a very important category of distinction, in large part because of slavery," Alexander said. "That whole dominance-submission perspective is so entrenched in our society that, unfortunately, too many of us are still learning that race is an important factor to use in judging people.

"Race is also an easy factor to use because it's so obvious," she said. "You can't tell a person's religion or occupation just by looking at them, but you can usually tell what racial group they belong to. That makes race an especially easy basis for prejudice."

*Editor's note: Michele Alexander, UMaine associate professor of social psychology, was killed Dec. 16 in an automobile accident near her home. She was 37.*

# Evolving

before our eyes



**Biologist Michael Kinnison studies contemporary evolution occurring at rates that would make Darwin dizzy**

**M**ICHAEL KINNISON doesn't expect sympathy from UMaine friends and colleagues when he describes the rigors of his fieldtrips to Trinidad.

Yes, it is a tropical island paradise. Yes, he sleeps in a hammock under the stars on verdant slopes near the Caribbean nation's north coast. Yes, there are colorful wild parrots and giant blue butterflies and prawn-like delicacies known as "river lobsters."

But did he mention dengue fever and mosquitoes? Fungus and foot rot? Flooding from jungle downpours? Poisonous snakes? Scorpions?

"Everything in Trinidad seems to bite," jokes the 33-year-old assistant professor of biological sciences. "In fact, you can get bitten by something different every day."

Not by guppies, however, and research into Trinidadian guppies (*Poecilia reticulata*) is the reason Kinnison travels regularly to the exotic locale off the coast of Venezuela. He plans to make three fieldtrips this year, funded by a







more than \$399,000, four-year National Science Foundation (NSF) grant.

It turns out that guppies — half-inch long, brightly colored inhabitants of jungle rivers in Trinidad — are one of the best model systems for research in an emerging discipline known as contemporary evolution, that is tapping the toolbox of modern genetics to cast new light on classical Darwinian theory and the role of “microevolution” in our world today. In so doing, they stand to rewrite our perceptions of evolution and perhaps even conservation strategies for endangered species like the Maine Atlantic salmon.

Brought to popular attention by the Pulitzer Prize-winning book, *The Beak of the Finch* (1994), contemporary evolution postulates that natural selection and other evolutionary processes are ongoing and observable in real time, not just frozen in the distant past, and that remarkable changes can occur within a decade or less in such well-documented subjects as guppies and Galapagos finches.

“The common perception of evolution is that it’s ancient history, on long time scales. Darwin doubted it was something you could ever directly witness,” says Kinnison. “But evolutionary history is being written every day.

We’re finding in these organisms with very short life cycles in the wild that evolution is something we can really measure.”

His path to the field of evolutionary biology began in his native Rochester, N.H., where he grew up fascinated by the worlds of water and fish. “Fly-fishing, boating, swimming — you’re always trying to imagine what’s going on beneath the surface,” he says. “In a way, that’s what I’m doing today in science.”

Kinnison’s Ph.D. research at the University of Washington was a study of contemporary microevolution using New Zealand chinook salmon. He has since authored or co-authored more than 25 scholarly publications.



It was his interest in aquatic ecology and cold-water fish such as salmon, trout and Arctic char that led Kinnison to the University of Maine in January 2002, after a two-year postdoc at Dartmouth College. He is still involved in UMaine-based research into wild salmon conservation and serves as a statewide representative for the Maine Atlantic Salmon Technical Advisory Committee.

The noisy political controversy surrounding the listing in November 2000 of wild salmon in eight Maine rivers for protection under the federal Endangered Species Act involved some of the same scientific questions that underlie Kinnison’s guppy research, such as how the intermixing of different populations of the same species affects adaptation and survival in a changing environment. Although there remains uncertainty about the degree of “wildness” among Maine salmon populations because of past stocking efforts and interbreeding, Kinnison supports the listing.



**Top photo: Pictured with two local guides are researchers Michael Kinnison (left), David Reznick (second from the left) and Andrew Hendry (second from the right), who, with colleague Paul Bentzen (not pictured), have spent the last three years conducting research on adaptation and gene flow in a remote jungle region in Trinidad.**

Photos by Andrew Hendry, Michael Kinnison and Nathan Millar



“The bottom line is whether the trait variation that exists in these salmon today is healthy and advantageous to their survival,” he says. “We need management strategies that take this into account. Should they be maintained as separate populations, or should some mixing be encouraged?” He describes trait variation as differences in characteristics, like egg and body size, and growth rate.

This microevolution of genetic trait variation is at the heart of his guppy studies, in particular a process known as “gene flow,” or simply the exchange of genes when different populations mix. Gene flow is often viewed as impeding adaptation of populations to different environments, but according to Kinnison “we actually know very little from an empirical

standpoint about the degree to which gene flow really limits most natural populations.”

“It is this uncertainty that has made it so difficult to judge the impact of historic stocking efforts in salmon or to evaluate the implications of human impacts on gene flow in many species of concern.”

And gene flow is what Kinnison is pursuing in steamy Trinidad, by looking at the very unendangered little *Poecilia* that populate waterways in a remote northern area between the towns of Arima and Blanchisseuse. The rivers he visits have colorful names like Marianne, Yarra, Aripo and Quare. One base camp borders the famous Asa Wright Nature Centre and is near the Simla estate, home of the late naturalist Charles William Beebe.

Kinnison and colleagues — including scientists from UMaine, McGill University, University of California, and Dalhousie University — usually hang their hammocks on the South Slope near Arima, then drive daily up and over the Northern Range mountains to arrive at the guppies’ habitat: short, narrow rivers that plunge from the heights over a series of “barrier” waterfalls, with lots of pools along the way for fish colonies.

“Below the falls, you have abundant predators; above the falls, few predators,” he says. “So we find that below, guppies are less bright. Above, you’ve got the full range of colors: orange, red, green, blue, black, silver. Below, they reproduce at a younger age. Above, they mature at a larger size and an older age.”

Gene flow kicks in, he explains, when guppies from above get swept into a lower pool. “Let’s say a bright-colored male arrives down below. Maybe the females go crazy and he passes on his genes, or maybe he gets eaten because he’s so visible,” says Kinnison. “What we actually see is that, right below the waterfall, guppies are more like the ones above, then

less and less as you get farther away. The low predation guppies thus appear to be getting their genes into the high predation population and we hope to measure the fitness implications of this.”

Using butterfly nets — “The local men all carry machetes, so they look at us kind of funny” — the researchers capture individual guppies to take measurements and “snip off a bit of fin for analysis, basically DNA fingerprinting,” he says. Part of his NSF-funded research involves artificially changing the rate of gene flow in the guppies to help quantify its evolutionary role in contemporary time.

Past studies, including research by David Reznick of the University of California at Riverside and by Princeton University’s Peter and Rosemary Grant, have shown that contemporary evolution can occur in guppies — and in Galapagos finches and some other species observed in isolated habitats — in less than a decade in response to environmental pressures and obeying the rules of Darwinian natural selection and sexual selection. When enough variation occurs that once-similar populations can no longer interbreed, a new species may be born.

“Microevolutionary processes can lead to big changes at rates never imagined in Darwin’s time, that’s the revelation here,” Kinnison says.

In addition to the guppy project in Trinidad and the conservation genetics work with Maine Atlantic salmon, he and his students are assessing trait variation among a dozen “relic” populations of Arctic char in various Maine lakes. His pride and joy is a newly constructed “guppy lab” in the basement of Murray Hall.

Kinnison also plans to develop a Web site to complement PBS’ “Sex and the Single Guppy” Web site, a popular tool that uses guppy research to teach evolution.

“This is exciting science that people should know about,” Kinnison says. “Evolution is not just paleontologists digging up fossils anymore.”

*Luther Young*



# HIGH ANXIETY

Research on panic disorders by UMaine psychologists focuses on susceptibility and treatment options



Illustrations by Heather Small

**A**NXIETY AND PANIC ARE normal. However, there are people whose anxiety and panic can rise to crippling levels of frequency and intensity.

Consider a person who becomes overcome by panic while driving on a dark stretch of forest-lined Route 11. She becomes so panic struck that she must turn around and head back home, despite being closer to her destination than her home.

Some people who experience panic attacks become acutely sensitized to the signs of an imminent attack. They can fear both the mounting signs of the attack and the attack itself. Paradoxically, their fear of an attack can insidiously feed the panic. This spiraling double-whammy of fear creates a self-fulfilling prophecy, bringing on the dreaded panic attack.

With an interest in panic disorders that reaches back more than a decade, researchers

at the University of Maine are trying to tease out the characteristics of those susceptible to panic disorders and “anxiety sensitivity,” the apprehension triggered by panic-attack symptoms. They also are trying to find out whether people who fit certain profiles are more amenable to less intensive therapy, thus lowering the cost of delivering treatment to rural residents.

Panic disorder, social phobia and agoraphobia (with or without panic) are diagnostic

categories of anxiety disorders. Social phobia is marked by intense anxiety about being embarrassed or incapacitated in front of large groups of people. "Someone with a social phobia would not be running for president," says Geoffrey Thorpe, a psychology professor at the University of Maine.

Agoraphobics fear going into public places alone, whether crowded or deserted. Those with panic disorder accompanied by agoraphobia fear that they will have a panic attack when they are far from home or help.

Roughly 3.5 percent of the population suffers from panic disorder, while agoraphobia affects about 5 percent.

Panic and anxiety are not abnormal, says Jeffrey Hecker, head of UMaine's Psychology Department. "We're hardwired to panic (to save ourselves). Anxiety also is normal because it prepares us for future danger and to be on guard."

However, those with panic disorders often misinterpret bodily sensations. The slightest hint of something amiss makes them believe there is something catastrophically wrong that will lead them to lose control of their minds or bodies, or to die.

"With phobias and fears, people become more narrowly vigilant about the cause of their fear," explains Sandy Sigmon, an associate professor of psychology and director of clinical training at the university. "In panic disorder, they are vigilant about their bodily sensations."

An excessively heightened vigilance is known as "anxiety sensitivity." If a person cannot find a plausible external explanation to unexpected bodily sensations, a "vicious cycle" of reinforcing and amplifying sensations and fears ensues, Thorpe says.

Thorpe once had a client whose first symptom of panic was feeling flushed in the face. One day she came into his hot office and suddenly felt flush. She immediately feared the onset of a panic attack. Only when Thorpe explained that the office thermostat was broken did her fear recede. Any time she felt flushed, "she would alarm herself," he says.

According to Hecker, people begin to look for danger cues when they are anxious. This anticipatory anxiety raises their tension level and makes the panic attack more likely.

ONE OF THE STRIKING facts about panic disorders is that roughly two-thirds of those afflicted are women. This made Sigmon curious to find out how women with panic disorder differentiate between the effects of their menstrual cycle and the symptoms they associate with a panic attack.

In a study published in 2000, Sigmon wrote, "The menstrual cycle may repre-

sent a regular opportunity for women with panic disorder to misinterpret ambiguous bodily sensations as threatening."

Sigmon says there was anecdotal evidence that women with panic disorder experienced more panic attacks in the pre-menstrual phase of the cycle. These women also tended to report more severe menstrual symptoms. Sigmon wondered if some women are able to discriminate between the sets of symptoms and whether this helps them to stave off a panic attack.

In the past few years, she has conducted a series of studies to find out. In the first study, she found that women with high anxiety sensitivity both reported more severe menstrual symptoms and greater changes in mood during the pre-menstrual phase, and responded with greater intensity to laboratory stimuli than a control group.

A second study found that women with high anxiety sensitivity reported more stereotypical beliefs about women's roles and more menstrual symptoms in general, regardless of the phase. These women also tended to pay more attention to their bodies during the cycle, and reported more physical sensations, and more severe ones, than a control group.

A third study revealed that during a "rumination task" — in which women contemplated their thoughts, emotions and physical sensations — those with high anxiety sensitivity were much more aroused and agitated than the control group.

In Sigmon's most recent research, women with panic disorder and a control group monitored all their physical sensations and feelings for 30 days. Daily, the women logged their feelings and recorded the severity. They also indicated what they thought was the cause.





"This is the part where I'm trying to figure out whether they discriminate between the sensations and whether that is helpful," says Sigmon, who is currently analyzing the data.

The goal of the treatment is to have the women learn that some physical sensations are not catastrophic. Preventing the onset of agitation, says Sigmon, may prevent the onslaught of panic.

**H**ECKER IS STUDYING ways to deliver more cost-effective treatment to people with panic disorder who are far from UMaine treatment and research programs, and professional therapists.

Hecker and Thorpe are co-authors of the 1992 book, *Agoraphobia and Panic: A Guide to Psychological Treatment*. After a tour through Maine shortly following the book's publication, Hecker began receiving calls from people who couldn't get to the university to participate in research studies, and who said therapists were few and far between in their areas. Hecker wondered to what degree self-help books might benefit these residents living in rural areas in the state.

He began a study in which one group seeking treatment was given workbooks on panic disorders, while another group underwent the standard treatment of seeing a thera-

pist. The people using the workbooks met with a therapist who guided them through the workbook, working with them "more like a coach or tutor than a therapist," Hecker says. However, this "self-directed" group only met with the therapist three times in a 12-week period, while members of the other group met with a therapist weekly.

He found that both treatments were equally effective. However, the workbook method was far less expensive. Compared to the standard course of treatment with a licensed psychologist, "we're delivering treatment through just a quarter of the visits," Hecker says.

Next, he set up another study with two conditions. In the first condition, participants were given the workbook and then met four times in small groups with a therapist. In the other condition, the researchers only used a single one-on-one meeting with a therapist, followed by three telephone calls to check on the participants' progress through the workbook.

Again, Hecker says, the research found no difference in the effectiveness of those treatments.

Now a third study is under way. The intervention used in this study is modeled on what could be done in a rural health clinic or with a family physician, according to Hecker. In this instance, someone with panic disorder would come into the office and be given the workbook, then would be shown a videotape that complements the workbook.

Hecker says he is trying to uncover the characteristics of those people who can really benefit from this "minimal therapist-contact" treatment and those who need a more intensive regimen.

One theory is that people with other psychological or personality disorders will need more than a workbook and telephone check-ups, Hecker says. "We're anticipating that (combinations of disorders) will indicate people who will need more intensive treatment," he says.

*Gordon Bonin*



# Primary source

Large libraries like Fogler have even bigger responsibilities in the digital age

Photo by Kenton Williams, with digital enhancement by UMaine Department of Public Affairs and Marketing



**J**IM FARRUGIA is not your average University of Maine graduate student or library patron. A librarian who used to work at Johns Hopkins University, he is researching his dissertation topic on logic-based formalisms for spatial information. To do that, he depends on UMaine's Fogler Library.

Farrugia, a Ph.D. student in the Department of Spatial Information Science and Engineering, taps into MathSciNet, a comprehensive database covering the past 64 years of the world's mathematical literature, and

ScienceDirect, a subscription-only source of research journals, abstract databases and reference works. He also uses WorldCat, one of the foremost bibliographic databases, which is licensed by Fogler. Two alerting services keep track of his research topic and send him e-mail when the newest pertinent papers are available.

For publications not accessible via Fogler or the Internet, Farrugia turns to the library's interlibrary loan service. Since arriving on campus nearly four years ago, he has requested hundreds of books and dozens of articles

related to his dissertation topic. If a book or publication is in print somewhere in the world, the odds are that the Fogler interlibrary loan staff can get it for him.

"Electronic access to databases lets me discover what resources exist," says Farrugia, who visits Fogler Library an average of five times a week. "Through it all, librarians help shorten the information retrieval times for a researcher or student, who then can grapple with the ideas rather than with the logistics of getting resources."



Photo by Kenton Williams

**R**aymond H. Fogler Library, Maine's largest research library, operates in the digital age, providing 24-hour access to resources whenever and wherever they are needed. In the early years, Fogler focused on building its campus-based print and microfilm collections, providing services to support the academic and research priorities of Maine's land-grant university, and to meet the needs of people throughout the state.

In the past decade, Fogler has taken the leadership role in the electronic networking of public and private libraries throughout Maine. The result is strength in numbers. The size of the library available to every citizen in the state has multiplied exponentially as patrons gain access to unlimited information resources in Maine and beyond. Fogler librarians are information specialists rather than generalists, guiding library users through the ever-changing world of digital information.

The University of Maine's digital library is poised to enter a new phase when \$52.9 million in funding is secured to construct an addition, to renovate the existing facility and expand the library annex. The improvements are indicative of the new role large libraries play today. Besides providing room for expansion and acquisition of collections, the new facility will be equipped with the latest information technology, as well as with the classrooms and specialists to teach patrons how to access resources. There also is a need to improve physical accessibility for library users.

Libraries are no longer solely about the bricks and mortar for housing books, but rather the state-of-the-art facilities and services needed to democratically provide everyone with access to information in the knowledge economy, says Joyce Rumery, UMaine's interim director of libraries. "As libraries provide access to more information services

and resources, they enhance the lifelong learning, economic growth, cultural and entertainment aspects people want in their daily lives."

**H**istorically, Fogler Library has always played a significant role in Maine because of its location at "the public's university," says Gary Nichols, Maine's state librarian, headquartered in Augusta.

"The public has always looked to the University of Maine for leadership in academic achievement and information," he says. "For years, Fogler Library and the Maine State Library have shared the responsibility to ensure that citizens in public libraries have access to collections statewide."

Fogler Library took the first steps into the digital age with the help of a bond issue. In the late 1980s, the referendum funded the creation of URSUS (University Resources Serving Users Statewide), an online catalog of holdings that included all University of Maine System libraries, then all libraries in the state, including legislative. And the cooperation didn't stop there.

Fogler's interlibrary loan service filled over 15,000 requests for materials held by other libraries that were requested by patrons, and loaned to other libraries more than 25,000 items from its 1 million holdings in the past year. Fogler also initiated the use of courier delivery, which is now used by all of the URSUS libraries.

Fogler has helped Maine libraries address one of the greatest challenges in the digital age — the price tag levied on information. Often the costs for access to information databases are prohibitive for individual libraries. Fogler has helped negotiate annual subscriptions to a number of commercial databases. Purchasing these databases allows them to be accessible via the Internet to people in Maine.

**"As libraries provide access to more information services and resources, they enhance the lifelong learning, economic growth, cultural and entertainment aspects people want in their daily lives."**

*Joyce Rumery*





UMaine's library, built in 1942, is named for alumnus Raymond H. Fogler, president of the department store chains Montgomery Ward and W.T. Grant, and an assistant secretary of the Navy during the Eisenhower administration.

Photo by David McLain

"Fogler is part of the backbone of the state's library community," says Barbara McDade, director of the Bangor Public Library. "Its leadership has meant that even the smallest communities have access to resources."

Per capita, Maine has more small community libraries run by volunteers than most states do. Nichols calls the library partnership between the university and the state a "remarkable achievement."

"We share philosophies, equal access and resources," says Nichols. "When we travel and tell others what we're doing in Maine, they're stunned. In most states, libraries develop inde-

pendent systems, but we're integrated into one, and that's pretty rare. Our scale — the number of libraries and open attitude of sharing by the leadership — works well for us."

Some of the first collaboratives among libraries in the United States date to the late 1960s, and most were in the Midwest. Elaine Albright's first job at the University of Illinois was to serve two cooperating libraries by tapping the resources of what was then the largest state university library in the country.

"The smaller libraries knew they needed the resources and couldn't afford them," says Albright, Fogler's long-time director of libraries

who ushered in URSUS and other digital innovations before retiring in 2003. "I started my career thinking clients' use of other libraries was very remote. Then I went to work for one of the first libraries in the country to work in partnership with others."

In those budding years of library automation and partnership, Albright was the human equivalent of today's computer search engine, researching the answers to queries and filling publication requests from other libraries. For eight years, she worked as part of the state-funded ILLINET, Illinois Information Network, gaining first-hand knowledge of the logistics and value of resource sharing between libraries. Before returning to her home state, Albright directed a multi-library cooperative in Illinois

serving 513,000 people in five counties.

"The state began to realize economic development benefits. The information access also allowed people to stay in their rural communities. While moderately state-funded at first, ILLINET grew into a model program with significant funding from the legislature," she says.

Having spent 17 years witnessing the empowerment of a rural state through its technologically linked libraries, Albright was prepared to sell the model to Maine. Her goal when she took the helm at Fogler in 1983 was to make the largest library in the state a service organization for more than just the campus.



Photos by Kathy Rice



Reference staffs at Fogler Library answer more than 35,000 questions a year, many in-depth research queries. An increasing number of reference questions are asked and answered via e-mail and Fogler's Ask-A-Librarian service.

Photo by Kathy Rice

In a recent survey commissioned by the University of Maine on the priorities of prospective students in New England, 89 percent of the respondents said that a library ranked among the top nationally is very important when considering college options.

Large libraries like Fogler have become sophisticated information centers for their states, directly affecting education and lifelong learning, economic development and quality of life. These libraries are important repositories of research and historical resources, and despite the technology, must operate in both the traditional and digital models of libraries.

"A common perception is that the more a library is digitized, the less room it needs," Nichols says. "While it makes sense to have research resources online and fragile historical materials digitized, we still have a tremendous amount in print, and will have for 100 years."

Fogler Library's collections include more than 2 million government documents and 1.4 million microform pieces. As a federal document depository, Fogler Library provides government information to Maine, Vermont and New Hampshire. The library is a Patent and Trademark Depository, and home to a nationally recognized Canadian Studies collec-

tion. Also found in the library are such valuable collections as the William S. Cohen Papers, the manuscript collection of Stephen King, and Maine-related archives, including those extensively documenting the state's forestry and agricultural history.

The library's annex holds most of the special collections, almost a third of the government documents, and portions of the bound journals and the circulating collections.

### **Fogler has helped Maine libraries to address one of the greatest challenges in the digital age — the price tag levied on information.**

While more library patrons than ever before are accessing information electronically, just as many know the value of opening books or resource materials. Bangor Public Library is a case in point.

Before its \$9 million expansion and renovation in 1998, Bangor Public Library had closed stacks and minimal electronic information resources. With the improvements, which included open stacks and new technology, circulation has increased 50 percent annually for the past six years.

"Technology is an enhancement to books," McDade says. "We're still early enough in the digital age that we need something permanent or we'll lose the knowledge we've gained."

In the past year, focus groups and discussions on campus have centered on plans for an expanded Fogler Library. Students and other users cite the need for group study areas and more seating, a portion of the library open 24 hours, and a library instructional facility. Faculty concerns include the library's static annual budget, which has caused cuts in staff, technology upgrades and acquisitions, especially in professional journals and monographs.

Public librarians call for Fogler to be the "last copy" center for the state — a repository of books or bound volumes within Maine's library network. Here, "last copies" would be held for access by any library in the state, freeing space in those smaller community libraries.

"When any library in the state expands, it shows the importance of libraries and it helps all of us in the state. If Fogler could expand and get more staff," McDade says, "it could only help Maine's library community with its resources and expertise."

*Margaret Nagle*

# Securing the home front

SEVERE

HIGH

ELEVATED

GUARDED

LOW

University of Maine expertise contributes to national homeland security efforts

**A**T A TIME OF AIRPORT JITTERS, nationwide terror alerts and snipers on rooftops during holiday events, University of Maine researchers are focusing their attention on new ways to keep Americans safe. The challenge is daunting, driven by anticipation of security risks in everything from the water we drink to the computer networks that operate critical facilities. Drawing from their expertise in information technology, chemistry, environmental monitoring and structural engineering, UMaine scientists and engineers are pushing our ability to detect threats early, gather information and give an advantage to those who are charged with maintaining vigilance.

# Securing the home front

## DECONTAMINATION

AMONG TOXIC nerve agents, VX may be the worst. An oily, odorless, amber-colored liquid, it can cause death by skin contact. It also can persist for days or months on surfaces. With support from a \$1.25 million grant from the U.S. Army, Howard Patterson of the UMaine Department of Chemistry is leading a research project to develop a device to detoxify VX.

If Patterson and his partners — Applied Thermal Sciences Inc., (ATS) in Sanford, Maine, and the Army's Edgewood Chemical Biological Center in Edgewood, Md. — are successful, their technology could be used to destroy VX chemical warfare stocks and decontaminate the scene of a VX release. Their approach depends on compounds known as zeolites, naturally occurring volcanic minerals. Cat litter is an example of a zeolite; engineers use these honeycombed minerals in industrial processes. The Army has already reported that, without light, VX can be broken down by zeolites that have silver ions in their molecular structure.

In his Aubert Hall lab, Patterson and graduate student researchers have found a way to speed up that process almost 100 fold. They reported in 2000 that silver-doped zeolites bathed in natural light can increase the rate of pesticide decomposition. They're also studying zeolite decomposition in other compounds, such as malathion.

With small concentrations (parts per million) of chemicals that simulate the VX molecular structure, researchers will focus on the basic science of VX decomposition, including the breakdown products and methods to achieve the shortest reaction time. ATS, founded by UMaine graduate Karl Hoose, will turn the results into an engineered device that will be tested at Edgewood. In addition, Patterson plans to hire two postdoctoral researchers who have an interest in commercializing the technology and producing devices in Maine.

## SENSORS

UMAINE CHEMIST Carl Tripp predicts that one day, emergency response personnel arriving at the scene of a toxic chemical spill will have a new life-saving tool at their side — a lightweight, portable device that can identify chemicals in the air or water within seconds.

Since 1998, Tripp has collaborated with other scientists and engineers at UMaine's Laboratory for Surface Science and Technology (LASST) on projects to develop such devices. Focusing on the fundamental properties of thin semiconducting metal oxide films, they create quarter-size sensor prototypes that are sensitive to toxic agents.

This winter, Tripp took another step forward by combining that



Photo by Michael York

Paul Millard of the Department of Chemical and Biological Engineering, right, is working with Mauricio Pereira da Cunha of the Department of Electrical and Computer Engineering, both also LASST scientists, to develop sensors that will detect pathogens such as *E. coli* and *Vibrio cholera* bacteria in aquatic environments. Their technology targets genetic material that is unique to each species. With National Science Foundation support, they are developing a new class of acoustic wave-based sensors that operate in water in combination with sensing surfaces that can recognize and bind specific target molecules.

knowledge with efforts to miniaturize a well-understood laboratory technique known as infrared spectroscopy. He is working with Paul Millard of the Department of Chemical and Biological Engineering. Their immediate goal is to address persistent non-volatile compounds, such as VX nerve agent, in water. His project, dubbed "Puddle in the Corner," has attracted a hefty pool — \$1 million — of U.S. Army research funds to develop the device.

The biggest problem with toxic compound-detecting sensors, says Tripp, is the high rate of false alarms. They can be set off by more than the agents they are designed to detect. The key to Tripp's technology is an adsorbent material that fits hand-in-glove with the molecular structures of toxic agents. The material concentrates and filters toxic compounds from water; the highly specific infrared spectrometer then identifies them and determines how much is present.

The next step is to integrate sampling protocols in a small instrument that will require little operator intervention. Tripp is working with ABB Inc., in Quebec to develop the miniaturized infrared spectrometer that he will combine with the sensor platform. Eventually, he hopes to establish a company to manufacture the portable units.

Meanwhile, other UMaine labs are pursuing different sensor technologies for similar purposes. In the Senator George J. Mitchell Center for Environmental and Watershed Research, John Peckenham and Steve Kahl are proposing a continuous monitoring system for lakes. Their project has drawn favorable review from water utilities.

## OCEAN WATCH

THE ROCKIER a coastline, the better, from Karl Schlenker's point of view. Schlenker is a member of the physical oceanography group in the School of Marine Sciences. He is installing a new network of stations in the Gulf of Maine that use a radar-like technology known as CODAR to gather information about currents and wave heights on the ocean surface.

Such information can assist rescue personnel, fishermen and other mariners by giving them a detailed look at sea conditions 24 hours a day, in all sorts of weather. CODAR is sold commercially by a West Coast firm, CODAR Ocean Sensors Inc. The stations, each equipped with a low-frequency transmitter and receiver, are designed to monitor waves and currents up to 124 miles from land. Five CODAR stations are currently planned as part of the regional system known as the Gulf of Maine Ocean Observing System (GoMOOS).

CODAR stations are currently installed in Penobscot Bay, Cape Cod and Nova Scotia. Additional facilities are planned for the Down East coast and southern Maine, according to Linda Mangum, research associate and GoMOOS data manager.

A network of CODAR stations could one day be used to track vessels on the high seas. Neal Pettigrew, UMaine oceanographer and chief scientist for GoMOOS, is working with colleagues at Rutgers University and CODAR Ocean Sensors to develop the technology into a round-the-clock tracking system for ocean vessels in America's coastal waters. To achieve the necessary coverage, antennae would be installed on the buoys and on land. Making practical use of CODAR data also would demand new interpretation and analysis capabilities, he says.

The researchers are looking at new buoy technology that would include better hull designs and an elastic tether to reduce tendencies for the buoys to pitch and roll. The current CODAR antennae are about 40 feet long, which makes them vulnerable to storm damage.

## SAFER CYBER NEIGHBORHOODS

THE TERM "cybersecurity" usually refers to the protection of computer networks from external attack. George Markowsky, UMaine computer scientist and mathematician, has reversed the concept. Networks like the Internet can be used to monitor potential threats to safety and security, he says. Moreover, new sensor systems can be combined with developing wireless communications and information technologies to enhance public safety.

Markowsky combines public and private sector research efforts to address security issues. He owns Trefoil Inc., a software company in Orono, Maine, and helped to establish the Multi-Sector Crisis Management Consortium ([www.msccmc.org](http://www.msccmc.org)), a nonprofit organization in the state that counts among its members the National Center for Supercomputing Applications and the University of Maine.

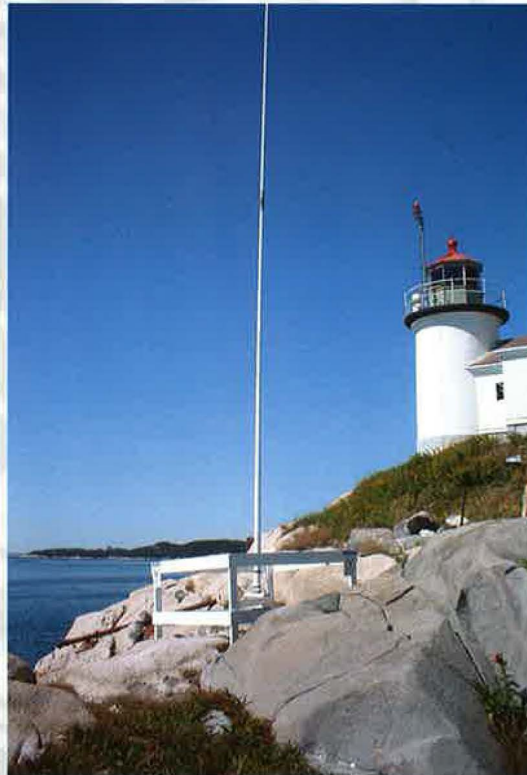
Markowsky also has created a homeland security laboratory in the Department of Computer Science and brought experts to campus to give presentations on issues such as weapons inspections, border policies and security precautions for marine commerce.

Techniques for monitoring the Internet for security threats are a goal of what Markowsky calls the Web Neighborhood Watch project in his laboratory. Gene Connolly, a computer science master's student who graduated in 2003, took a first step in that effort by developing

a method to find the geographic location of a computer based on Internet traffic and identification numbers that are unique to every machine.

Although unsuccessful in linking a computer to a street address or even a single community, Connolly demonstrated that "you can get in the ballpark."

"If people are going to use the Internet to make threats, they're also going to leave information about themselves," says Markowsky.



To be practical for homeland security, a system of antennae on buoys and on land needs to be easy to deploy and maintain. Current plans are to develop a working system in the Gulf of Maine, an ideal testing area with regular ship traffic to Portland, Maine; St. John, New Brunswick, and other ports. Oceanographer Neal Pettigrew envisions CODAR ship tracking systems maintaining vigilance along the entire U.S. coastline, possibly under Coast Guard supervision.

Photo by Karl Schlenker

## Securing the home front

### BETTER BUILDINGS

AS THE TRAGIC events of Sept. 11, 2001 showed, a building's structural resilience has life and death consequences for its inhabitants. Researchers at UMaine's Advanced Engineered Wood Composites (AEWC) Center are developing standards for tough new composite structures designed to withstand both terrorist-related and natural disasters. They are working with the military and government agencies, as well as private companies, on ways to apply new composite technologies to bridges, ships, buildings and other facilities.

One research project funded by the U.S. Navy focuses on composite panel performance and manufacturing. Engineers are testing commercially made panels in an effort to help industry make products for Navy ships that have consistent strength characteristics. For the Coast Guard, AEWG is working on new high-strength materials to replace aging piers, retaining walls and walkways.

Meanwhile, improvements to wood structures may benefit home construction. Analysis of structures damaged by storms, earthquakes and other disasters has found that weakness can exist where panels are attached to structural members. Graduate student Keith Martin is designing, building and testing panels of fiber-reinforced polymer materials that could be used in disaster-resistant housing.

### CROSSING THE BORDER

SECURING BORDERS is a top safety concern, but changing rules can have economic consequences. Understanding how evolving border policies are affecting businesses that ship goods across the U.S.-Canada border is a goal for Marie-Christine Therrien of the Maine Business School and Georges Tanguay of the Department of Economics. Both are affiliated with the Canadian-American Center at UMaine.

"We are interested in knowing if new regulations have led to more or less efficiency for firms exporting across the border," she says.

With a seed grant from the Canadian embassy, Therrien and Tanguay will interview officials at firms that participate in the estimated daily \$1.2 billion in trade between the two countries. They will seek information from about 150 companies in Canada and the U.S. in the next year.

Ultimately, they would like to take a broader look at border policies. "We will examine the choice of border policies aimed at reducing terrorism in an international context. The recent resurgence of terrorism and the resulting American war on terrorism have made border security an important policy issue in Canada," says Therrien.

The issues are of interest to government agencies as well as businesses, Therrien notes. Agencies need to share information about people and goods crossing the border. Analysis of events leading up to Sept. 11, 2001 has highlighted gaps in targeting potential security risks. For companies engaged in international trade, managers seek to minimize shipping delays and other factors that can affect product costs. Therrien and Tanguay are focusing on strategies for increasing trade while simultaneously improving security.

Therrien has proposed an expansion of the border security project with George Markowsky in the Department of Computer Science. She and Tanguay also are working with Habib Dagher, director of the Advanced Engineered Wood Composites Center at UMaine, on a proposal to the National Science Foundation to evaluate the reliability of the electric power grid in eastern Canada and the U.S. If funded, the project would incorporate vulnerability to terrorist threats, as well as structural and managerial approaches to hazard reduction.

*Nick Houtman*



Photo by Kathy Rice

High-tech anti-terrorism devices can suffer from a problem familiar to every cell phone user: low batteries. Whether it's a cell phone, an ocean buoy or a chemical warfare agent sensor array, portable devices need batteries. The technologies that store and generate power are critical elements that can determine the effectiveness of field-based homeland security systems. Bill DeSisto, assistant professor in the Department of Chemical and Biological Engineering, is working with a Connecticut company, Yardney/Lithion Technical Products Inc., maker of powerful batteries such as those on the Martian robots Spirit and Opportunity, to give battery technology a new charge. His goal is to increase the amount of energy that can be packed into a battery. The key to his research is a nanoparticle. Chemical reactions that generate electricity in a battery occur on the surfaces of such tiny particles. By making those particles smaller, battery makers can increase the amount of electricity stored and generated. However, chemical reactions on nanoparticles tend to occur too quickly; DeSisto hopes to find a way to control those reactions. He has received a nearly \$85,000 grant from NSF's Approaches to Combat Terrorism Program to develop a particle coating that will control the rate at which chemical reactions occur.

## Chemicals in the Landscape

UNIVERSITY OF MAINE graduate student Sarah Nelson has spent two summers scaling mountains and traversing streams in Acadia National Park in Bar Harbor, Maine, to analyze water samples to study how mercury and other chemicals accumulate in the landscape.

Now, with a \$78,000, three-year Canon National Park Science Scholarship,

**Sarah Nelson's thesis focused on the influence of water percolating through the tree canopy on the chemistry in streams.**

she will continue her research in the winter.

Nelson was one of eight student researchers awarded a Canon Scholarship to conduct environmental studies at national parks in North and South America. Nelson, who works in UMaine's Senator George J. Mitchell Center for Environmental and Watershed Research, will use the scholarship to analyze winter trends in watershed chemistry at Acadia National Park.

"The goal of the program is to train the next generation of conservation scientists," says Gary Machlis, University of Idaho professor and coordinator for the Canon National Parks Science Scholars Program. "We see these students as future leaders in conservation science."

Nelson's proposal was chosen from 140 applications and is the only 2003 project to be conducted in the United States. Other 2003 Canon scholars will be working in Canada, Argentina, Brazil, Peru and Mexico.

Nelson, who grew up in Berlin, Mass., became interested in environmental science after volunteering to monitor water quality in the Assabet River, which flows through Berlin.

In 2002, Nelson earned her master's degree and is working toward a Ph.D. in ecology and environmental sciences. She was part of a team working at Acadia to understand how mercury and nitrogen in streams and precipitation relate to the natural features and history of the landscape — national issues of concern to the National Park Service. In Acadia, the research effort focuses on watersheds on Cadillac Mountain and on Hadlock Brook.

Photo courtesy of Sarah Nelson



## Setting the Pace

**F**OUR YEARS AGO, Matthew Rodrigue came to the University of Maine to pursue his interests in technology and business, and to compete in Division I cross country.

The valedictorian and two-time All-American athlete from Farmington, Maine, ran cross country for the university his first year and started coursework for two degrees — one B.S. in computer engineering with a minor in business administration, and a second B.S. in electrical engineering with a minor in mathematics. Then he got involved in the many leadership development opportunities on campus.

"Through it all, there were common threads that complemented one another," says Rodrigue of his varied pursuits. "They all required focus, drive and work ethic."

Rodrigue left varsity competition as an America East runner-up to coach Orono High School's cross country team for the past three years. Concurrently, he was involved in Student Government, serving first as a student senator and senate president pro tempore, then last year as Student Government president.

And that was just the beginning. In September 2002, he was appointed by then Maine Gov. Angus King to the University of Maine System Board of Trustees. Rodrigue also served as president of UMaine's chapter of Sigma Phi Epsilon; last August, he was elected to the national fraternity's board of directors.

He has spent the last three summers in academic co-ops and internships in Maine, working at International Paper in Jay, then at Fairchild Semiconductor in South Portland, in the areas of process technology and device engineering.

Last year, Rodrigue was the UMaine Student Leader of the Year and a Rhodes Scholarship finalist. This summer, when Rodrigue completes his two degrees, he will take a year off before enrolling in law school to study intellectual property law.

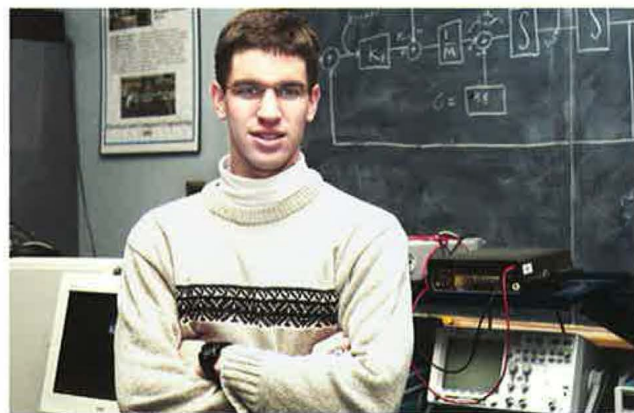


Photo by Kathy Rice



David Neivandt

## Understanding Protein Transport

**K**NOWING HOW PROTEINS and other compounds move across cell membranes can reveal important details about diseases, ranging from cancer to Alzheimer's disease.

Helping to find answers that could lead to better understanding of the biological process is University of Maine graduate student Andrew Doyle. Doyle is spending six months at the Institute of Physical Chemistry at the University of Heidelberg, Germany, with the research group of Michael Grunze, who directs the UMaine Institute of Molecular Biophysics. The team is studying the use of high-energy laser spectroscopy to probe fundamental questions about protein transport.

At UMaine, Doyle also works with Assistant Professor of Chemical Engineering David Neivandt, who is building a new generation laser spectrometer in his Jenness Hall laboratory.

Doyle's work is supported by the Pulp and Paper Foundation and a grant from the National Science Foundation for the UMaine Institute for Molecular Biophysics. Institute partners include the Maine Medical Center Research Institute in Portland and Jackson Laboratory in Bar Harbor.

## Grounded in Greatness

NINETEEN LANDSCAPE horticulture students at the University of Maine worked in the shadow of Olmsted Brothers designer Carl Rust Parker when they developed management plans for the grounds of the Maine governor's mansion, known as the Blaine House.

The suggestion to involve students was made by Blaine House Grounds Committee chairperson Becky Linney and Associate Professor of Landscape Architecture William

Mitchell, with support from Gov. John Baldacci and his wife, Karen.

For their senior capstone projects in the Landscape Horticulture Program, the students worked in six groups, each developing a management plan involving the latest techniques to use

"from the soil to the tops of the trees." History was a factor, because Blaine House gardens were designed by Parker in 1920.



Photo courtesy of the Maine Office of Tourism

**There is renewed interest in using the Olmsted gardens for public education and to showcase gardening in Maine.**

The Grounds Committee will select the best features of each plan to include in its final manual. The manual will guide future management decisions, such as native plant selection and location, and integrated pest management.

"The goal was to help the committee develop a manual of

proper horticulture standards to use in maintaining the grounds," Mitchell says. "There's renewed interest in using the Olmsted gardens for public education and to showcase gardening in Maine. (This way) whatever happens in the gardens is based on scientific information."



## The Future on Paper

DESPITE A ROCKY FEW YEARS for pulp and paper mills that resulted in shutdowns and layoffs, the industry is on the rebound, according to University of Maine Professor of Wood Science Robert Rice. And that's particularly good news for Maine's largest industry.

Since 1998, more than 250 paper machines have been idled across North America; 105 in 2001 alone. In the 1990s, more than \$255 billion in mergers and acquisitions occurred.

Nationwide in 2000 and 2002, the paper industry had its greatest drop in sales since the Depression, says Rice. "In the short term,

pulp and paper follows business cycles, which have been in a general downturn. But in the long term, the paper production levels follow trends in population."

Last year, the pulp and paper industry in Maine produced more than 5 million tons of paper, up substantially from the previous two years. The state now stands ready to benefit further. Maine has a highly skilled workforce; good-to-excellent forest resources; good access to major markets for paper; and reasonable environmental regulation, says Rice. In addition, state officials are knowledgeable about forest resource issues, and there's relatively good cooperation between industry and government.

To remain competitive, pulp and paper mills require reasonable energy expenses and labor costs, lower taxes on equipment and property, investment and updated technology, says Rice. In Maine, they also have to deal with changing age demographics.

Incentive packages, says Rice, and a concerted effort between manufacturers, timber suppliers and government, will keep Maine mills running and the U.S. pulp and paper industry competitive.



## Improve cognitive function, **reduce risk of stroke**

**P**ERSONAL HEALTH FACTORS that contribute to a higher risk of stroke also can lead to reduced cognitive functioning, according to a study published in the February issue of the journal *Stroke*, and highlighted at a meeting of the American Medical Association in New York.

A Framingham Heart Study research investigation led by Merrill “Pete” Elias of the University of Maine and Boston University has found that the more at-risk a person is for having a stroke within the next 10 years, the lower that person is likely to score on cognitive tests. Those tests include abstract reasoning, visual spatial planning, organization and concentration, scanning and tracking.

“Changes in cognitive function can be a very sensitive indicator of changes in the brain,” says Elias. “The bottom line is that people at higher risk for stroke perform less well on cognitive tests. The practical outcome is additional support for prevention of stroke risks in the first place, and then early intervention when changes in cognitive function are detected.”

The study is based on data from 2,175 participants of the Framingham Offspring Study (offspring of the Framingham Heart Study participants) who were free from stroke and dementia,

and had taken a battery of neuropsychological tests in a series of longitudinal examinations.

The subjects ranged in age from 33–88 years old; 54 percent were women.

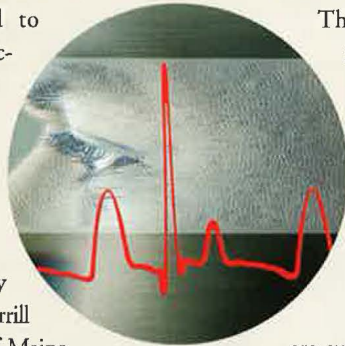
In addition, the data were controlled for other non-stroke risk factors that are associated with lower cognitive function, such as age, education, depressed mood and alcohol consumption.

The Framingham Heart Studies are supported by the National Heart, Lung, and Blood Institute and the National Institute on Aging.

The Framingham and other studies have established that factors such as smoking, high systolic blood pressure, diabetes, cardiovascular disease, atrial fibrillation and left ventricular hypertrophy increase the chances of having a stroke in 10 years. The risk factors are included as weighted predictors of stroke in the Framingham Stroke Risk Profile.

“It is important (to know) that it is possible to intervene at early stages of cognitive dysfunction, but prevention of stroke risk factors at as early an age as possible is the best strategy,” Elias says.

Since 1974, Elias has led the Maine-Syracuse Studies of Hypertension and Cognitive Functioning, designed to assess changes in mental functioning over time. He has been a Framingham Heart Study investigator since 1990.



### Field experience in **Honduras**

NEARLY 30 UNIVERSITY OF MAINE students headed to a warmer climate for spring break, but rest and relaxation were not on the agenda.

Students in a course, Field Work in Modern Languages, led by Professor of Spanish Kathleen March, went to Honduras, where some helped build an education center near San Pedro Sula. Others worked with the elderly, and in orphanages and schools in Santa Rosa de Copán. They were accompanied by other UMaine students who volunteered for the service-learning experience.

The travelers took with them items such as basic medical supplies, clothing, small toys and school materials.

The trip was coordinated by the university, the student organization REACH (Respect, Education, Action, Community and Hope) and the Maine chapter of Sustainable Harvest International (SHI). It demonstrated student dedication to being involved in international relief efforts and the university's support of diverse learning methods, March says.

In Maine, students Sarah Kennedy and Julia Monley lead SHI and REACH, respectively, and have participated in similar volunteer projects. Both worked in Nicaragua last year, where they helped to build a library at a small rural school with money raised by REACH.



Pictured left to right, Jan Dobrzelewski, Beth Wiemann and Stuart Marrs.

### Sounds of *Percussion and Violin*

SOME MAINE TEENAGERS followed the beat of a different drummer when Percussion Continents — percussionist Stuart Marrs and violinist Jan Dobrzelewski — presented “informances” at three high schools in February.

The performances were dubbed informances because they were “more than music,” says Marrs, a University of

Maine professor of music. “We played something they have never heard before, but we hope they will hear again in the future. The Marrs/Dobrzelewski duo commissioned these new works.”

The duo performed selected works for violin and percussion from six composers, including University of Maine composer Beth Wiemann. Marrs and Dobrzelewski, a Swiss conductor and violinist living in Costa Rica, also discussed the origins of the music and the dozens of percussion instruments Marrs uses in every performance.

Marrs and Dobrzelewski first collaborated in 1972 when both were in the National Symphony of Costa Rica. Their most recent CD is *Percussion Continents I*; they hope to produce *Percussion Continents II* in 2005 under the Swiss label AMIE in its “les Helvétiques” collection.



## Dairy's First Responders

A NEW DAIRY TASK FORCE Response Team at the University of Maine is supporting Maine dairy farmers trying to persevere in challenging economic times.

UMaine's Agricultural Center created the team to develop and deliver educational programs that dairy farmers need most. The recent Governor's Task Force on the Sustainability of the Dairy Industry in Maine identified the need for the university to provide a broad-based level of support in a wide variety of management areas.

The 10-member Dairy Task Force Response Team will include representatives from the university's research and public outreach divisions, including Cooperative Extension. They will work with the Maine Department of Agriculture, the Maine Dairy Industry Association and several agribusinesses.

A number of programs are already planned for this year: seminars in estate planning and transfer, and implementation of the dairy farm business summary for management accounting.

Team members are working with farmers on alternatives through the Farms for Maine's Future Program, implementing farm biosecurity and disease risk assessment to improve food safety, and supporting the growing organic dairy industry in Maine.

## Taking Inventory

**U**NDERSTANDING the characteristics of Maine's estuaries and bays has the potential to aid marine resource management. To compile such a marine inventory, coastal professionals are hoping to enlist the help of citizens.

Tracy Hart of University of Maine Marine Extension has teamed up with the Quebec Labrador Foundation/Atlantic Center for the Environment to



coordinate the development of a guidebook for citizens conducting marine inventories. Experts in marine-related issues in Maine are making recommendations on purposes and processes for such monitoring.

With the guidebook, people can provide pertinent new information about the areas' unique features, history, and physical, chemical, biological and geological attributes.



## A New Spud in Town

THE UNIVERSITY OF MAINE has licensed a new potato variety to the McCain Corp., for potential production as french fry and table stock. Known to researchers as potato 1753-16, the new spud was developed at UMaine's Aroostook Farm in Presque Isle, largely through the efforts of the late Alvin Reeves.

"This is an early-maturing variety," says Steve Reiling, director of the Maine Agricultural Center at UMaine. "It has good yield, high quality, and the right sugar content and specific gravity for french fry stock."

Propagation work remains to be done to generate enough seed potatoes for planting. Making the variety available to McCain will benefit Maine farmers, Reiling adds, since they won't have to pay royalties for planting it, as would farmers in other states.

Other promising potato varieties are being studied, Reiling says, under the guidance of Zenaida Ganga at the Aroostook Farm.

## Tree Fans Unite

**I**N ONE OF THE MOST heavily forested states in the country, there's now a club for tree lovers.

The Maine Tree Club is for people of all ages who want to learn about and identify the 50 kinds of coniferous and deciduous species around them. Each month, club participants receive mailings highlighting two species of Maine trees. They also receive a pocket guide to trees and the Maine Big Trees Register that lists the largest trees by species and their locations in the state.

Much of the knowledge gained by Maine



Tree Club members can be easily applied in their own yards and communities.

In addition, outings are scheduled throughout the state to get people into the woods

for practical, hands-on learning and enjoyment, says Richard Brzozowski, University of Maine Cooperative Extension educator. The outings are guided by experts and planned for the mountains, coastal regions and other parts of Maine.

Maine Tree Club is sponsored by UMaine Cooperative Extension, the Maine Forest Service and the Pine Tree Arboretum.

## LASTING IMPRESSION



In 2002, some of the women's studies graduates posed for a snapshot. These students, one from Nepal and the others from Maine, majored or minored in women's studies; one earned a master's degree in communication with a graduate concentration in women's studies. Now some are working in medical or social services. Two have careers in writing (one on the editorial staff at *Hope* magazine in Maine). Two have done graduate work abroad and are applying to law school.



**M**ORE THAN TWO DECADES AGO, the University of Maine sharpened its vision, taking steps toward establishing a “bifocal” curriculum — one that focuses on the contributions, perspectives, values and needs of women, as well as those of men. The Women in the Curriculum initiative, with its roots in equal opportunity and women’s development at the university, started providing educational resources and development opportunities for faculty in 1981.

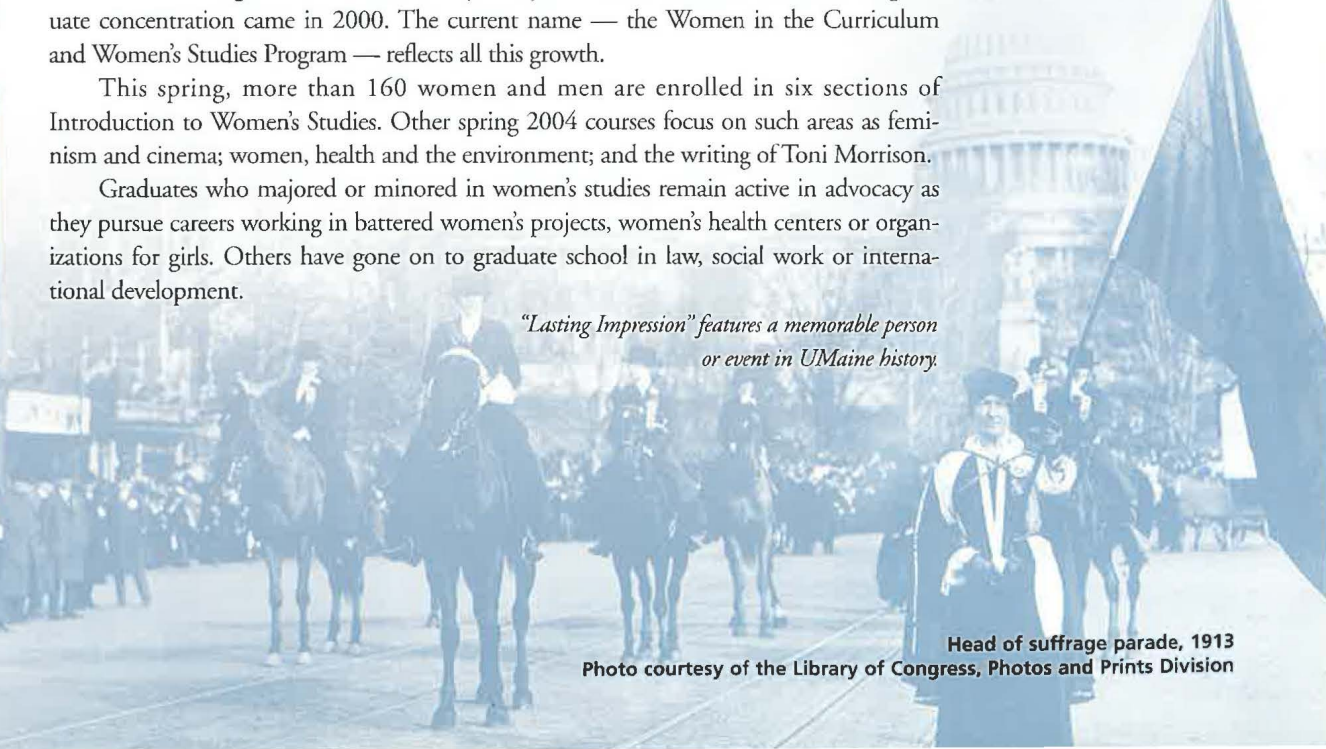
Since then, the program has publicly celebrated the achievements and history of women, not just in March during National Women’s History Month, but throughout the year. A weekly lecture series to stimulate community discourse and an annual awards program honoring outstanding Maine women — all open to the campus community and beyond — enhance the faculty development activities.

But perhaps the most far-reaching effect of such advocacy has been the establishment of an independent academic program in women’s studies. Courses with the WST designator and a minor began in 1989, followed by a major in 1998. Graduate courses and a graduate concentration came in 2000. The current name — the Women in the Curriculum and Women’s Studies Program — reflects all this growth.

This spring, more than 160 women and men are enrolled in six sections of Introduction to Women’s Studies. Other spring 2004 courses focus on such areas as feminism and cinema; women, health and the environment; and the writing of Toni Morrison.

Graduates who majored or minored in women’s studies remain active in advocacy as they pursue careers working in battered women’s projects, women’s health centers or organizations for girls. Others have gone on to graduate school in law, social work or international development.

*“Lasting Impression” features a memorable person or event in UMaine history.*



Head of suffrage parade, 1913  
Photo courtesy of the Library of Congress, Photos and Prints Division

**A** DECADE AGO, a celebration began at the Page Farm and Home Museum at the University of Maine to pay tribute to the state's agricultural heritage.

That celebration is still going on at the museum, which, thanks in part to a naming gift from Henry H. Page, is now home to an important Maine collection of farm tools and technologies of rural culture.

The more than 6,700 artifacts in the collection relating to the farms and farming communities of 1865–1940 range from antique kitchen utensils to a fully restored 1920 Model T Ford. Permanent exhibits highlight aspects of agricultural heritage, including animal husbandry, spinning, crops, food processing and ice harvesting.

Last year, approximately 7,000 visitors — half of whom were schoolchildren — toured the museum, curated by Patricia Henner.

The main building is a restored post-and-beam barn, built in 1863 before UMaine was founded. Thanks to a successful \$1 million fund-raising campaign, an endowment fund at the University of Maine Foundation provides a base budget for the museum's operation.

With assistance from benefactors, the Winston E. Pullen Carriage House was constructed last year next to the barn. Also sited near the barn as part of the museum are a blacksmith shop, a heritage garden and the Harold & Marion Chute Schoolhouse, a restored, one-room schoolhouse from Holden, Maine.

Such resources for education and research provide much more than a window to the past. By exploring conditions and philosophies in history, the museum offers suggestions for the future.



Photos by Toby Hollis



## Page Farm and Home Museum

UNIVERSITY of MAINE  
**FOUNDATION**

Two Alumni Place  
Orono, Maine 04469-5792  
207-581-5100 or 800-982-8503

[www.umainefoundation.org](http://www.umainefoundation.org)

100 Foden Road, Suite 303, W. Building  
South Portland, ME 04106  
207-253-5172 or 800-449-2629