

UMaine Today

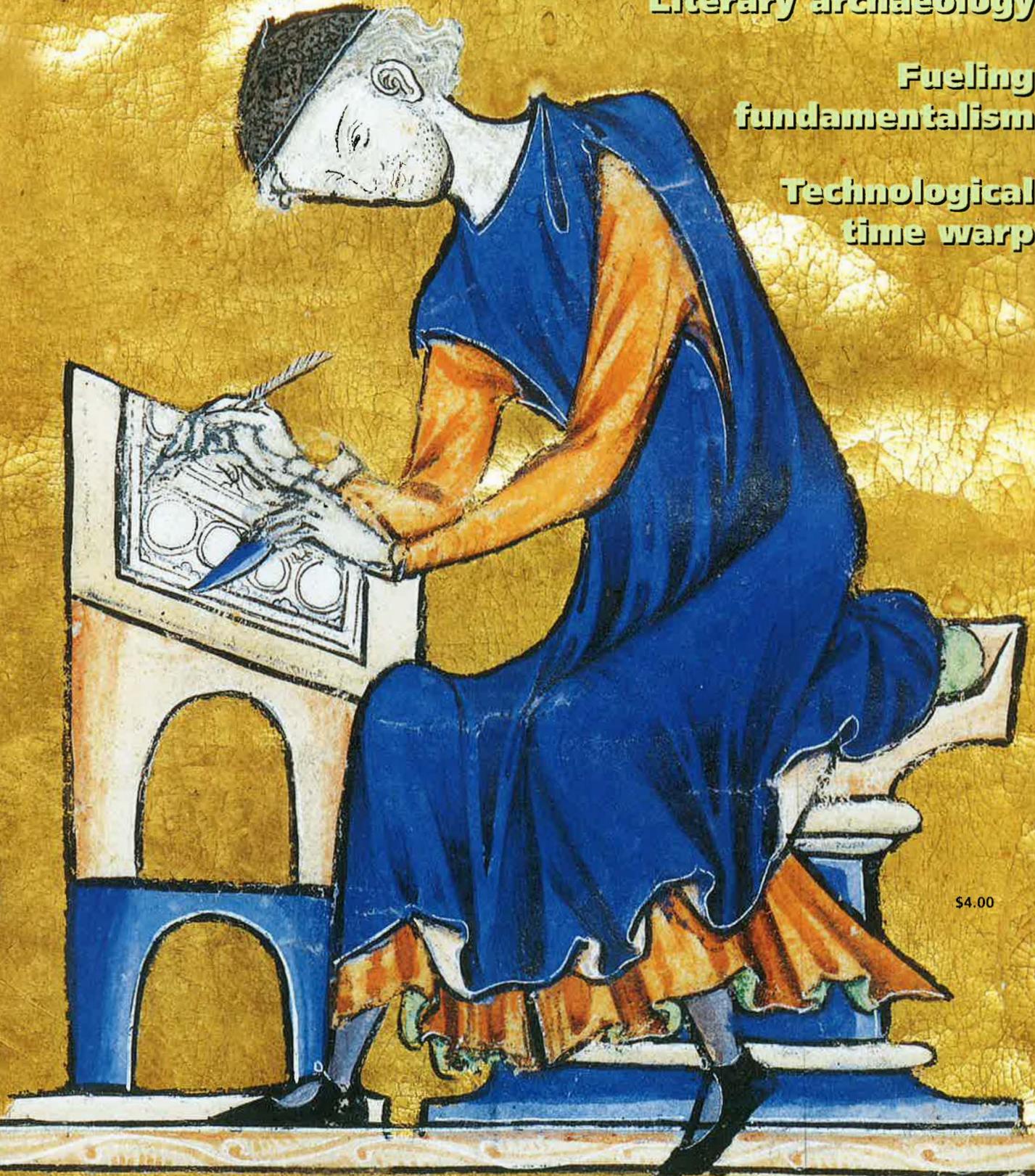
CREATIVITY AND ACHIEVEMENT AT THE UNIVERSITY OF MAINE

MARCH/APRIL 2003

Literary archaeology

**Fueling
fundamentalism**

**Technological
time warp**



\$4.00

From the President

ONE OF THE MANY distinctive features of the University of Maine is the year-round beauty of our campus. The natural Maine landscape is part of the university's identity and makes an important statement about UMaine's leadership role in environmental stewardship.

In our state and in venues throughout the world, UMaine scientists are conducting cutting-edge environmental research in such areas as climate change, wetlands ecology, marine resource management and forest ecosystems. As a modern land-grant university, UMaine has a responsibility to make conscious efforts to bring the resources and expertise at our institutions to bear on community, state, national and international problems.



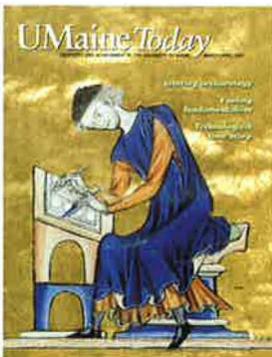
Photo by Warren Roos

Maine's flagship university also leads by example. UMaine is committed to maintaining a safe learning and working environment that truly respects and takes care of the natural landscape. Our focus is on operating, maintaining and developing UMaine's infrastructure and growth in a sustainable manner. Under our university-wide sustainability plan, we undertake environmentally sound practices, such as conserving water and energy, expanding campus recycling efforts, using public transportation, and developing green building and renovation standards, to name just a few. And we heighten awareness through education.

Responsible environmental behavior comes from understanding ecology — the fact that everything is connected to everything else, and that health and safety are imperative.

This academic year, the University of Maine is implementing an aggressive safety and environmental management program. We have reorganized and reassigned resources in several areas related to these important initiatives, and we have taken steps toward developing a campus culture that values our shared goal of ensuring that every student and employee is working safely and helping to reduce UMaine's environmental impact. The result will be that we meet our environmental regulatory obligations and then move beyond compliance to become leaders in stewardship of the environmental resources on which we all rely.

Peter S. Hoff
President



ON THE COVER: A scribe is one of the historical figures depicted in a circa 1230 manuscript from a moralized bible, part of the Medieval and Renaissance Manuscripts Collection of the Pierpont Morgan Library, New York, N.Y. The full folio (14³/₄ x 10¹/₄ inches) shows "Blanche of Castile and King Louis IX of France and Author Dictating to a Scribe." Medieval scribes and their manuscripts are the focus of research by University of Maine Professor of English Linne Mooney (story on page 15).

© The Pierpont Morgan Library, New York, MS M.240, f. 8



Peter S. Hoff, President

Robert A. Kennedy, Executive Vice President
and Provost

UMaine Today

Publisher

Jeffery N. Mills

Vice President for University Advancement

Created by the University of Maine
Department of Public Affairs
Joseph F. Carr, Acting Director

Executive Editor

Margaret Nagle

Contributing Writers and Associates

Carrie Bulduc, Joseph Carr,
Gladys Ganiel, Nick Houzman, Kay Hyatt,
Margaret Nagle, Chris Smith, Susan Young

Design, Photography and Production

Department of Marketing
Monique Mace-Hashey, Director

Designers

Michael Mardosa, Carol Nichols, Valerie Williams

Production Coordinator

Rick Winter

Readers are invited to send comments to:
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 four-year, 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 is a member of the University Research Magazine Association.

UMaine Today is produced six times a year by the Department of Public Affairs, 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: Evelyn Silver, 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.

Copyright © 2003 by the University of Maine System.

Printing and distribution of UMaine Today is underwritten by the University of Maine Foundation.

UMaine Today is printed on recycled paper.

2 **Losing Your Edge**

For the past quarter-century, University of Maine psychology researchers have studied how mental acuity in people diminishes with age. The study underscores the need to seek treatment for health problems that increase the odds of reduced mental function. It also demonstrates that loss of cognitive sharpness can occur long before old age.



5 **Fundamentalism in Conflict**

Militant fundamentalism has long been at the heart of conflict in the Mideast, according to two UMaine experts on the subject, historian Alex Grab and anthropologist Henry Munson. That's why today, it's more important than ever to understand extremism and the part the United States plays in it.



9 **Transforming Technology**

We hear it all the time: Technological advances are changing our lives like never before. But UMaine historian Howard Segal reminds us that technological advances changed society throughout the ages — and they didn't do it alone.



12 **Scientists at the Head of the Class**

UMaine students Ethan Perry and Deborah Perkins have gone to the ends of the Earth — Antarctica and the Arctic, respectively — to conduct research. This year as NSF Teaching Fellows, they and other university students are sharing their love of science with schoolchildren.

15 **Literary Archaeology**

Before the printing press revolutionized the literary world, medieval manuscripts were important documents of record. Now international scholars like Linne Mooney are using the latest technology to translate and understand the many layers of information found in Middle English manuscripts.



18 **The Nature of Value**

To develop sound land-use policies, UMaine resource economists are using formulas and models to align private and public interests in managing growth.



20



20 *student focus* 22 *insights*

Mechanical Whales

- Studying Climate at the South Pole
- Crude Calculations
- From Stump to Ship
- Older Adults RSVP
- Teaching Alternatives

- Monitoring the Birth of the Free Press
- Improving Katahdin
- What It Means to Get Old in the Woods
- 4-H and Veterans

*UMaine study highlights the health risks
that result in reduced mental function*

L O S I N G Y O U R E D G E

I**N A CONVERSATION, FORGETTING** a familiar name or fact can generate a chagrined smile and a chuckle — or frustration and concern. For most people, sporadic memory lapses are no more significant than a trip to the grocery store. We all forget things during the course of the day. But for others, more frequent memory lapses can be a symptom of something less benign.

Exactly how physical health affects mental functioning has been the subject of one of the longest-running research projects at the University of Maine — the Maine-Syracuse Studies of Hypertension and Cognitive Functioning. Founded in 1974 by Merrill “Pete” Elias, UMaine professor of psychology and epidemiology, and David Streeten of the State University of New York at Syracuse, the project has demonstrated an important correlation between mental and physical health: Two age-related health problems — untreated high blood pressure and diabetes — contribute to reductions in mental skills as we age.

The Maine-Syracuse Studies have been supported continuously by the National Institutes of Health (NIH), including most recently the National Heart, Lung and Blood Institute. The data collected by Elias, UMaine psychologist Michael Robbins and their colleagues provides a perspective on the long, slow slide from alert mental functioning that occurs as some people age.

Exactly how physical health affects mental functioning has been the subject of one of the longest-running research projects at the University of Maine — the Maine-Syracuse Studies of Hypertension and Cognitive Functioning.

In separate research with colleagues at Boston University, Elias also has shown that some changes in mental functioning can even signal the onset of Alzheimer's Disease, the most common form of dementia in the elderly.

Now, Elias, Robbins and other UMaine scientists are expanding their ongoing study of cognitive functioning. They are investigating a gene and a naturally occurring chemical in the body that may be associated with dementia, particularly Alzheimer's. They are focusing on what happens before the onset of major symptoms — before friends and family members notice that a loved one seems to be increasingly confused and forgetful.

Their findings may help scientists find treatments for mild reductions in mental skills — reductions that can be critical for people in high-risk professions — as well as the more debilitating conditions that rob people of their memories and their quality of life. Their study underscores the need for people to seek treatment for high blood pressure, diabetes and obesity, factors that make reduced mental function more likely. As yet, there is no medication that directly restores or maintains mental function, although pharmaceutical companies are conducting trials.

AS THE MEDIAN AGE of America's population rises, early detection and treatment of these conditions are becoming more critical. According to the Centers for Disease Control and Prevention, more Americans are now killed annually by Alzheimer's than by traffic accidents. An estimated 4 million Americans are thought to suffer from the disease; almost twice that many have some form of dementia. The number of the most vulnerable Americans, people over 85 years old, is expected to double by 2030.

The Maine-Syracuse project tracks the health and mental functioning of about 2,000 people in New York state and Maine. Some have moved to other states but continue to participate in regular checkups and tests.

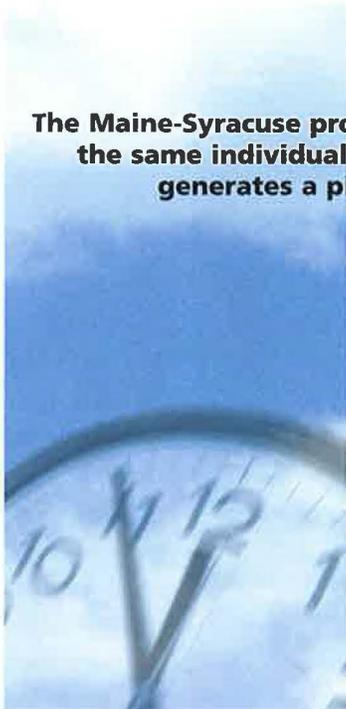
Every five years, the participants fill out detailed questionnaires on their diet and health, and undergo physical examinations and clinical tests when necessary. They complete an extensive series of rigorous cognitive tests of reasoning, and verbal, visual and memory skills. Each session takes more than three hours.

The data from 28 years of study clearly links high blood pressure and diabetes with a modest decline in mental functioning, says Elias. "We're not talking about stupid or smart. We're talking about individual changes in cognitive ability as a result of experiencing one of these risk

factors over a period of time," says Elias. "Hypertension and diabetes have insidious effects on cognitive functioning. If untreated, they eventually erode your ability to think and remember."

THE NEW EMPHASIS on factors related to dementia and Alzheimer's is the result of a five-year, \$2.3 million NIH grant. The goal is to study a gene known as APOE4 and homocysteine, a chemical that is produced naturally by the body.

The UMaine research team includes Penelope Elias, a Boston University psychologist who also holds a part-time position at UMaine; and Judith Deking and Suzanne Brennan, scientific and medical technicians, respectively, at Syracuse. Dr. Steven Scheinman of the State University of



The Maine-Syracuse project is unusual because it has followed the same individuals for so long. Such a longitudinal study generates a picture of how people change over time.

New York Upstate Medical University in Syracuse conducts the blood work and APOE4 genotyping.

Marc Budge, a geriatric physician at Oxford University in England, collaborates on the homocysteine analyses. Budge also works with the Oxford Project to Investigate Memory and Aging, which has conducted major studies of homocysteine, APOE4 and Alzheimer's.

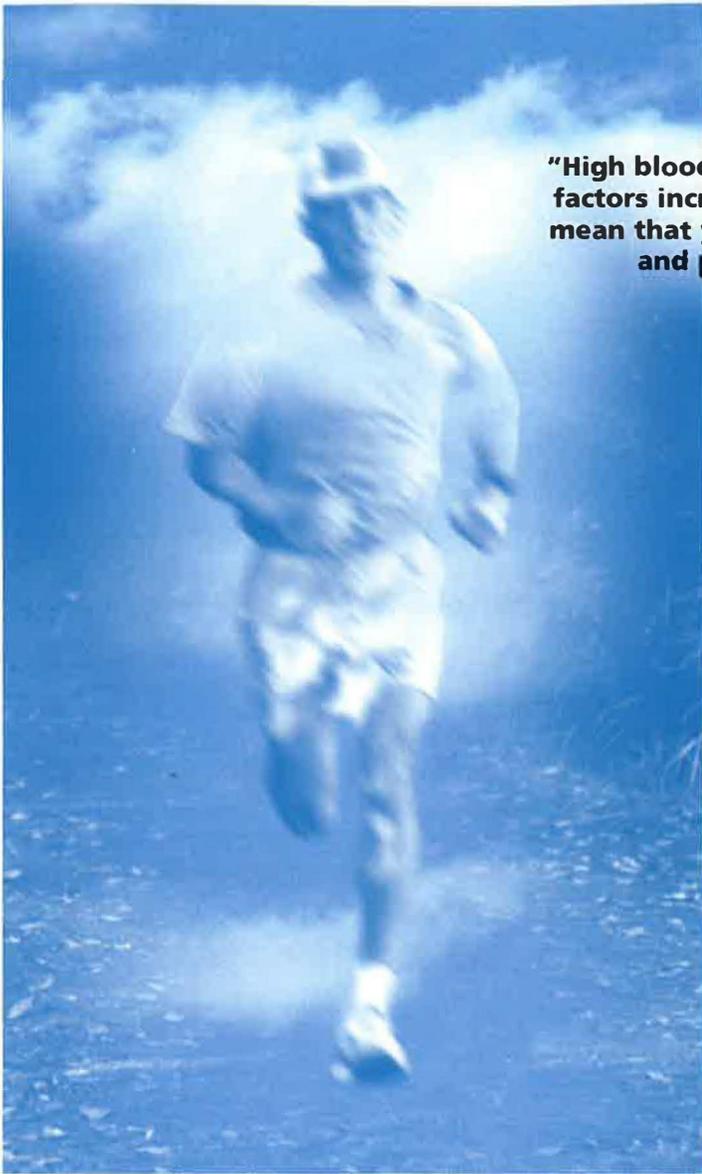
The Maine-Syracuse project is unusual because it has followed the same individuals for so long, notes Pete Elias. Such a longitudinal study generates a picture of how people change over time. It may be the only study in the country that has tracked changes in cognitive function in relation to blood

pressure status over such a long period for people with normal mental skills, he says.

Only now are some of those people starting to show signs of dementia. An important question, says Elias, is why a small portion of individuals develop dementia, while others show cognitive change over time but remain free of the disease.

"Once dementia is diagnosed, the risk factors and cognitive function become intertwined," says Elias. "The cause becomes more difficult to pinpoint. For example, is high blood pressure contributing to Alzheimer's or is it caused by Alzheimer's?" The same problem occurs with people who suffer from vascular dementia, which can be caused by visible strokes, as well as undiagnosed or so-called "silent strokes."

Evidence that a reduction in mental functioning might signal the eventual onset of dementia first came as a result of Elias' collaboration with the well-known Framingham Heart Study in Massachusetts.



“High blood pressure, obesity, high homocysteine and other risk factors increase the likelihood of mental decline, but they don’t mean that you will necessarily decline. Consequently, treatment and prevention are important. Intervention in the process of mental decline is possible.”

Pete Elias

IN THE LAST FEW YEARS, scientists have unraveled twists and turns in the chemical path that leads from normal brain function to Alzheimer’s. They also understand that the brain lesions caused by strokes are a significant cause of dementia. However, it’s still not clear what enables some people to stay sharp well into their 90s while mental confusion begins to rob others of their memories and reasoning abilities at a much younger age.

The APOE4 gene and elevated levels of homocysteine, says Elias, are now thought to be two of multiple factors that may predispose people to a higher risk of reduced mental skills or dementia.

“One of the things we’re interested in is the impact of these cumulative hits,” he says. “Say you have high blood pressure, high cholesterol, diabetes and the APOE4 gene, but I have only one of those factors. What’s your risk of lower cognitive performance relative to mine?”

Over the past year, Elias and his team have been re-testing the Maine-Syracuse Studies participants and collecting more health data. Blood samples are being analyzed for both the APOE4 gene and homocysteine levels.

“High blood pressure, obesity, high homocysteine and other risk factors increase the likelihood of mental decline,” says Elias, “but they don’t mean that you will necessarily decline. Consequently, treatment and prevention are important. Intervention in the process of mental decline is possible.”

The Maine-Syracuse data and other studies do show, in fact, that for some people, bringing blood pressure down from very high levels can improve mental skills. “The first line of defense is reducing long-term risk,” says Elias. “If you cut your fat and sugar intake, you would be addressing the prevention end of the equation. But there is evidence that treatment for high blood pressure and diabetes can improve cognition. It depends on the severity of those risk factors and how many of them you have.”

Treatments for high blood pressure and cardiovascular disease have multiplied in recent years, but many of those at risk are neither diagnosed nor successfully treated, Elias notes. “People take losses of cognitive functioning, even minor losses, very seriously, which is a reasonable concern in this competitive society. Thus, physicians can offer yet another incentive for adherence to prescriptions for prevention and treatment: reduce risk factors to preserve the highest possible mental function over the life span.”

Nick Hourman

Boston University, where he holds an appointment, is a center of Framingham data analysis.

When the Framingham project began in the 1950s, physicians did little to treat high blood pressure. In fact, it was thought to be important to sustain blood circulation in the brain. It wasn’t until the 1960s, when Framingham data started getting attention, that high blood pressure was understood to be a serious risk for heart disease and stroke.

In the mid-1970s, about a third of the 5,000 Framingham participants took a short but comprehensive battery of mental skills tests. In analyzing the results, Pete Elias found that individuals who performed poorly on those tests had higher blood pressure, despite many controls for treatment, age, education, occupation and other variables. Eventually, he and other Framingham scientists concluded that those with lower scores on the mental skills tests also had a higher risk of developing probable Alzheimer’s.

The changes in mental functioning detected by the cognitive skills tests can precede a diagnosis of probable Alzheimer’s by at least 10 years, they reported.



Mideast experts at the University of Maine look at the undercurrents of unrest and prospects for peace

Rather than a single dictator or weapons cache, the region's long-standing conflicts should be of concern to the American government, say two University of Maine professors with expertise on the region.

THE UNITED STATES again has the might of its military focused on the Middle East, this time on the premise of eliminating weapons of mass destruction in Iraq. When added to the ongoing tensions in the region, such intervention makes the prospects for peace in the Middle East seem distant, if not intangible.

Rather than a single dictator or weapons cache, the region's long-standing conflicts should be of concern to the American government, say two University of Maine professors with expertise on the region. The focus should be on the misery, despair and rage felt by many of the 200 million people who live in the Middle East. Such feelings give rise to militant fundamentalism, or extremism, which frequently advocates violence to achieve its goals. A primary goal of fundamentalist groups is ending foreign domination, most often by the United States.

Despite the downfall of the Taliban in Afghanistan and the dispersion of al Qaeda — the terrorist network behind the Sept. 11 attacks — fundamentalist groups are alive and well in the Middle East, says Henry Munson, chair of the UMaine Anthropology Department, who has written three books on Islam. There is a tendency to dismiss fundamentalists as “bigoted, hateful extremists” ready to shed blood based on religious ideals, Munson says. However, the militant Islamic groups — while they are



“If you want to defeat terrorism, you need to dilute the rage that fuels it. The United States, Israel and the governments of predominately Muslim countries of the world have a common interest in demonstrating to all Muslims that political moderation is not futile and that terrorism is.”
Henry Munson



Photo by Margaret Nagle

Further intensifying anti-American sentiments in the Middle East is the United States’ unequivocal support for Israel in its long-simmering conflict with the Palestinians. “This conflict exemplifies more than anything Arab impotence and frustration with U.S. policies,” says Grab. “Peace and stability will not be achieved in the Middle East as long as this dispute remains unsolved.”

Grab, who was born and grew up in Israel, and maintains dual U.S.-Israeli citizenship, has been an outspoken critic of that country’s 35-year occupation of the Palestinian territories. He is particularly critical of the Israeli settlement policy, which has established nearly 200 settlements with a population of 400,000 inhabitants on Palestinian land in the West Bank and Gaza Strip.

The absence of a peaceful solution has been disastrous for both the Palestinians and Israelis, says Grab, who spent a month in Israel earlier this year. Normal daily life for most Palestinians has become nearly impossible with Israeli roadblocks that impede their free movement, leading to rampant unemployment. Long curfews, massive arrests and destruction of property by the Israeli army also are commonplace. These desperate conditions have pushed young Palestinians to carry out numerous terrorist attacks in Israeli cities, murdering hundreds of Israeli civilians and causing much insecurity in Israel.

Israelis pay a heavy price in other ways as well. Ongoing violence has had adverse effects on the Israeli economy; tourism has plummeted and unemployment has been rising. Considerable amounts of money are invested in defending the settlements, leaving various programs in Israel without sufficient resources. The trampling of Palestinians’ human rights corrupts Israeli society and undermines Israeli democracy, says Grab.

While the American government has officially opposed the Israeli settlement policy, the U.S. has continued to support Israel economically, militarily and politically. Israel receives \$3 billion annually, making it the largest recipient of U.S. foreign aid for the last 30 years.

indeed bigoted, hateful and xenophobic — appeal to a broader swath of people who are angered by America’s dominance in Middle Eastern affairs and its perceived pro-Israel bias. These groups articulate a rage that is felt by many Middle Eastern Muslims with no sympathy for Islamic extremism per se, the professors say.

“I don’t believe there is a cultural war between Islam and the West,” says University of Maine Professor of History Alexander Grab. Most Muslims, including several million who live in the United States, are not fundamentalists and reject extremism.

However, in the Middle East, misery, despair, a sense of hopelessness and impotence fuel fundamentalism. The frustration is fed by the fact that much of the Muslim world is plagued by serious social and economic prob-

lems, is ruled by corrupt and undemocratic regimes, and is held in contempt by many in the West, Grab says.

ENDING ISRAELI-PALESTINIAN CONFLICT ESSENTIAL

AN IMPORTANT part of the appeal of fundamentalist movements is their strong opposition to intervention by and influence of foreign powers, especially the United States. Fundamentalists denounce the ties between Muslim regimes in countries like Saudi Arabia and Pakistan and the U.S. They are especially upset by the American military presence in these countries.

While the U.S. has not created Islamic fundamentalism, its imperialist policies and military presence have helped to galvanize that movement, Grab says.

For its part, Israel has been a staunch American ally, and has fully cooperated with and supported U.S. policies in the Middle East and other parts of the world. Clearly, the U.S. government has determined American interests in the Middle East will be better served by maintaining a powerful Israel rather than by helping Palestinians achieve their goals, says Grab.

Arab regimes also say they support the Palestinian cause but, in practice, do next to nothing to help them, he adds. Many Arabs despise their governments' inaction and corruption. Many also resent the double standard of U.S. policies, namely supporting Israel despite its long occupation of Palestinian lands while moving fast to dislodge Saddam Hussein's forces from Kuwait in the Gulf War in 1991.

In the current conflict with Iraq, Grab does not believe that Saddam Hussein's brutal dictatorship or possession of weapons of mass destruction sparked American plans to invade Iraq and change its government.

"Let's not forget that in the 1980s, the U.S. supported Saddam despite his brutality and use of gas, which killed thousands of Kurds," he says. "Then, however, Saddam was fighting against Iran, which was viewed by the American administration as a major threat to American hegemony in the Gulf area. When, in 1990, Saddam attacked Kuwait, a major U.S. ally, President (George H.) Bush denounced him as a Hitler and mobilized a huge coalition against him."

In Grab's opinion, what recently motivated the George W. Bush administration to prepare to invade Iraq was the wish to control huge oil reserves. Only Saudi Arabia possesses larger oil resources than Iraq. Moreover, by establishing a pro-American regime in Baghdad, the Bush administration aims at strengthening U.S. control over the Middle East. Finally, focusing on Iraq also distracts the American public from discussing economic problems, rising unemployment, and stock market scandals in the United States.

American leaders speak frequently about the U.S. as the leader of the free world and

about the need to spread democracy and justice. Indeed, Grab says, the U.S. should pursue those ideals in the Middle East and stop viewing the region simply as a source of cheap oil.

The U.S. should also cease its support — including arms sales — for corrupt dictators, remove its military bases in the region, support democratic movements, and work hard to bring about a peace agreement between Israelis and Palestinians. By pursuing such policies, the U.S. will gain much respect and admiration in that part of the world.

AMERICAN FOREIGN POLICY MUST ADDRESS THE RAGE

HENRY MUNSON'S anthropological perspective on American foreign policy differs somewhat from historian Grab's. He says it is perfectly natural for the United States to be concerned with maintaining the flow of oil from the Persian Gulf to the rest of the world. Munson does not accept the argument that American foreign policy toward Iraq is based primarily on the desire to control the country's oil supply, although he concedes that many Middle Eastern Muslims

believe this. He argues that the Bush administration's policy toward Iraq is based primarily on concerns about Saddam Hussein's possession of weapons of mass destruction.

However, Munson does agree with Grab that resolving the Palestinian-Israeli conflict is essential to peace in the region. He also agrees that the perception that the United States does not care about Arab or Muslim interests drives some to support militant Islamic groups.

"The Israeli-Palestinian conflict crystallizes the sense of hopelessness, despair, impotence and frustration that America can do nothing it wants to do and that the Arabs can do nothing about it," says Munson. "We need to dilute the despair and the rage that fuel fundamentalism and terrorism in the Middle East."

Resolving the Israeli-Palestinian conflict is a step in this direction. Munson notes that American commitment to Israel's security is a non-negotiable pillar of American policy, but enabling the Palestinians to create a viable state in which they can live their lives with dignity and security will, in fact, enhance rather than undermine Israel's security.

Munson contends that the U.S. must strengthen the moderates in the Middle East

In the Middle East, misery, despair, a sense of hopelessness and impotence fuel fundamentalism. The frustration is fed by the fact that much of the Muslim world is plagued by serious social and economic problems, is ruled by corrupt and undemocratic regimes, and is held in contempt by many in the West.
Alexander Grab

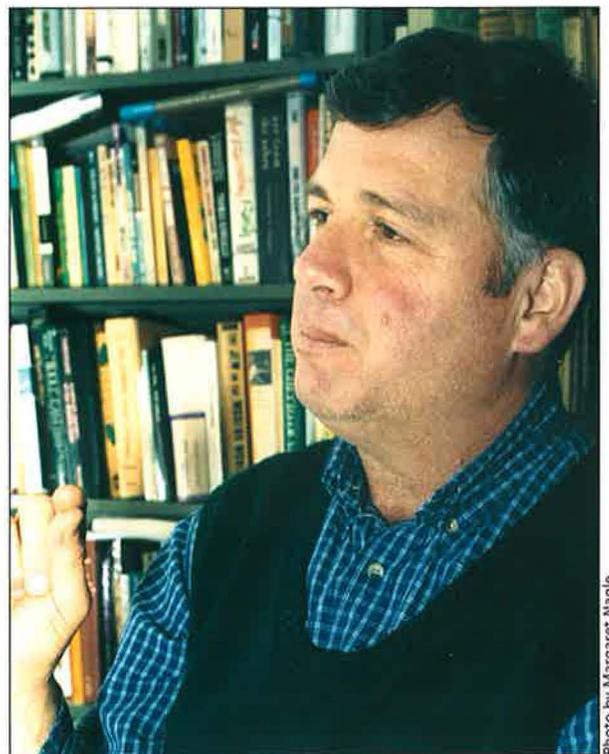


Photo by Margaret Nagle

so as to weaken the extremists. He suggests that American foreign policy often has had precisely the opposite effect.

“Making people’s lives unlivable,” he says, “is not an especially effective way of making them embrace moderation over militancy.”

Helping moderates does not mean installing handpicked governments loyal to American wishes, Munson warns. Such actions are widely viewed as imperialist. While many in the Middle East despise their brutal governments, this doesn’t mean they would support foreigners overthrowing these regimes.

The same thing could happen in Iraq. While it is important to ensure Saddam Hussein has not obtained nuclear weapons, a regime change raises serious problems.

“Replacing Saddam Hussein with an American-controlled regime runs the risk of stirring up tremendous nationalistic resentment,” Munson says, and it could be only a matter of time before terrorist attacks against U.S. forces begin.

He harkens to the Shi’ites of southern Lebanon who initially welcomed Israeli forces in 1982. But the welcome turned to rage when the Israeli army rounded up Shi’ite men, took over homes and disrupted a major religious holiday. Frustrated Shi’ites coalesced into the Hezbollah movement and the Israeli occupa-

tion engendered a far more lethal terrorism than the terrorism it was intended to eliminate.

Munson also points out that it was the presence of American troops in Saudi Arabia that triggered Osama bin Laden’s campaign of terror against the United States. As a rule, people do not like to see their countries occupied by foreign forces, he says. If they cannot

American policy in the Middle East should focus less on military force and more on addressing the grievances that induce Muslims to support extremists.

fight the foreign occupiers by conventional military means, they often resort to terror.

In addition to being more sensitive to nationalistic sentiments, the U.S. should focus more on economic development. Jobs and economic opportunities are critical in a region where the population is growing and vast numbers of young people are not employed.

Munson acknowledges that many terrorists come from well-to-do families and are motivated more by resentment of foreign domination than by poverty. However, economic stagnation in the Middle East creates a volatile situation that extremists can exploit.

As for the United States’ changing allegiances in the region, they make sense given the historical context, Munson says. It made sense to support Saddam Hussein in his fight against the revolutionary regime in Iran. It also made sense to support the mujahideen in Afghanistan as they tried to oust the Russian occupiers.

The problem came when the United States prematurely left Afghanistan before the country and its government were rebuilt.

Munson says that many Muslims contend that the difference between American policy toward Iraq and North Korea is based on American hostility toward Islam and indifference to Muslim deaths. This stance overlooks the fact that North Korea may already have nuclear weapons, whereas Iraq does not.

American policy in the Middle East should focus less on military force and more on addressing the grievances that induce Muslims to support extremists. “If you want to defeat terrorism, you need to dilute the rage that fuels it,” Munson says.

“The United States, Israel and the governments of predominantly Muslim countries of the world have a common interest in demonstrating to all Muslims that political moderation is not futile and that terrorism is.”

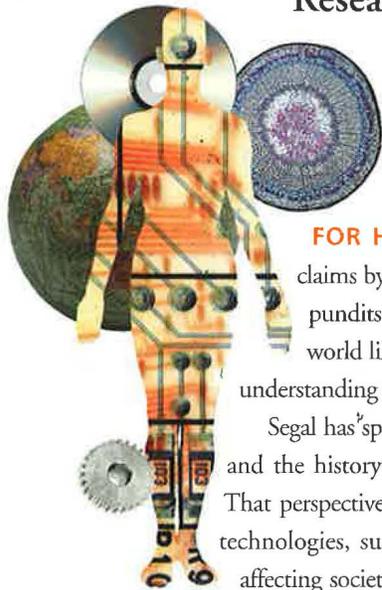
Susan Young



Ramallah, March 2002
AFP PHOTO/AWAD AWAD

Transforming Technology

Research by historian Howard Segal shows that the future is not — nor has it ever been — shaped by technological advances alone



FOR HISTORIAN HOWARD SEGAL, claims by today's high-tech gurus and political pundits that technology is transforming the world like never before are based on a lack of understanding of what the world was like before.

Segal has specialized in the history of technology and the history of science for more than 20 years. That perspective gives him insights into how today's technologies, such as the Web and computers, are affecting society in ways that are not so very different from the way railroads, telephones, electricity and assembly lines, for example, changed the world in earlier generations. However, he says, people today increasingly think of technology as more of a mixed blessing than, as in the past, a panacea for all of society's ills.

"If one believes countless newspapers and magazines, television and radio programs, and Web sites and Internet discussions, not only are endless high-tech advances all the rage, but those advances are rapidly transforming American society, and generally for the better. As these sources repeatedly insist, Americans have never seen so much technological change in so short a time and have rarely been so optimistic about the future. These repeated assertions are simply wrong," says Segal, the Adelaide and Alan Bird Professor of History at the University of Maine.

In addition, Segal says, these optimistic assertions are obscuring the need for reasoned debate about the type of technology that he believes is unprecedented in history: biotechnology.

Biotechnology encompasses a wide range of developments, from stem cell research and genetically modified foods to gene therapy and cloning. What distinguishes biotechnology from all prior technologies is that, at least in theory, it could literally change human nature. All prior technological advances, and all utopian visions based upon them, presumed the need to create effective means of improving — or tempering — human nature, which was generally conceded to be imperfect and incapable of eventual perfection (however defined).

"If you eventually have people being created in other than conventional means, it clearly raises all sorts of questions about morality and responsibility — along with possibly redefining gender roles in reproduction," Segal says.

In his research, Segal considers technological advances and their consequences for society, as well as people's attitudes about technology. Reasonably accurate public opinion polls did not exist before the 1940s, but Segal finds evidence about people's attitudes about technology in newspaper and magazine stories, editorials and letters to editors, speeches, sermons, worker and labor union publications, and historical, literary and travel writing. Particularly rich sources for Americans' hopes and fears about technology are utopian and science fiction literature.

SEGAL HAS PUBLISHED widely on these topics, including the books *Technological Utopianism in American Culture*; *Future Imperfect: The Mixed Blessings of Technology in America*; *Technology in America: A Brief History* (with Alan Marcus of Iowa State University); and the forthcoming *Recasting the Machine Age: Henry Ford's Village Industries*. He is currently working on *The Wave of the Future: High-Tech Utopias*.

"I'm not denying that the technological advances that are supposedly transforming the world are important. But shaping the world is a more complicated process than can be accounted for by these technologies alone," he says. "Pre-existing values, cultures, economies, social structures and political systems create the conditions for acceptance or rejection of new technologies. Moreover, the contemporary computerization of the world may have profound effects, but it is questionable whether the older transportation and communications advances — from canals to airplanes, telegraphs to electricity — were any less crucial in their day than these. Indeed, the recollections of countless Americans who lived through these earlier technological developments invariably emphasize the sense of momentous change in their lives and their communities over a mere decade or two."

However, Segal says, earlier generations' attitudes about technology were more likely to be uncritically positive than they are today. Historically, most Americans assumed that technological advance equaled social progress and, ultimately, a better world. With great fanfare, Americans marked the anniversaries of events such as the building of the transcontinental railroad, the linking of the telephone from the East to West coasts, the construction of the Brooklyn Bridge, and the production of the first Ford Model T.

"Pre-existing values, cultures, economies, social structures and political systems create the conditions for acceptance or rejection of new technologies."

Howard Segal



Illustration by Michael Mardosa

The high watermark of American faith in technology was the landing of a man on the moon, Segal says.

“When Kennedy in 1961 committed the United States to landing an American on the moon, there was a pervasive national sense that it would be worth it, whatever the cost. There were a lot of simple assertions that this event would transform the world, bringing peoples and nations together. But once Neil Armstrong, Michael Collins and Buzz Aldrin landed on the moon, and the world wasn’t transformed in the years after, there was a predictable sense of ‘where do we go from here?’”

“It’s instructive to consider the celebrations of the 25th anniversary of the moon landing. They were much more subdued than those earlier celebrations of other technological achievements, and there was almost an indifference, or disappointment, that it wasn’t the transformative event it was supposed to have been,” Segal says.

Major factors that have contributed to Americans’ growing skepticism about technology are technology-related environmental crises, repeated disappointments over nuclear power and other alleged technological panaceas, and distrust of both public officials and technical experts growing out of the Vietnam War and the Watergate scandal, Segal says.

But the increasing mistrust doesn’t mean that people have never had their doubts about technology, or, more specifically, the ability to harness it.

For Segal, these concerns are reflected in Mary Shelley’s *Frankenstein* (1818). While scholars have often interpreted the book as a wholesale condemnation of the advance of science, Segal argues that it is rather a cautionary tale against pursuing scientific objectives without regard for their moral consequences. As such, the book’s message is ever more timely today as society confronts the moral dilemmas posed by biotechnology.

In an article in a recent issue of the international journal *Nature*, Segal writes that “what actually troubles Shelley about the scientist Victor Frankenstein is not so much his quest to discover the cause of ‘generation and life’ but rather the secretive, self-centered and finally self-destructive manner in which he pursues this primitive form of physiological engineering. . . . As Shelley understood, a truly mad scientist might escape moral responsibility for his actions.”

Today, when the prospect of creating human life in the laboratory has moved from the realm of fantasy to that of possibility or even probability, it’s more important than ever to keep scientific and technological experiments open to external scrutiny.

“The big issue is who makes the decisions about the way biotechnology advances. The people, or elected officials, may not have the expertise to make informed decisions. And the experts may have biases, depending on their sources for funding,” Segal says.

ACCORDING TO SEGAL, it’s up to us to recognize how complex and difficult a relationship technology has with society, and to seek to understand its consequences — both good and bad — instead of waiting to be delivered by technology.

“Simple-minded assertions that technology is transforming the world give a false assurance that we can look into a technological crystal ball and everything in the future will be all right. In the case of biotechnology, it’s such a difficult issue that it could be tempting for people to seek easy answers, and let others take the burden and make the decisions.



“People should try and stay in touch with the developments in biotechnology, know what’s going on, and communicate with their elected officials, if necessary,” Segal says. Thanks to the Internet and the much-vaunted unprecedented access to knowledge, this is hardly as challenging as it otherwise might have been.

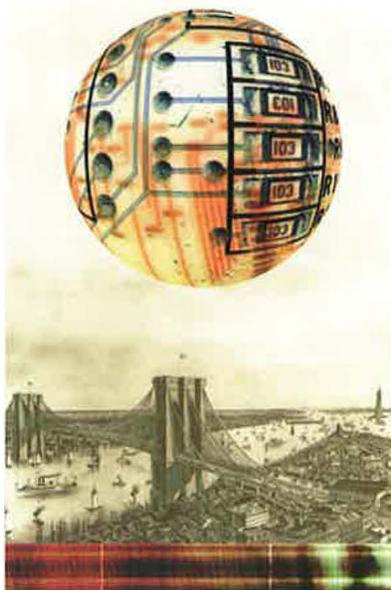
Americans’ increasing skepticism about all forms of technology could provide a solid foundation for building the safeguards that would keep biotechnology in check. Segal says that those skeptical attitudes were reinforced after Sept. 11, 2001.

“Notwithstanding the inevitable post-Sept. 11 stress on developing new technological devices for combating terrorism, one has not seen the grass-roots love affair with high-tech weapons that was so apparent as recently as the 1991 Persian Gulf War. Investigations after that war into the actual performance of military technology eventually demonstrated a gap between rhetoric and reality. In the case of Sept. 11, conflicting ideologies, not technology — be it primitive knives and box cutters or modern airplanes — would eventually be deemed the principal culprit,” Segal says.

Genuine progress is linked not to the latest technology, but to Americans’ more nuanced conceptions of technology’s value and limitations, he says. “Those Americans who are not seduced by questionable prophecies and shallow sound bites are beginning to understand that there’s a profound difference between technology as a means to an end and an end in itself. It’s not stark pessimism, but rather a healthy skepticism about unadulterated technological advance.”

Gladys Ganiel

“Simple-minded assertions that technology is transforming the world give a false assurance that we can look into a technological crystal ball and everything in the future will be all right.”



Scientists *at* *the* Head of the Class

With NSF funding, some of UMaine's leading student researchers are taking their enthusiasm for science into public schools

CLAD IN A LARGE red parka, black snow pants and giant blue boots, University of Maine senior Ethan Perry faces a flurry of questions from a dozen squirming third graders when he strides into their classroom at the Herbert Gray School in Old Town, Maine. A life-size inflatable emperor penguin is tucked under his arm.

His oversize footgear sparks the most interest. "Will it hurt if I step on your foot?" asks one boy. Probably not, Perry answers with a grin. "Are they heavy?" No, pretty hollow. "Why are they so big?" To accommodate layers of socks and boot liners. "Why are they blue?" Don't know.

"Did you see penguins?" queries another student. Yes, lots of them, but no emperor penguins. "Did you pet them?" No, they're too skittish. "Did you slide on your



Photos left to right: NSF Teaching Fellow Ethan Perry talks with third graders at Herbert Gray School in Old Town about the basics needed for a field trip in 2001 as part of a survey of vertebrates, fourth graders at Lewis and Clark Middle School in Milford studied bird specimens from UMaine with Rick Gordon (not shown), a lesson on composting and food safety, Pameka Harris shows first graders at Helen Dunn School in Greenbush how to make "dirt dessert"; and Ethan Perry shows eighth graders at Indian Island School in Old Town with their research.

belly like a penguin?" Not exactly, Perry says, launching into a story about sliding down ice fields on a shovel.

The rampant curiosity is precisely the response the geology major from Ashland, Maine, hoped to elicit with the cold-weather getup, courtesy of a trip to Antarctica he made with other UMaine researchers in spring 2001.

"I want to make the students aware that scientists can go and do things that are both fun and important from a research point of view," Perry says of his teaching. "Being a role model is as important as providing scientific information."

Soon Perry has the students planning their own trips to Antarctica. They decide what they will study, how they will get to the ice-covered continent and what "essentials" to take with them. The youngsters decide DVD players and penguin food are among the must-have items.

"He's very fun. I like the experiments we do with him," says 8-year-old Sam Peabody. His favorite activity with Perry was a fieldtrip to Schoodic Point, a scenic rocky outcropping on the Maine coast that is part of Acadia National Park, where students mapped geologic features and surveyed tidal pools.

SPARKING STUDENTS' INTEREST

SUCH EXCITEMENT, curiosity and personal interaction between university and K-12 students is the whole point behind the National Science Foundation Graduate Teaching Fellows program. The national initiative supports the studies of university science students while improving K-12 science education and

strengthening the bonds between universities and local schools. It especially hopes to encourage more K-12 students to pursue science as a career by providing them with young working scientists as role models.

This year, Perry is one of 12 NSF Teaching Fellows at the University of Maine — young scientists who are reaching thousands of students at elementary, middle and high schools in local communities. (In addition, a dozen NSF Teaching Fellows in a new program in the College of Engineering use UMaine sensor research for lessons at Bangor High School.)

Strong partnerships between the university and K-12 districts are formed because fellows and teachers work regularly and collaboratively with scientists at the university. The program helps students and teachers meet the specified goals of Maine's Learning Results statewide education standards by sharing information and new research in areas related to science and technology, such as chemistry, molecular biology, geology and mathematics.

The program achieves its goals and more, says Sandy Daniel, the teacher of the third grade class at the Herbert Gray School. "He sparks their interest and makes them learn more," Daniel says of Perry's time in her classroom. "He motivates them."

The Teaching Fellows program was started at UMaine three years ago with a \$1.3 million NSF grant. UMaine was one of 20 successful applicants out of 170 colleges and universities nationwide that applied.



rd graders at
o to Antarctica; in
by School in
t pictured); as part
ourth graders at
brah Perkins helps
rch reports.



Photos by Margaret Nagle

The grant was recently renewed and enlarged. Gov. John Baldacci was on hand to announce that UMaine had received \$1.5 million to continue and expand the Teaching Fellows program through 2006. The additional money means more school districts can participate and as many as 10,000 students will benefit.

SHARING THE EXCITEMENT

THE INITIATIVE to bring the program to the University of Maine was spearheaded by Susan Brawley, a marine sciences professor. Other UMaine faculty members who oversee the fellows are Barbara Cole, chemistry; Susan Hunter, biological sciences; Stephen Norton, geology; and Michael Vayda, biochemistry, microbiology and molecular biology.

"I decided by the fourth grade to be a scientist because I got so jazzed by seeing things under a microscope," Brawley says. "It's exciting to let these students at the cutting edge of their disciplines take their enthusiasm for science to our public school classrooms."

In addition to putting university students in classrooms, the NSF grant money allows UMaine to share scientific equipment with local schools. For example, although Maine's K-12 Learning Results education standards require that students begin to use microscopes by fourth grade, few elementary schools regularly visited by the Teaching Fellows had them, and they were not of high quality, Brawley says. The UMaine program provides a cost-effective means for many districts to share expensive equipment that few could budget alone.

"One thing this program does is offer an opportunity for success," says David Ploch, a science teacher at Old Town High School. With equipment from the university, his students are now able to extract and analyze their own DNA, which is more interesting than studying the genetic material from an onion as they did before the NSF program.

The NSF money also allows fellows to take their classes on fieldtrips, a luxury foregone by many cash-strapped schools. While Maine's coastline is legendary, some children had never visited the ocean until they took an NSF-sponsored fieldtrip. Once at the ocean's edge, they did fieldwork, such as quantifying different species of animals and algae.

Professional development opportunities are available through the NSF program, including funding for travel by K-12 teachers and the fellows who work in their classes. Last summer, two teams of public school teachers and UMaine students were in Kenya banding birds in a United Nations biosphere reserve, and teaching classes and seminars with Kenyan teachers and their students.

Another teacher and NSF fellow traveled to Japan. There, they worked with a leading expert on "red tides," the harmful algae that can shut down shellfish harvesting along coastal waters. Their visit also motivated educational exchanges between the University of Tokyo faculty and a local high school.

Back in Maine, the educators and Teaching Fellows incorporated their experiences abroad into lessons for their students.



Deborah Perkins' science lessons at Indian Island School dovetail with Maine's laptop initiative, which provides computers to all seventh and eighth graders in the state.

EXPECTING THE BEST

NSF FELLOWSHIPS augment available funding for outstanding graduate students and allow them to undertake more independent research projects. For example, master's degree student Deborah Perkins from Cumberland, Maine, is studying ruddy turnstones, a migratory shorebird that summers in the Arctic. Through her own grant writing, she secured funds to cover the extensive travel and operational costs related to Arctic fieldwork last summer. The NSF fellowship allows Perkins to fully focus on her scientific study and to work closely with her faculty research advisor without having to secure funding for tuition and a stipend.

In the classroom, Perkins hopes to inspire young women to follow in her footsteps, which have crisscrossed the country from Tennessee to Montana to Alaska, mostly in pursuit of bears. Her interests shifted to migratory birds shortly before she came to UMaine in 2001.

"I have given talks to high school students about my bear work. The girls are so amazed because it is so atypical," she says.

The benefits of the NSF Teaching Fellows program reach far beyond the classroom, says educator Pam Kimball, who first participated as the curriculum coordinator for School Union 90. Students benefit by learning from and being inspired by real scientists. Teachers benefit by being exposed to the latest scientific knowledge.

In addition, the program raises academic standards by encouraging students to tackle complicated scientific problems with the belief that they can solve them, says Kimball, now the principal of two elementary schools in Brewer, Maine.

Because of the NSF program, Kimball says, "we will have more scientists and engineers leave our schools."

Susan Young

More information about UMaine's NSF Teaching Fellows program is on the Web www.umaine.edu/NSFGK-12/

Literary Archaeology

Medieval literature scholar is bringing
the words of the Middle Ages into the 21st century



Photo by Toby Hollis

IMAGINE DISCOVERING a new world, finding facts that could rewrite history or reading pages of text last perused six centuries ago. Such revelations are possible not as a result of an archaeological dig, an expedition to the hinterlands or a dive 2,000 leagues beneath the sea, but by “reading” done in libraries in England by University of Maine Professor of English Linne Mooney.

She says it’s like being a literary archaeologist.

“I go back to the primary materials, sifting through medieval manuscripts like tons of sand

to find a text that gives information about the literature, history and social background during Chaucer’s time,” she says. “It’s painstaking work.”

Mooney has a window on life and thought in medieval England that is rarely found in history books. It is based on interpreting and translating Middle English as it was written and spoken between 1350–1500.

“It’s amazing the number of manuscripts that no one has looked at,” Mooney says. “Primarily, Middle English scholarship has

Linne Mooney is using computer technology in manuscript research, undertaking projects that soon will make medieval scribes and their verses available to an online audience.

"I go back to the primary materials, sifting through medieval manuscripts like tons of sand to find a text that gives information about the literature, history and social background during Chaucer's time. It's painstaking work."

Linne Mooney

Cambridge, Trinity College MS. R.3.21, f. 249.
Reproduced by permission of the Master and Fellows of Trinity College, Cambridge, England

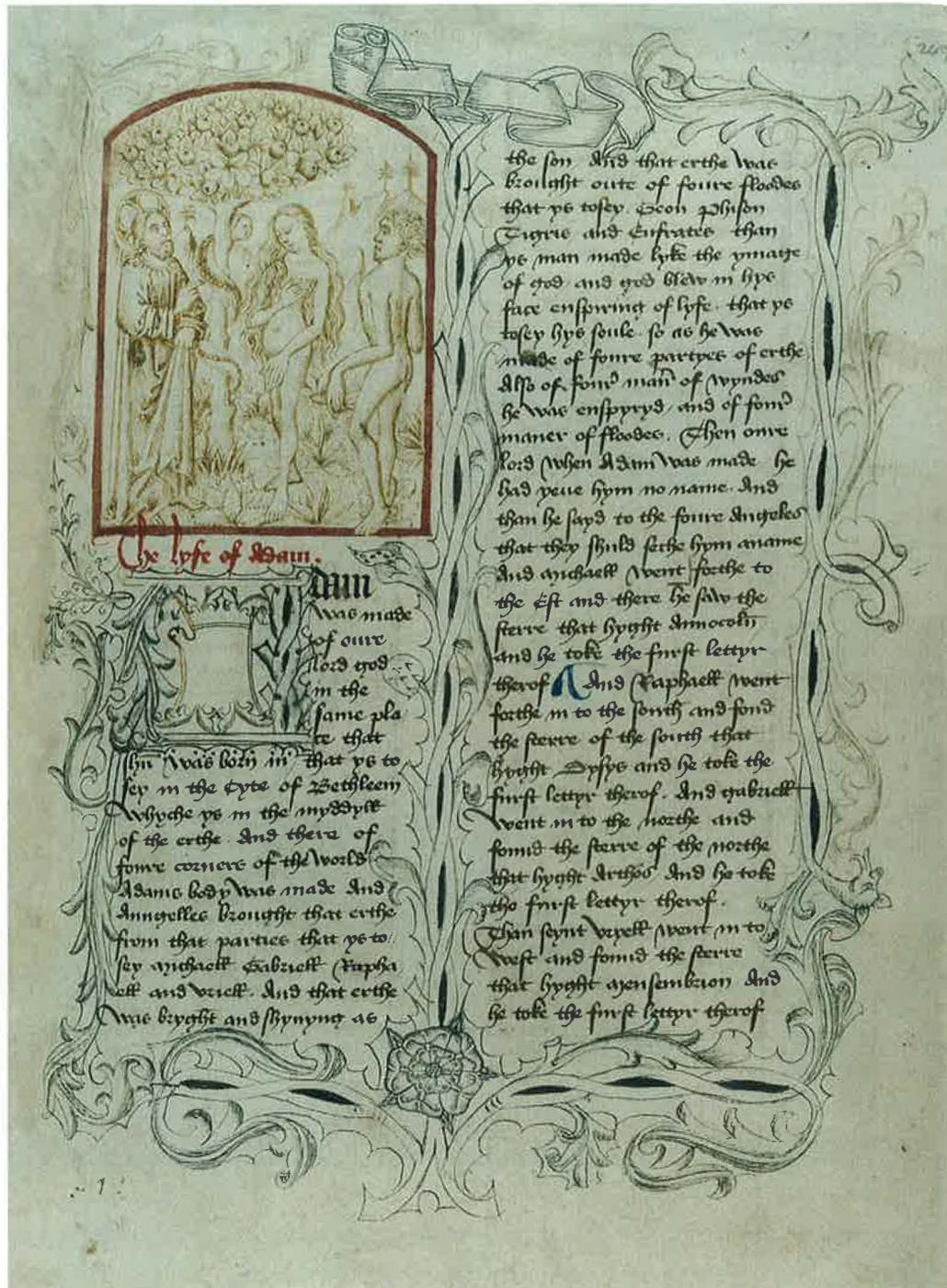
focused on *The Canterbury Tales*. Hardly anyone has looked at the everyday manuscripts written by physicians, parish priests, people hired to keep the books for an estate — those who knew how to write and who had enough interest in literature to get access to literary manuscripts to copy for their own use.

"I've found many new texts written in English that no one knew about," she says, "and even physical evidence of use of some of the manuscripts. Years ago, working in the Bodleian Library in Oxford (England), I opened a manuscript of veterinary instructions and texts about which herbs should be used for which medicinal preparations. Seeds, stems and leaves fell out that had been trapped in the spine and between the pages for hundreds of years. It had apparently been used by a medieval owner as a press for storing the herbs he was collecting: I could even recognize the rosemary leaves between the pages describing their use in medicines. The manuscript had been in the library for more than 400 years."

MOOONEY HAS DEVOTED more than two decades to the study of late-medieval English paleography (the study of handwriting) and codicology (the study of books).

She has been one of the pioneers in using computer technology in manuscript research, undertaking projects that soon will make the scribes and their verses available to an online audience.

Mooney recently completed a yearlong appointment as the Leverhulme Visiting Professor at the Centre for Medieval Studies, University of York in the United Kingdom. While there, she worked on an online, revised edition of *The Index of Middle English Verse*.



She also developed a prototype for a Web site cataloging the handwriting of medieval scribes.

When completed, her electronic version of *The Index of Middle English Verse* will provide a high-tech resource for researchers of medieval English literature, medieval literature in other vernacular languages, Renaissance literature, English literature from later periods, medieval social and political history, anthropology, linguistics and the history of science.

Mooney's index lists all poetry written in English from 1200–1530 and indicates where the original manuscript is located. Her volume follows the first index of its kind, published in 1943 by Carleton Brown and Rossell Hope Robbins, and updated by Robbins and John Cutler in 1965, which is now both out-of-date and out-of-print. Mooney's revised electronic index will include more than 350 additional pieces of verse from discoveries and publica-

tions made since 1965. It will allow scholars worldwide to search the entire 20-megabyte text by title, author, word, subject, genre and verse form.

Information for many of the new entries was discovered when Mooney was a visiting professor at Cambridge University for two years, beginning in 1995. Her quest led her to small libraries, graveyards and the great houses of the English countryside.

"Bits of verse have survived on tombstones, on wallpaper, on paintings on cloth, carved into balconies or painted on the walls in great houses. Often, I would go out not having any idea of exactly where the inscriptions were. Now that it has been identified where they are and what they say, anyone looking in the index can know that someone carved graffiti in the third pillar of the left aisle of a nave in a particular church," she says.

Mooney's ability to read ancient text, including her expertise in recognizing the handwriting of particular scribes, has led her to begin a large-scale endeavor to identify and catalog their works. Currently, she is writing a book on the more than 150 professional scribes from 15th-century England whom she has identified. She also is developing a Web site that will feature digital images of the medieval manuscripts they wrote.

"Before photography, top manuscript scholars made all kinds of mistakes identifying handwriting because they couldn't carry the manuscripts from library to library with them, and they had to rely on memory," she says. An online reference will speed up and enhance manuscript analysis.

Mooney says the ability to identify scribes is important because it sheds new light on the history of the period. For instance, one scribe produced six of the surviving copies of the prose *Brute Chronicle of England*; all six belong to a group of 11 manuscripts that leave out about 25 pages of text. He also produced a copy of *The Canterbury Tales* that includes an additional tale about the pilgrims.

"To have a scribe making this many copies from the same original (with the 25-page

defect) is important information for the study of how manuscripts were produced in the last years before the introduction of print," Mooney says. "This scribe was producing multiple copies of a long and popular text just before William Caxton set up the first printing press in England in 1476; his efforts to do by hand what the press did better and quicker demonstrate that the printing press came in response to need when booksellers recognized that they couldn't produce enough by handwriting to meet the demand."

FOR THE PAST THREE years, Mooney has collaborated with an international team of scientists working on a project called Studies of Textual Evolution of Manuscripts by Mathematical Analysis. The goal is to determine how software and methodologies developed for evolutionary biology research can help determine which medieval manuscripts were copied from which others, creating family trees of surviving manuscripts of a given text.

In addition to looking at parallels between DNA evolution and the evolution of manuscripts, the same biochemists are studying the DNA of ancient parchment. The hope is to one day be able to determine what sheep herd or breed the parchment of a particular manuscript came from, and thus know where the manuscript was produced.

Mooney's continuing research will focus on the scribes who wrote manuscripts in late medieval England — the 100 years leading up to introduction of the printing press and in the 50 years thereafter when manuscript and print competed for market share.

"More and more manuscript images are being made available to everyone through the Web," Mooney says, "but for me there is still a magic about handling the original object. I have no idea what my first manuscript was, but the feeling I had then is something that hasn't faded, even though I've handled a couple thousand manuscripts."

Gladys Ganiel



CYBER SCRIBES

THE TRANSITION from manuscript writing to print in the late medieval era has much in common with the transition from print to electronic media today, according to University of Maine Professor of English Linne Mooney.

During medieval times, Mooney says, professional scribes painstakingly copied texts by hand. Some scribes set up shops and trained apprentices in the craft. This system was slow and errors often occurred in the copying. *Canterbury Tales* author Geoffrey Chaucer, for one, was known to have complained about scribes corrupting his texts.

The advent of printing provided authors more control over the content and distribution of their work. It also helped to reach a new, larger audience. On the other hand, printing discouraged the updating of texts and the frequent collaboration of authors that had been common during the manuscript era. Mooney believes that this kind of flexibility is returning in the electronic age.

"The author of *Piers Plowman* wrote at least three versions of the tale, and when writing was in manuscript form, he could do that. He could build on the story, and include references to contemporary events and social mores. In going to digital, we are going back to an age where you can do that," Mooney says.

Online works, Mooney says, can be enhanced by animated portions and links to related sites. Authors also freely update their texts and collaborate with others. In addition, just as printing helped authors to reach more readers, so too can contemporary authors reach a wider audience by posting their works online.

The Nature of Value

New tools developed by resource economists offer insight into the intrinsic worth people place on the environment and how that translates into effective land-use policies

FROM THE NATION'S largest metropolitan areas to the smallest rural communities, public and private land-use decisions can have long-lasting implications for the future. At stake are quality-of-life issues, such as scenic views, clean water and community atmosphere, as well as the economic activities that provide jobs.

There's no crystal ball giving landowners and planners a view of tomorrow to ensure they make the right decisions today. Indeed, development proposals often set the stage for public controversy and lawsuits. However, University of Maine resource economists are going behind the scenes to accurately capture the values that people place on the environment. They are developing tools that help landowners and planners look to the future and contemplate the effects of public and private land-use decisions.

Their work is providing citizen advocates and planners with new ways to address the tendency for expanding urban areas to gobble up farmland and forests. One of their goals is to improve the basis for effective public policies.

Kevin Boyle, UMaine professor of environmental economics, has been tapped by state and federal governments, nonprofit organizations and corporations to estimate, in simplest terms, the values that people place on nature. He has focused on a variety of topics — from free-flowing rivers and clear lakes to fishing preferences and forestlands. In academic circles, he is well known for reducing the experimental bias that can mar studies of public values.

Results of well-designed valuation research, he says, can reveal the preferences that individuals express through their daily economic deci-

sions — actions that may, in aggregate, be contrary to public policies, such as measures to preserve open space and rural heritage.

UMaine Assistant Professor of Resource Economics and Policy Kathleen Bell studies land-use decisions. Her recent research combines economic modeling with computerized mapping technology (geographic information systems or GIS) to analyze changes in land-use patterns. Visualizing future land-use patterns helps citizens and planners to understand the consequences of public policies.

The maps that she and her colleagues have produced indicate the likelihood that any given land parcel will be developed. They are maps of development pressure based on models that take into account current land-use policies, demographics and the real estate market.

Environmental economists like Boyle and Bell have their critics. For example, some contend that the value of nature cannot be captured in dollars and cents, that land-use decisions involve much more than comparing the economic value of a strip mall or a subdivision to a wetland or forest preserve.

Yet economists bring important information to the decisionmaking table. "We observe peoples' values through their choices. All we're doing is showing people how their values are expressed through the decisions they make. If you do or do not care about natural resource issues, your choices and actions tell us your preferences," Boyle says.

For example, Boyle and Bell have demonstrated that people are willing to pay good money to be close to nature. In a recent study for the U.S. Fish and Wildlife Service, they analyzed data on residential land prices near

federal wildlife refuges in Massachusetts, New York and Pennsylvania. Their results show that the closer a house is to a protected wildlife area, the higher the property value.

Property value data, says Boyle, provide an incentive for developers to preserve views, wildlife habitat, recreational areas and other amenities. "On a property, open space is just as important an attribute as a fine kitchen or a luxury bathroom. This is not really the environment versus dollars. Developers can get money out of (protecting open space)."

Bell also points out that economists help citizens and policymakers understand the drivers of land-use change and the efficacy of land management policies. At the heart of the open space versus development issue, she says, is the public's ability to influence private decisions.

Many public amenities, such as vistas and wildlife habitat, are the cumulative result of numerous private landowner decisions. Those amenities may have value for a community, but when owners exercise their development rights, those public benefits can be lost. Often, the public has no recourse or even a role in the decision. The challenge is to design policies that align private and public interests, she says.

In a recent study of rural Calvert County, Maryland, south of Washington, D.C., Bell worked with Elena Irwin of Ohio State University and Jacqueline Geoghegan of Clark University to create an economic model simulating future growth.

"We ran our model using information on past land-use decisions and policies, parcel characteristics and land values, then used the results to forecast where development would happen. We examined whether this future

development would be consistent with the county's comprehensive plan."

The result was an eye-opener, Bell says. "Historically, people were very happy with their land-use management policies. They thought their policies were performing



"We observe peoples' values through their choices. All we're doing is showing people how their values are expressed through the decisions they make. If you do or do not care about natural resource issues, your choices and actions tell us your preferences."

Kevin Boyle

admirably because they hadn't seen a lot of residential and commercial development. But we found that these policies were not being pushed. A policy such as a five-acre minimum lot size looked effective until people from Washington, D.C., decided that they were willing to commute for two hours and residential subdivisions started appearing. That five-acre minimum lot size zoning not only did not prevent that growth, but it led to growth that might have been less appealing to the commu-

nity as a whole, in that you have individual houses taking up more land."

Among the open-space preservation methods included in the Calvert County model, policies that promote development within identified growth areas were the most effective in reducing pressure on open spaces. The model suggests that motivating developers to work within well-defined geographical boundaries would succeed in reducing pressure on open-space rural lands.

Such measures could be particularly important in suburban areas located between highly urbanized and wide-open rural spaces. Yet they seem to have limited appeal to the country as a whole. In an ongoing study of public attitudes for the U.S. Department of Agriculture, Boyle finds that most people don't place a high value on farmland preservation programs. Residents of rural communities with an abundance of open land, and big cities, where development proliferates, tend to consider such programs a low priority for public funds. That leaves the highest concern in communities at the urban fringe, where pressure to convert open space to buildings and pavement is most evident.

The findings could help policymakers fine-tune their approaches to open-space protection, taking into account local circumstances.

"The new information that economists can bring to people," says Bell, "is that land-use decisions are individual decisions, that they reflect human behavior played out on the landscape. We have to respect the complexity of human behavior and acknowledge how people make decisions. The challenge is to align private and public interests through effective policies."

Nick Houtman

"The new information that economists can bring to people is that land-use decisions are individual decisions, that they reflect human behavior played out on the landscape. We have to respect the complexity of human behavior and acknowledge how people make decisions. The challenge is to align private and public interests through effective policies."

Kathleen Bell

Mechanical Whales

Research by two UMaine students hopes to unlock the underwater secrets of the world's largest mammals

Photo by Louis Herman, courtesy of the National Oceanic and Atmospheric Administration (NOAA) Photo Library

WHALES ARE PART OF our culture. Through movies, photos and whale-watching cruises, millions of people have seen the world's largest mammals gliding at the ocean surface or showing off their signature tails or flukes. We've even recorded their eerily beautiful songs.

But considering that whales only spend about 2 percent of their time at the surface, how much do we really know about them?

Two University of Maine students are among a small number of researchers worldwide who are using new technologies to reveal the secrets of whale behavior.

Becky Woodward, a Ph.D. student in mechanical engineering, and her husband and colleague Jeremy Winn, an undergraduate in the School of Marine Sciences, have collaborated on whale research for three years. They are working with Mick Peterson, UMaine associate professor of mechanical engineering, to study how whales maneuver and how their physiology allows them to search for food at the surface and in bone-crushing depths.

Their research is funded by the Maine Science and Technology Foundation and UMaine through the Canadian-American Center, Sea Grant and the GK-12: Sensors program in the College of Engineering.

Woodward and Winn, who grew up in Virginia and Montana, respectively, worked

for the Coastal Ecosystem Research Foundation, a nonprofit organization in British Columbia that combines marine mammal research with ecotourism. Prior to that, Woodward worked with Peterson on the biomechanics of horses for her master's degree at Colorado State University in the mid-1990s. Woodward and Winn came to UMaine in 2000.

"Each whale species has a unique shape and size — different morphological features that allow them to effectively fill their particular ecological niche within the world's oceans," Woodward says. Her goal is to perform a comparative study between whale species to look at how body shapes may affect maneuverability, speed and efficiency. She also may look at why some species may be able to avoid ship strikes or fishing gear entanglements better than others.

The key to their research is a \$10,000 electronic monitoring device invented at the Woods Hole Oceanographic Institution in Massachusetts. Known as the DTAG, the foot-long device includes a variety of motion and acoustic sensors. It is attached by suction cups to a whale's back and is set to release automatically. An onboard transmitter allows researchers to track the animal. After the instrument releases and floats back to the surface, researchers can follow the signal to retrieve the device and its valuable data.

In their research, Woodward and Winn successfully deployed the DTAG on blue whales in the Pacific and humpbacks in the Atlantic during the 2002 field season. Thus far, their study has taken them to the waters off British Columbia, California and Newfoundland. The project has the potential to contribute to our understanding of funda-



Photo by Tonya Peterson

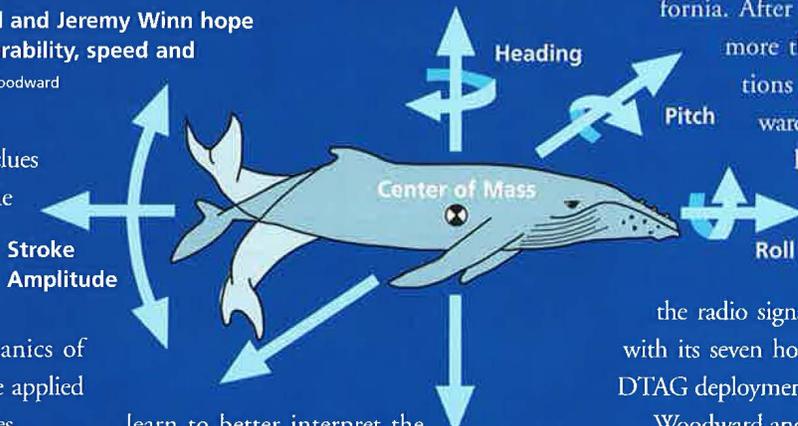
In their research, Becky Woodward and Jeremy Winn hope to better understand the maneuverability, speed and efficiency of whales. Graphic by Becky Woodward

mental whale biology and provide clues about reducing human impact on the marine animals.

From an engineering perspective, the study also will provide a better understanding of the mechanics of underwater maneuvering that can be applied to new designs for underwater vehicles.

With more than 160 dives now recorded, Woodward and Winn have learned to interpret motion sensor data from the tag. The pitch record of fluke stroke patterns helps to estimate the whale's energetic efforts. In addition, characteristic dive profiles are starting to emerge for different behaviors. Dives can be sorted into foraging, feeding or traveling categories based on the shape of the dive, and stroke and glide swim patterns.

"The truth is we don't really know what the whales are doing underwater," says Winn. "But even with its limitations, this data is more than anyone has ever seen before. As we



learn to better interpret the data, we will expand our insight into whale behaviors."

On the water in an inflatable zodiac, Woodward and Winn work as a team. Approaching a whale is risky. While one of them guides the boat, the other uses a 20-foot pole mounted on the bow to place the DTAG on the animal's back. From then on, they are committed. They must follow the whale and record details, such as when and where it surfaces, its behavior, and whether other animals are in the vicinity.

They are well equipped for this work. They wear insulated survival suits and carry

video cameras, including one for underwater use. They also pack a digital compass, radios, a GPS, range finder, and even spare parts for the DTAG and the boat motor.

"Every time we go out, every time we put a tag on, we have to hope that the whale doesn't head out to sea or that a big fog bank doesn't roll in and make it impossible to follow the whale. Once you put a tag on, you have to follow it until it comes off," says Woodward. "It's a bit nerve-racking to have a \$10,000 piece of equipment riding around on the back of a whale."

Once a DTAG failed to release on a blue whale in the Santa Barbara Channel off California. After following the animal for more than six hours, sea conditions deteriorated, and Woodward and Winn were forced to head back to shore for a long night. But luck was with them in the morning; they detected the radio signal and retrieved the device with its seven hours of data — the longest DTAG deployment on a blue whale.

Woodward and Winn now continue their investigations at UMaine. With Mick Peterson, they have formed a cetacean research group that includes John Riley, a bio-resource engineer and faculty member in the School of Marine Sciences; Anna Demeo, a marine sciences student from Southwest Harbor; and Sean Todd, a faculty member at the College of the Atlantic in Bar Harbor.

Woodward and Winn say they want to provide students and the public with opportunities to share their excitement. "We hope to use the research as a teaching tool — a way to tell people about the whales," says Winn.

Nick Houtman

Studying climate at the South Pole

WHEN A TEAM of University of Maine professors and students arrived at the South Pole in early January, it was the first time in almost a half-century that a scientific team reached the destination by traveling over the West Antarctic Ice Sheet and through the Transantarctic Mountains.

Watching the historic moment — as well as the researchers' three weeks of travel by sled train to collect snow and ice cores — were teachers and public school students from Maine to Oregon.

Both the expedition and educational uplink were made possible by funding from the National Science Foundation.

The researchers were completing the fourth in a series of expeditions across the West Antarctic Ice Sheet to collect environmental data about the southern continent. The team was led by Paul Mayewski, professor of geological sciences and director of the UMaine Institute for Quaternary and Climate Studies, who developed the idea for the International TransAntarctic Scientific Expedition (ITASE). Team members include Research Assistant Professor Gordon Hamilton and four graduate students.

Because of its geographic position and unique environment, Antarctica holds important keys to questions about global climate. In addition, the research will provide clues to the fate of the West Antarctic Ice Sheet, which is thought to be vulnerable to changes in climate and sea levels.

Schoolchildren communicated with the UMaine researchers through a Web link (www.ume.maine.edu/USITASE/) managed by the Institute for Quaternary and Climate Studies. The public followed the expedition's progress via a Boston Museum of Science Web site (www.secretsoftheice.org).



Photo by Dan Dixon

Crude Calculations

IF A CATASTROPHIC OIL SPILL like the one that recently fouled the coast of Spain happened in the waters off Maine, the state's marine economy would suffer. But how would the state accurately determine those costs — from declines in commercial fishing stocks to lost tourism dollars — in order to collect damages from those responsible for such a spill?

Helping Maine assess the value of its marine resources so it will be in a better position to recoup losses in the event of a spill is the focus of a study by the University of Maine's Margaret Chase Smith Center for Public Policy. The research is sponsored by Maine Sea Grant.

The work is critical to the state because Portland is the third largest crude oil port on the East Coast. Oil-carrying vessels also sail to Bangor, Searsport, Eastport and to St. John, New Brunswick.

"There is a real possibility that Maine could have an oil spill that would impose very large costs on the state's marine economy," says Jonathan Rubin, the center's interim director and the principal researcher on the project. "Deter-

mining losses from oil spills is very difficult due to both methodological and data problems. Effort should be spent now preparing the groundwork to enable a better assessment of damages."

In 1996, the tanker *Julie N*, carrying 8.8 million gallons of fuel oil (the same oil that spilled into the Atlantic off Spain last fall), struck

a bridge abutment on its way into Portland Harbor. Nearly 180,000 gallons of oil spilled into the Fore River. In addition to fisheries damage, estimated economic losses included 300 lost tour boat trips,

4,862 lost recreational boat trips, 225 lost whale-watching trips and 1,380 lost or diminished trips on a walking trail near the spill site. Officials acknowledged that the damage was underestimated because not enough data existed to measure total lost use of recreational resources.

To remedy this problem, the Margaret Chase Smith Center will develop baseline data on recreational uses of Maine's coast. The study will focus on recreation and tourism, the largest parts of Maine's marine economy. Extensive data already exist on the size and value of commercial fisheries.

Portland is the third largest crude oil port on the East Coast. Large vessels carrying oil also sail to Bangor, Searsport and Eastport.

From Stump to Ship

A 30-MINUTE SILENT FILM made in 1930 and donated years later to the University of Maine is one of 25 selected to the National Film Registry, Library of Congress, for 2002.

From Stump to Ship, filmed and scripted by Alfred Ames, president of Machias Lumber Co., documents a dying chapter of Maine's logging history. The black-and-white film captures timber harvesting by woodsmen and horses, river driving, milling of logs and loading of lumber onto schooners.

As a National Film Registry selection, *From Stump to Ship* is considered one of 350 "culturally, historically or aesthetically" significant films. The registry was created to reflect the breadth and diversity of American motion picture heritage. The 2002 film selections were created between 1901–91.

The original film of *From Stump to Ship* was donated to UMaine in 1970. Fifteen years later, with a grant from the Maine Humanities Council, funding from the university and corporate sponsorship, the film was restored by Maine-based Northeast Historic Film.

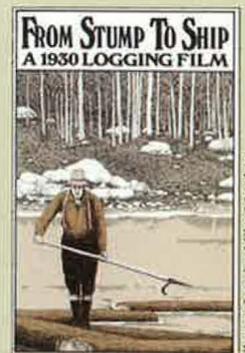


Illustration by Mike Mardosa

Older Adults RSVP

OLDER ADULTS HAVE THE EXPERTISE and time to help their communities. Charitable groups often are in need of volunteers and advice. Now the Center on Aging at the University of Maine is bringing them together.

With a \$90,000 grant, the center will administer the region's Retired and Senior Volunteer Program (RSVP), a decades-old federal project that pairs healthy, active adults over the age of 55 with organizations in need of volunteer services. The renewable annual funding comes from the Maine Bureau of Elder and Adult Services, and the Corporation for National and Community Service, which administers Senior Corps programs like RSVP. Additional funding and support comes from the university's School of Social Work and the College of Business, Public Policy and Health.

Under the university's stewardship, RSVP will expand and move in new directions, says Lenard Kaye, director of the Center on Aging.

"Sponsorship of RSVP serves to further underscore the Center on Aging's deep commitment to providing real-life community services that will make a genuine difference in the lives of

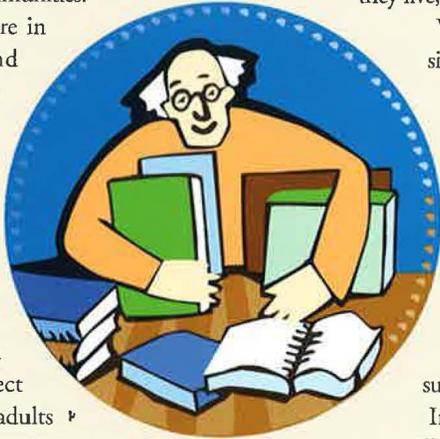
older adults and the communities in which they live," says Kaye.

Working with the university's Maine Business School, Kaye plans to establish a new executive division in RSVP. Through this program, volunteers with financial management, budgeting and fund-raising expertise will be paired with non-profit groups in need of such services.

In addition, senior volunteers will be involved in homeland security-related organizations like the Red Cross. They will staff shelters, provide counseling and assist in the agency's response to local emergencies. Volunteers also would be placed with town and county emergency management offices.

"We anticipate that (the Center on Aging) will bring only the highest level of innovation and expertise in designing high-impact volunteer placement opportunities for seniors in Maine," says Shireen Tilley, director of the Corporation for National and Community Service for Maine, New Hampshire and Vermont.

The Center on Aging is taking over administration of RSVP from the United Way of Eastern Maine, sponsor of the program since 1987.



A UNIVERSITY OF MAINE assistant professor of journalism is in Bosnia this spring to study how journalists are gathering information as Bosnia-Herzegovina transitions from state-controlled to privately owned media.

Shannon E. Martin received a Fulbright Scholar Award for teaching and research at the University of Sarajevo. It is Martin's second trip to Bosnia-Herzegovina. In 2000, the International Research and Education Exchange invited her there to train journalists to use Internet resources.

"My research springs from a fundamental principle of information distribution as the linchpin in effective self-governance," she says. "The media provide the forum for presenting ideas, problems and solutions. I tell my journalism students that they are the information seekers for their neighbors, and it's their job to make sure everyone has the information to make good decisions."

However, in Bosnia-Herzegovina people are less confident of journalists as information conduits, Martin says. They are accustomed to the government dicta coming through the state-controlled media, and the media are not yet confident enough to challenge the government consistently.

Martin's research hopes to shed light on who is setting the agenda for public discourse in Bosnia-Herzegovina. She has conducted extensive research on the agenda-setting function of the mass media and information controls by the government in the U.S.

She is the author of *Bits, Bytes and Big Brother: Federal Information Control in the Technological Age* and *Newspapers of Record in a Digital Age: From Hot Type to Hot Link* (with Kathleen Hansen). Her third book, *The Function of Newspapers in Society: A Global Perspective* (with David Copeland), will be published this spring.



Teaching Alternatives

IN MID-COAST MAINE, an innovative alternative certification program created by the University of Maine College of Education and Human Development is helping schools address the teacher shortage. Since 2001, UMaine, in partnership with the area superintendents' association, has offered the two years of coursework, intensive training and strong support needed to put conditionally certified teachers in classrooms.

The preparation dovetails with Maine's Initial Teacher Certification Performance Standards and licensing provisions.

Based on the initiative's success, UMaine recently received a five-year, \$1 million Transition to Teaching grant from the U.S. Department of Education to expand the program to other parts of the state. With conditional certification, school districts in the program are recruiting and hiring mid-career professionals with strong subject matter skills and successful backgrounds, as well as recent college graduates with outstanding academic records and majors in areas other than education.



Photo courtesy of Tom Settlemire, Bowdoin College

Improving Katahdin

A BREED OF SHEEP that got its start in Maine in the 1950s is attracting international attention because of improved internal parasite-resistance research by scientists at the University of Maine and Bowdoin College.

The Katahdin hair sheep breed is not rare. In fact, it is the fifth most popular in the U.S., out of more than 20 commercial breeds.

UMaine researcher Stanley Musgrave, emeritus professor of animal science, was involved in early work with the breed. Today, Richard Brzozowski, a UMaine Cooperative Extension educator in Cumberland County, and Tom Settlemire of Bowdoin College are working on improving the breed for market.

Current research focuses on the genetics and biology of parasite resistance in the Katahdin. The result could benefit sheep breeders in Maine and the Northeast.

Katahdins are known for their hardiness, and some carry a gene that makes them resistant to scrapie, a type of spongiform encephalopathy that is related to Creutzfeldt-Jakob disease (vCJD) in people.

In recent years, interest in Katahdins has been shown by the government of China, as well as the Gates Foundation.

An international conference on Katahdin hair sheep is slated for Oct. 16–19 in New Gloucester, Maine.

What it means to get old in the woods

AS THEY GET UP IN YEARS, spruce and fir trees change in predictable ways. Their growth slows or even stops. Their needles get thicker, and new branches develop a shortened, gnarled appearance.

With support from a three-year National Science Foundation grant, University of Maine and Oregon State University scientists are trying to get to the root of why such changes occur in these and other species. The results could lead to improvements in predicting forest growth and help scientists understand the role of forests in global environmental cycles, says Michael Greenwood, the Ruth Hutchins Professor of Tree Physiology at UMaine.

Slower growth means trees absorb less carbon — an important factor in the current global climate change debate.

“We don’t really understand what causes trees to go through developmental stages,” says Greenwood. “There are a couple of theories, and there is undoubtedly a genetic component, but we don’t know what triggers the process.”

In tree years, old age varies considerably by species. Balsam fir rarely approach 100 years old, but spruce can live as long as 150–200 years. The oldest eastern white pine, located in New York state, is 450 years old, but such long-lived examples are rare. On the other hand, bristlecone pines, said to be the oldest recorded trees on Earth, are more than 3,500 years old.



Greenwood and Michael Day, an assistant scientist in UMaine’s Department of Forest Ecosystem Science, are collaborating with Barbara Bond of Oregon State to test two theories of tree development. One theory suggests that changes in old growth are due to environmental or physiological factors, such as a lack of nutrients or increasing resistance to sap flow. Another theory suggests that developmental changes are genetic and may be irreversible.

The truth may include parts of both theories, says Greenwood. To find out, researchers will graft branches of both old and young red spruce and Douglas fir onto trees of different ages. They will monitor growth, sap flow, photo-

synthesis rates and other factors. The goal is to understand how the grafted branches are affected by the age of the host trees.

Previous research by Day and Greenwood suggests that the growing tips, or meristems, of old red spruce retain some sort of memory after they have been separated from the large trees from which they grew. There is evidence that meristems from old trees maintain their old-growth characteristics even after being grafted onto young trees, implying that gene expression in growing tips changes as trees age or grow larger beyond reproductive maturity.

“If we understand what triggers development, we may be able to get the branch to grow like a young tree again,” Greenwood says.

4-H and veterans IN AN EFFORT TO PROVIDE educational and community service experiences for young people in the state, Maine 4-H has created a new program that will link veterans’ groups with youth organizations.

The basis of the new program is a plan to connect veterans with 4-Hers and youths in other organizations, such as scouting and school groups, to place flags and plant flowers at cemeteries beginning Memorial Day 2003.

“The young people and the veterans will both benefit from their association in this program,” says Richard Brzozowski, a UMaine Cooperative Extension educator in Cumberland County. “By meeting and working closely with veterans, the members of the youth groups will develop a tangible connection to an important part of history.”

Cooperative Extension provides the staffing for 4-H programs statewide. More than 16,000 Maine children, ages 5-18, participate in 4-H programs each year.

LASTING IMPRESSION

FROM THE TIME Vincent Hartgen arrived at the University of Maine in 1946, he created a revolution by teaching and encouraging people to enjoy art, particularly modern art. To do that, he founded the Department of Art and the university's exhibition program, established and built an impressive permanent art collection, and painted and exhibited his own work.

In the classroom, Hartgen's teaching was legendary. His students still remember how he helped them understand and love art, and how he changed their lives.

In addition to his seven-gallery exhibition program, he hung works from UMaine's permanent collection in offices and public spaces on campus so that people would feel the influences of art every day. He also established a statewide traveling exhibition program for schools in an effort to build awareness, even in very young children, of the many roles art plays in our lives.

In his own art, Hartgen investigated nature. He loved the complex process by which idea and feeling are turned into visual poetry. He drew constantly and painted in aquarelles. He developed a unique vision, supported by masterful technical facility that was based on representation of natural forms, but spoke expressively through the imaginatively abstract use of color, movement, varied mark-making and subtle tonal gradations. His love of this process never diminished. Some of his most recent works were on exhibit in Portland, Maine, at the time of his death, Nov. 27, 2002, at the age of 88.

"Lasting Impression" features a memorable person or event in UMaine history. Look for a story about the University of Maine Museum of Art and Vincent Hartgen's legacy in an upcoming issue of UMaine Today.

Diving In

Krystal Fogler of New Rochelle, N.Y., set 10 school records — five individual and five on relay teams — as a student at the University of Maine. Last year, she completed a degree in kinesiology and physical education, and was named Maine Athlete of the Year. Fogler is the great-granddaughter of the late Raymond Fogler, the UMaine benefactor for whom the university library is named.

Photo by Monty Rand

GARTH CHANDLER KNOWS the difference a good sports program can mean to college students and the community.

When his two daughters were growing up, they participated in youth competitive swim programs and swam throughout high school on a total of seven Maine State Championship teams. When it was time to go to college, they both chose the University of Maine, in part, because of its Swimming and Diving Program. Both were members of the UMaine team as undergraduates and then went on to attain graduate degrees at the university.

Chandler, who also is a swimming and diving official, says the University of Maine provides the unique opportunity for Maine youth who swim competitively to remain in state and compete at the Division I college level.

In 1991, 20 years after its inception, budget cuts threatened the program. That's when Chandler and other parents of swimmers, as well as state swimming officials, alumni and friends, got together to find a way to ensure the program's future. They

formed the Maine Swimming and Diving Group to raise money for an endowed fund in the University of Maine Foundation.

The foundation was instrumental in the fund-raising efforts. To draw attention to the intercollegiate program, head coach Jeff Wren swam 65 miles of Maine's Penobscot River in four days.

One of the first contributions came from UMaine alumni and authors Stephen and Tabitha King.

The following year, the nonprofit Maine Swimming and Diving Corp., was established to oversee the allocation of endowment funds for the program's operating expenses.

"With a long-term funding goal of \$1.2 million, we needed an endowment fund," says Chandler, who serves as clerk of the corporation. "The program and university facilities serve well the youth of the state of Maine. Interest in swimming, for sport or recreation, whether participant or spectator, can last a lifetime. It is important to keep the program alive."