

UMaine Today

CREATIVITY AND ACHIEVEMENT AT THE UNIVERSITY OF MAINE

JANUARY/FEBRUARY

2006

A photograph showing two large mammoth skulls with antlers laid out on a wooden table. Several people's hands are visible, touching and examining the skulls. There are several white plastic cups and containers around the skulls, suggesting a preparation or cleaning process. The antlers are long and segmented, with some white tape or material wrapped around them. The skulls are light-colored and appear to be made of bone. The background is a plain wooden surface.

Why do we know
so little about
**the largest mammals
on the planet?**

President's Message

Photo by Bill Drake



THE ARRIVAL OF 2006 brings us to the beginning of an exciting time at the University of Maine. I am buoyed by the enthusiasm that permeates our campus community, and by the great support I sense from people around Maine and beyond, so many of whom tell me that they share in our optimism and believe that UMaine is on the right track.

The Board of Trustees recently granted formal approval for our fundraising campaign, which begins in earnest this month. We've spent months planning this effort, and I am convinced that we will reach our \$150 million goal. While the private fundraising is critical, those of us who care about UMaine must

also work together to make the case that this university is worthy of a greater public investment.

Base state funding, targeted R&D money and bonds are all part of the formula needed to help us advance in critical areas, making UMaine an even greater educational, economic and cultural force in Maine.

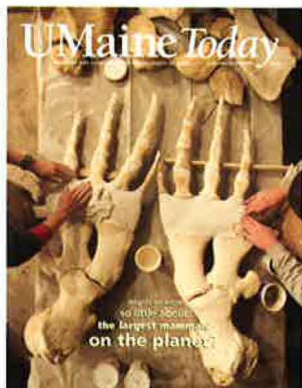
As we have seen in many other states, the greatest progress comes when private fundraising campaigns and increased public support coincide, hastening advancement and drawing energy each from the other. Potential donors tell us they are ready to hear how they might help, and we believe that we can make a compelling case for increased state funding.

We were particularly gratified when Maine voters spoke loudly in November about their support for UMaine, approving the two bond proposals that included money to support UMaine activities and initiatives, totaling \$3.85 million.

UMaine is, and will continue to be, a great investment. We have bold plans and big ideas, intended to transform UMaine and help the state ensure a brighter future.

Visionaries have never been in short supply at UMaine. I was reminded of this a few months ago when the Laboratory for Surface Science and Technology (LASST) celebrated its 25th anniversary. In 1980, the founders certainly had high hopes, but they never could have anticipated the educational, scientific and economic force LASST would become. Today, so many in our community have the same kinds of ideas and initiatives. In 25 years, with a successful fundraising campaign and the continued statewide public support, our successors will admire that vision in the same way we regard the foresight of those who founded LASST.


Robert A. Kennedy
President



ON THE COVER: Using expanding foam and sculptable epoxy, Chris Tremblay and Troy Thibodeau, working under the direction of University of Maine graduate student and cetacean expert Daniel DenDanto, reconstruct the pectoral flippers of a 46-foot sperm whale. DenDanto, an authority on fin whales and a national expert on marine mammal skeletal articulation, cleaned, preserved and reconstructed the skeleton for display in the Nantucket Whaling Museum. Nantucket's sperm whale is in a diving posture that engages viewers, inviting them to examine the natural sculpture from every angle. "My hope is that people take more away about the life of the whale than about its death," DenDanto says. See the related story starting on page 18.

Photo by Carl D. Walsh

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University of Maine profile

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 88 bachelor's, 64 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.

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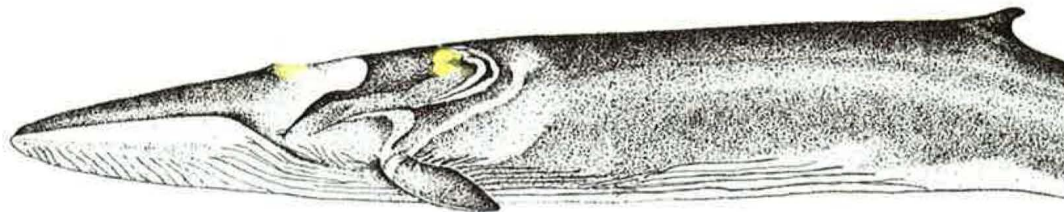
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Deep Roots, Old Strength #9 by Michael H. Lewis turpentine wash (with oils) 2005

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Research by sociologist Kyriacos Markides takes him to ancient monasteries to better understand the religious, mystical experiences that are part of the everyday lives of monks, hermits and Christian healers.

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To understand the Napoleonic era, one must look beyond the military campaigns and the emperor's private life and study the economic, social, administrative and cultural aspects of his reign. To do that, says historian Alex Grab, look beyond France.

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UMaine Ph.D. student Daniel DenDanto is one of the world's experts on fin whales. Through his research, he learns how finbacks live; through his articulations, he immortalizes the largest mammals on Earth after they die.

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Growing Up in Maine

UMaine professor wades into the debate about the future of the Louisiana Delta

By David Munson

NO ONE LIKES TO be the bearer of bad news, and members of the Louisiana government are no exception.

In pursuit of a decidedly optimistic vision of the future for that vast expanse of mud, sand and cord grass that is the Mississippi River Delta, the Louisiana government set into motion an ambitious plan to “restore” the eroding Louisiana coastline, setting its sights on a hefty \$14 billion in federal support. And that was before Hurricane Katrina.

However, in order to secure that level of funding, the Pelican State’s application would have to be more than ambitious. It would have to be convincing.

That’s where Joe Kelley comes in.

World-renowned for his expertise in marine and coastal geology, and equally famous for his uncompromising approach to defending coastal land, the University of Maine marine geology professor was asked to participate in the National Academy of Sciences (NAS) review of Louisiana’s funding proposal. Louisiana officials were hoping for a thumbs-up from NAS’s Ocean Studies Board

that would strengthen their bargaining position with the feds.

What they got was something else entirely.

In their Nov. 9 report, Kelley and his colleagues, a best-of-the-best assemblage of economists, engineers and other specialists who convened beginning in 2004, determined that the bad news is exactly what the people of Louisiana need to hear, and that a

true restoration of Louisiana’s coast is the stuff of campaign speeches and fairy tales.

“The report seems critical of Louisiana’s plan, but it’s critical in a constructive way,” says Kelley. “I think the biggest take-home message from our report is that the Louisiana government needs to be honest with the people of Louisiana about the future of the coast.”

The National Academy of Sciences committee raised serious concerns regarding Louisiana’s methods for selecting which coastal protection initiatives to pursue, as well as the overall scope of the state’s coastal management plan.

KELLEY IS NO STRANGER to Louisiana coastal concerns. He was a member of the University of New Orleans faculty from 1979–82. In 1984, he and Alice Kelley, his wife, wrote *Living with the Louisiana Shore*, a reaction to what he saw as the costly and destructive efforts to stabilize a shoreline



THAT SINKING

ravaged by reckless development in the face of the rising sea.

In its evaluation of the project put forth by the Louisiana government and U.S. Army Corps of Engineers, the NAS committee on which Kelley served raised serious concerns regarding the state's methods for selecting which coastal protection initiatives to pursue, as well as the overall scope of the coastal management plan. The panel also questioned the Louisiana government's ability to present a clear and unbiased view of those processes to the public.

The rising waters and raging winds of Katrina only served to underscore what the panel of experts determined even before the hurricane hit.

"Overall, the projects that were being proposed just don't go far enough. The people of Louisiana need to know that you can't restore the delta — it's too big, too expensive and just too far gone. They can bring in money to restore some select places, but they would have to abandon some places, too," says Kelley, who, as Maine's longtime marine geologist at the Maine Geological Survey, was a guiding force behind the establishment of the most environmentally protective coastal management regulations in the nation.

Maine's Sand Dune Law governing



coastal development, which Kelley helped to strengthen and expand in the late 1980s, is considered a model for other states.

Kelley is critical of Louisiana's public relations efforts regarding proposed coastal improvement projects, noting that public information sessions would be better attended if the true implications of coastal erosion and coastal protection projects were known. Too often, he says, only a handful of residents show up because the projects, as presented, don't mean anything to them.

On Trinity Island off Terrebonne Parish in Louisiana, a building that was once sited inland is now on the gulf shore because of erosion.

Photo courtesy of Dinah Maygarden

G FEELING

THAT SINKING FEELING

"If (the state) had said 'we're considering abandoning this town,' you can bet people would have shown up," Kelley says.

THE SHORTFALLS THAT the NAS committee discovered were not all due to procedural problems at the state level. Federal funding mandates and time constraints fostered their own brand of shortsighted policymaking. What began as a comprehensive, albeit somewhat misguided, coastal improvement plan quickly became a scaled-down hit list of short-term, doable projects that would meet federal criteria.

Those criteria, which included such innovation-crushing mandates as "all projects must be completed within five years" and "all projects must have been done in Louisiana before," clipped the wings of Louisiana's original \$14 billion proposal midway through NAS's evaluation process, shifting the focus toward a quick-fix package that could be achieved with no more than \$2 billion in federal funding.

While a lack of federal support helped to steer the process back toward a Band-Aid approach to coastal protection, bad choices are bad choices, and the project selection criteria Louisiana used created a process that was more like a game of musical chairs than a scientifically defensible procedure. According to Kelley, thousands of individual projects were lumped together into a dozen or so ambiguous groups. Each project, and thus each group, was churned through a



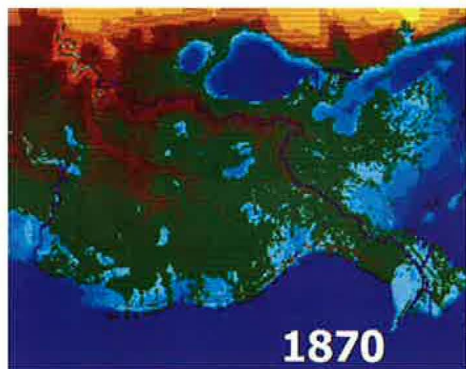
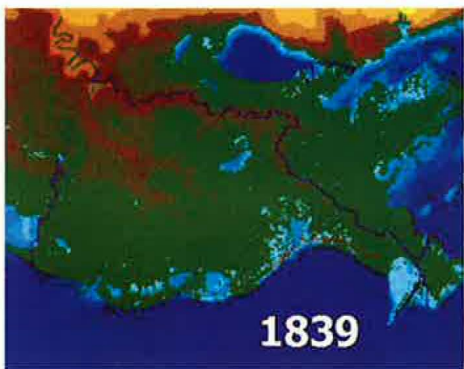
Roads like this one are commonly found along Louisiana's coast. Areas of open water on either side of the road were formerly vegetated by marsh grasses and are converting because of sea level rise and storm damage. Photo courtesy of U.S. Geological Survey

dizzying matrix of scoring formulas to determine their economic viability. When the music stopped, the winning groups were hoisted into the top spots for funding.

"Projects were given a certain value based on formulas that would state something like 'two-and-one-half miles of salt marsh provides a reduction in storm surge by one foot.' Quantified by what?" Kelley says. "The selection process was just not transparent, and when this kind of money is involved, it ought to be."

Procedural shortcomings in the selection process were illustrated in frightening detail by one of the most highly visible proposals to make the cut: the Mississippi River Gulf Outlet (MRGO). Unpopular with residents and extremely expensive to maintain, MRGO was just the kind of project that should have been culled, Kelley says.

"They were essentially looking for more than \$200 million to line MRGO with rocks," says Kelley with frustration. "It served something like one boat a day. It laid

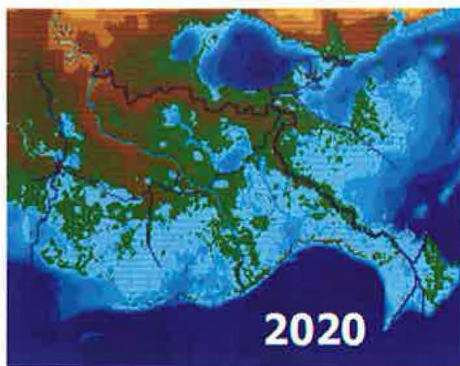


waste to enormous amounts of land. It caused environmental damage and was thought to be a superhighway for storm surge leading into the heart of the city. It empties into the industrial canal where a levee breach happened as a result of Katrina.”

AS CONTROVERSIAL AS the MRGO project is, the recommendation set forth by NAS promises to stir things up even more. Kelley proposed a “third delta” scenario that NAS committee members, and many other scientists, believe could strengthen and expand the Mississippi Delta to the west!

“Our thought was to divert the river and create a new, large delta south of New Orleans,” says Kelley. Running his finger over a satellite image of the region, Kelley pointed out a huge expanse of soggy wetland surrounding the river’s existing outlet known as the Birdsfoot Delta. “It’s been called a ‘third delta,’ but that isn’t exactly accurate because the Birdsfoot Delta would be abandoned and would eventually disappear. It would be controversial, but we need to think big here.”

In addition to contributing to the historical and geological information included in the NAS report, Kelley also helped to create an entire section that describes what an ideal river delta might look like. Kelley hopes the report will help to inspire a frank and realistic discussion about the future of Louisiana’s coast at all levels.



“They need to create a map that shows the new places where money will go and those areas that will have to be abandoned,” Kelley says. “Restoring the delta to create something like what was there in the past is just not going to happen. The government needs to come clean about the fact that we cannot sustain the delta as we know it.”

Kelley enthusiastically supports the increased funding for research that was part of Louisiana’s plan, and advocates methods for distributing research funds that encourage new, out-of-the box thinking. It will take the intellectual resources of the nation to arrive at meaningful solutions to the problems faced on Louisiana’s coast, he says.

“Some have argued that most of the land loss in the delta occurred as the result of dredging and canals built by the oil industry. I think we need to take a hard look at the oil industry’s role and how industry could contribute to a solution,” says Kelley.

“There’s also the larger question of whether the whole project is in the national interest. Houston and Mobile could pick up the oil and gas slack in a heartbeat, and the changes may be a benefit to the fisheries. As a group, we had trouble deciding if the restoration projects were even in the nation’s economic interests.”

Kelley’s final recommendation was for the creation of a blue-ribbon panel that could examine the social, economic and geological realities of the Louisiana coast, and develop a working plan for the future.

Erosion control is a critical issue for Louisiana, where 25–35 square miles of saltwater wetlands are lost to the gulf each year. According to marine geologist Joe Kelley, land area roughly the size of Rhode Island has been lost to the forces of erosion in the last 75 years.

Historic and Projected Erosion Along Louisiana’s Coast, courtesy of Sudhayda/Curole, made possible by Restore or Retreat

“The scale of what has been considered isn’t big enough to really do anything,” says Kelley. “We need a long-term plan for people to learn to live with the forces at work here.

“There are certainly things that can be done to protect some of what we have, but I’ll say it again: people don’t build deltas. Rivers build deltas.” ■

Kelley’s call on Katrina

WHILE HIS involvement in the National Academy of Science’s review of Louisiana’s coastal improvement plan did not include an evaluation of the state’s levees, dikes or other storm-protection measures, Joe Kelley did write the book on the Louisiana coastline (*Living With the Louisiana Coast*, 1984), making him something of an expert on the gulf state’s ability to withstand hurricanes and other storms. His verdict on Katrina? There is little any city can do in the face of a major hurricane.

“Any city that gets a direct hit from a Category 5 hurricane is going to be destroyed, especially New Orleans because it’s so low,” says Kelley. “Even if they spent the money, it doesn’t matter if it’s tomorrow, next week, or 50 years from now: with a Category 5 hurricane, it wouldn’t matter.”





*Seeking
Spirituality*



By Dick Broom

UMaine sociologist undertakes a pilgrimage to discover the secrets of mysticism

ON HIS WAY TO writing about sinners, Kyriacos Markides was distracted by saints.

That diversion has led him to become an internationally recognized authority on Eastern Orthodox mysticism, focusing on the lives of monks, hermits and Christian healers for whom religious, mystical experiences are part of everyday life.

In 1979, Markides was in his native country, Cyprus, to begin research on international terrorism when he accidentally encountered a man who would change his life. Daskalos was a lay healer who lived only two miles from Markides' family home, yet the two had never met.

"When I was a boy, I heard stories about him," Markides says, "but we were taught to stay away because he was presumably dangerous, and in contact with the dead and the spirit world."

The more Markides talked with Daskalos and observed his unusual healing abilities — on several occasions, he accurately diagnosed people's illnesses over vast distances by simply "feeling" their photographs with eyes closed — the more intrigued the sociologist became with the idea of studying the extraordinary world within which the mystic lived and worked. He placed the terrorism project on the back burner and instead became an observer in Daskalos' circle of healers and mystics.

"As I watched these people in action and engaged them in conversations, I gradually came to suspect that the basic assumptions about reality within which most of us operate might be grossly inadequate," Markides says. "We have assumed that reality is only what we can perceive with our five senses and study with our scientific instruments. Of course, science is extremely important and is the best method for

Deep Roots, Old Strength #8 by Michael H. Lewis
turpentine wash (with oils) 2005

Seeking Spirituality

giving us knowledge of how our three-dimensional universe works. But the material universe of our everyday reality may not be the only universe and the only reality there are."

THE INITIAL CONTACT with Daskalos and his circles of followers led to a 10-year research project and a published trilogy (starting with *The Magus of Strovolos*) about their world and extraordinary experiences. It also led Markides to realize that many people carry on double lives. On one hand, they live ordinary, "normal" existences while, at the same time, they report having mystical experiences similar to those of Daskalos. However, they often remain quiet about their inner experiences in fear that they may be misunderstood or, worse, stigmatized as mentally ill.

The work with Daskalos and his circles eventually opened the way to the discovery of the mystical traditions and practices that survived in ancient monasteries of Eastern Christianity. To do his research, Markides has traveled extensively to meet monks, hermits, mystics and elders considered to embody the "grace of the Holy Spirit."

One of his best leads came in 1991 when a friend told him that "real saints" — people who radiated God's love — can be found on Mount Athos, an isolated peninsula in northern Greece where 20 monasteries form the center of Eastern Orthodox monasticism.

"Once I stepped onto the Holy Mountain, as it is called, my academic life and work changed once again," Markides says.

At the first monastery he visited, Markides was met at the gate by Father Maximos, whose wisdom and spiritual insights figure prominently in Markides' research and second trilogy. Though only 32 at the time, the charismatic Father Maximos was regarded by other monks as an "elder" and a spiritual guide.

"It was as if he had been waiting for me," Markides recalls. "He took me under his wing and became my informant about Eastern Christianity, especially its more mystical side. It was then that I realized that, contrary to the theories of the great German sociologist Max Weber, there is a part of organized Christianity that has all the hallmarks of what many Westerners search for in Hinduism and Buddhism, namely an 'enchanted' or experiential path to God."

The monks at Mount Athos told Markides of the extraordinary experiences of great saints and holy elders, of their visions and communion with the spirit world, of speaking with angels and fighting demons. Through Father Maximos, Markides also met a hermit living in a mountain cave. The pair walked several hours to meet the man who, like most hermits, was a former monk devoting himself to ceaseless prayer.

Contrary to the stereotype, the hermit was neither crazy nor an antisocial misfit, Markides says. "He was full of lively humor, wisdom and good heartedness. Because of an inner calling, he had opted to devote his time and energy to praying for the good of the world. Scores of healing miracles were attributed to him by devout pilgrims who considered him a living saint."

Markides also has spent time with 40 monks at the Panagia Monastery in the Troodos mountains of Cyprus. Again using the method of participant observation, Markides studied their world and listened to tales of miracles performed by living saints and the Holy Virgin. He listened to extraordinary experiences of monks that prompted them to abandon "the world" and spend the rest of their lives in prayer and contemplation. He also challenged them with a scholar's secular skepticism.

"We were engaged in discussions about all kinds of theological, spiritual and philosophical questions," he says. "I do ethnographic research, what any other sociologist or anthropologist would do when he or she enters into an 'exotic' culture or subculture, and tries to understand it from within and writes about it."

MYSTICISM, WHILE STILL a prominent aspect of the Eastern branch of Christianity, has been repressed or driven underground in the West, Markides says, because of the Enlightenment and the triumph of rationalism and the scientific revolution.

While Western Christianity, through scholastic theology, emphasized reason as the method to reach God, the leading Eastern theologians and holy elders emphasized contemplation and the way of the "heart" as the appropriate methodology on how to know God. This is radically different from trying to "prove" God's existence through reason. Rather, it is through spiritual practices, such

as continuous prayer, reminiscent of some of the yoga practices in Hinduism and Tibetan Buddhism, that could lead to mystical illumination and union with God, what the Greek fathers of the church call Theosis.

"Perhaps for a more holistic understanding of reality and for the good of the world, we may need to integrate the external enlightenment of the West with the inner enlightenment of the holy elders and mystics of all the great religions," Markides says. "It is becoming increasingly clear to many thinkers today, including some pioneering researchers in the sciences and humanities, that unless we incorporate the accumulated wisdom of the mystics into our world view, we will continue to shortchange ourselves in terms of our understanding of the nature of Reality with a capital R, with perhaps disastrous consequences about the future of our species."

Such a contention challenges not only Western theology, but also the assumptions underlying mainstream scholarship, teaching and research on virtually every college and university campus. But he insists that mystical religion and mainstream science need not be enemies, but, instead, partners in finding a more meaningful understanding of the cosmos.

"Most academics work within the context of reductionism, of materialistic prejudices that tell us that the reality we see with our senses and study with our instruments is the only reality there is," Markides says.

"We need to expose students to the possibility that there might be more to reality than what they know through their senses. We need to study the record that the great mystics in all religions have left behind, and perhaps employ in our daily lives some of their methods of meditation and contemplation."

At the very core of all the great civilizations and religions are great teachers who had mystical experiences and visions — the Buddha under the Bo Tree, Moses on Mount Sinai, Paul on the road to Damascus, Markides says.

"For example," he says, "it is impossible to imagine how Christianity and the world would have been today had Paul not fallen off his horse that fateful day of the first century when he underwent his mystical epiphany." ■



Kyriacos Markides, left, and Michael H. Lewis.

Photo by Bill Drake

Both
researchers
ask us to
suspend
disbelief so
that we may
be sensitized
to the
possibility of
transcendental
realities.

Two paths, one journey

MORE THAN 25 years ago, artist Michael H. Lewis and sociologist Kyriacos Markides each began research on the same subject — spirituality. Lewis used the Maine landscape as a starting point for his turpentine wash paintings, suggesting a mysterious and timeless inner reality.

Markides encountered monks, hermits, healers and spiritual elders, and wrote about their teachings and mystical experiences. In the 1980s, Markides sought out Lewis' paintings as cover art for the first of his six books and Lewis started providing feedback on Markides' manuscripts. They became fast friends, inspiring and encouraging each other, and sharing ideas while walking the wooded paths on the University of Maine campus. The two UMaine faculty members continue their independent research, each seeking the transcendental moments that are all around us. The enigmatic subject of spirituality is made accessible through Markides' narratives and Lewis' landscapes. They take a global, nondenominational approach to exploring inner enlightenment. Both researchers ask us to suspend disbelief so that we may be sensitized to the possibility of transcendent realities. The books and paintings invite participation and encourage us to draw our own conclusions.



Female and male wild-type *Drosophila melanogaster*.
Microscope/camera details: Leica MZFLIII/Axiocam, flies anesthetized with CO₂.
By Kristina Yu, ©Exploratorium, www.exploratorium.edu

UMaine biologist attracted to *Drosophila* heartbeats and courtship songs

By Luther Young

HAROLD “DUSTY” DOWSE looks at fruit flies differently from the rest of us. While we may wonder how the pests magically appear when a ripe banana calls, he wonders what makes their little hearts beat, and what governs their biological clocks and sonorous courtship “songs.”

For 25 years, Dowse, a professor of biological sciences at the University of Maine, has probed and measured and recorded *Drosophila melanogaster*, or the common fruit fly, using the insect’s remarkable modeling of fundamental mammalian biology to seek clues to human disease and development.

Along the way, he has established a niche as one of the research community’s leading “fly people,” as the tight-knit group of *Drosophila* investigators is called. Dowse has published more than 50 papers in peer-reviewed journals and shepherded generations of graduate students into professional research careers, many focused on fruit flies.

“You have to pay homage to *Drosophila*,” Dowse says, referring to the fly’s nearly 100-year history as an inten-

sively studied model organism, and its major contributions to the modern understanding of genetics and developmental biology. “Their genome is moderate in size, they have short life cycles, they’re easy to care for. Why use anything else?”

Those who conduct research with mice or worms could probably come up with some reasons. Fruit flies are just a sixteenth of an inch long and tend to escape to far corners of the laboratory unless soundly anesthetized with carbon dioxide. An entire experiment can be ruined by a sneeze or stumble. Manipulating them calls for the dexterity and the patience of a jeweler.

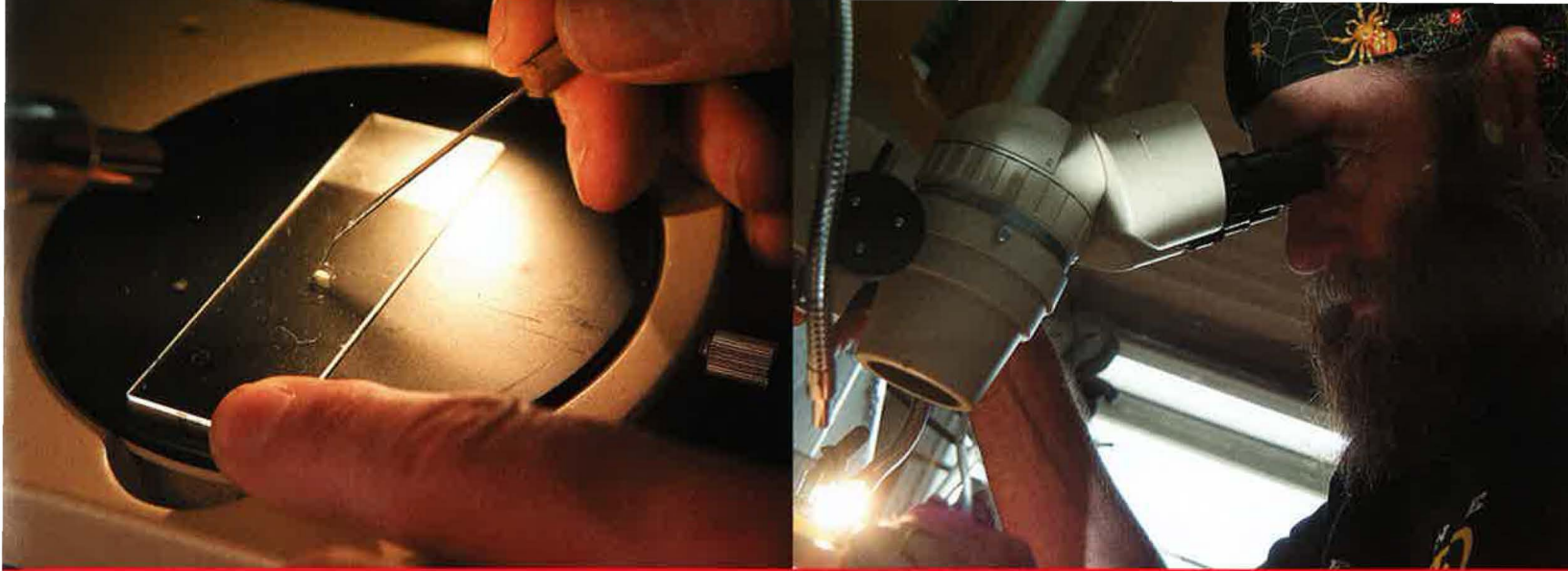
But Dowse, 60, knows his flies, inside and out, after working with *Drosophila* for much of his career, and he relishes spreading the gospel about the “exotic” research taking place in his various inner sanctums located throughout Murray Hall, assisted these days by graduate students Nick Brandmeir and Allison Cox.

WIDELY RECOGNIZED on campus, not just for his longtime tenure and ubiquitous

teaching, but for his dark bushy beard, colorful do-rag, earring and the Harley he rides from his home in rural Cambridge, Dowse is an independent sort, a laid-back father figure to his many students and a tinkerer who invents and builds much of his own laboratory equipment.

“I walked in the front door here in 1979 and said to the secretary, ‘I’m looking for work,’” recalls Dowse, who graduated with a Ph.D. in biology from New York University in 1971. During his eight-year, post-graduate hiatus, the Albany, N.Y., native worked as a short-order cook at a truck stop and as an electrician’s helper, and built custom wood cabinets in his own business.

He was rescued from the UMaine doorstep by Frank Roberts, then-chair of the Zoology Department, and hired as a half-time instructor in comparative anatomy. By 1986, he was solidly established in a tenure-track position in what is now the Department of Biological Sciences and collaborating with colleague John Ringo, a *Drosophila* geneticist who studies their cardiac rhythms and mating behavior;



Professor of Biological Sciences Harold Dowse prepares to monitor the heartbeat of a fruit fly pupa. Its heart movement, usually 120 beats per minute, can be viewed optically and electronically as a signal on a computer monitor. The goal of Dowse's research is to understand the cardiac pacemaker, the electrochemical oscillator that generates heartbeat. Dowse has discovered a number of mutations that render the heart arrhythmic, and is probing the way such lesions yield information on the ion channels of the pacemaker. Neurotransmitters and ion channel-specific toxins also are used to alter function. Photos by Bill Drake

with fruit fly neurogenetics researcher and National Academy of Sciences member Jeffrey Hall of Brandeis University; and others around the country.

DOWSE'S ENTRY into the *Drosophila* research arena came some 70 years after Thomas Hunt Morgan and three of his students at Columbia University pioneered the study of mutations in fruit flies to formulate the chromosome theory of inheritance. Within a few years, *Drosophila* had enabled a slew of discoveries, including the first proof that chromosomes contain genes and that ionizing radiation causes genetic damage.

But it was in the late '70s and early '80s that the field took off, hand in hand with the revolution in molecular biology.

"The closer we looked, the more it became clear how similar the basic development processes are in all living things," Dowse says. This conservation of biological

function between species means that, if a gene can be identified in *Drosophila*, researchers have a good idea where to look for a "homologous" gene in humans.

Drosophila has approximately 13,600 genes, compared to upward of 25,000 in humans, and only eight chromosomes, compared to 46 in humans.

In combination with the use of selective toxins and neurotransmitters, such as serotonin, norepinephrine and dopamine to systematically alter cardiac function, Harold Dowse and his colleagues have identified two ion channels that constitute the core of the *Drosophila* pacemaker, and most likely play a similar role in mammalian systems.

In addition to such basic processes as the systematic implementation of the body's structural blueprint during embryonic development, the homology extends to higher-order processes like learning, memory, sleep, neurodegeneration and addiction behaviors.

The release of the *Drosophila* genome sequence has further accelerated discovery, Dowse says. The collaborative sequencing effort — first published in March 2000 and steadily refined since then — confirmed that

Dowse's early work at UMaine involved probing the genetic control of *Drosophila*'s biological clock, specifically circadian rhythms. The research benefited from his natural bent for mathematics, signal analysis and computer programming.

"I'm the gray eminence in spectral analysis," he jokes. "I still get calls and e-mails from people around the world asking for help with Fortran programs I wrote 20 years ago."

BUT IT'S ANOTHER rhythm that has been the main focus of his laboratory since the early 1990s: heartbeat, which he studies in the pupal stage when *Drosophila* is still transparent and largely dormant. Heart





In Harold Dowse's lab, generations of fruit flies live in glass vials, where they are fed a diet that includes molasses, yeast and cornmeal. Graduate student Nick Brandmeir uses the fruit flies to study the role of neurotransmitters, the chemical messengers released by nerve cells. Male and female fruit flies are anesthetized and then transferred to a multichambered "mating wheel," where they are paired for observation. By examining changes in the mating behavior of fruit flies, Brandmeir hopes to better understand how specific chemical signals affect the processing of information and the production of behavior in the central nervous system of animals.

movements — 120 beats per minute in normal flies — are monitored optically. The signal displays on a computer screen, through an apparatus he designed. "It's noninvasive, I don't have to anesthetize them," Dowse says simply. "It seems the less you do to your organism, the better."

His goal is to understand the cardiac pacemaker, the electrochemical oscillator that generates heartbeat. In 1995, Dowse coauthored research that proved insect hearts are myogenic — the heartbeat is generated in muscle — as opposed to neurogenic, or nerve-driven, as had been previously thought. Since mammalian heartbeat is also myogenic, and taking into account many other parallels, *Drosophila* can serve as a useful model for studying basic molecular mechanisms of human cardiac function.

To elucidate those inner workings, Dowse targets mutations in the fly that affect so-called ion channels, directional electrochemical gatekeepers in the cell that are critical to an organism's nervous and muscular systems. His laboratory has stud-

ied a number of ion channel gene mutations that exhibit severe cardiac arrhythmias, including slowpoke, no-action-potential temperature sensitive, amnesiac, and ether-a-go-go, a bizarre defect that causes flies awaking from ether anesthesia "to bounce around like popcorn popping."

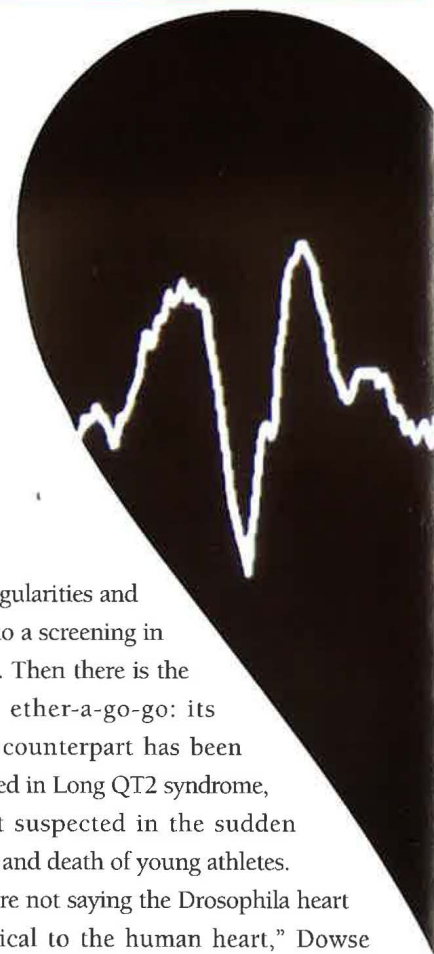
In combination with the use of selective toxins and neurotransmitters, such as serotonin, norepinephrine and dopamine to systematically alter cardiac function, Dowse and his colleagues have identified two ion channels that constitute the core of the *Drosophila* pacemaker, and most likely play a similar role in mammalian systems.

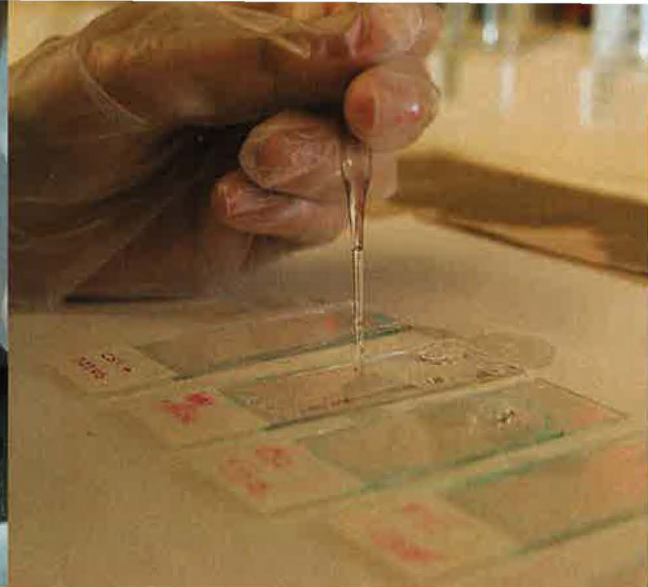
"No pacemaker in any species has ever been completely worked out, but I'm confident I can get the major pieces in place within the next couple of years," he says. "We already have most of the key players."

The implications for human health are promising. Mutations in two genes originally discovered in *Drosophila* have been proven to underlie cardiac disorders in humans. The first is tinman, a developmental gene, which when defective causes heart-

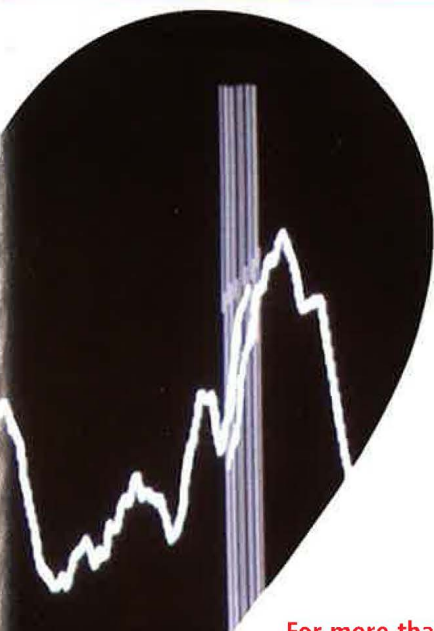
beat irregularities and has led to a screening in humans. Then there is the famous ether-a-go-go: its human counterpart has been implicated in Long QT2 syndrome, a defect suspected in the sudden collapse and death of young athletes.

"We're not saying the *Drosophila* heart is identical to the human heart," Dowse says. "But at the level of these basic mechanisms, *Drosophila* is making advances possible that can't be made in humans."





In her master's research, Allison Cox is studying a gene called *cacophony*; mutations in it result in an unusually rapid heartbeat and an aberrant courtship song. Using immunohistochemistry, she is trying to determine the anatomical location of *cacophony*'s expression. By driving the tissue-specific expression of wild-type *cacophony* in a mutant background, she also hopes to determine where *cacophony*'s expression is involved in the production of courtship song. Cox records the *Drosophila*'s mating songs to look for differences in the genetic and molecular constructs in the ion channel structure.



For more than a decade, Professor of Biological Sciences Harold Dowse has studied the heartbeat of the fruit fly. His goal is to understand the cardiac pacemaker, the electrochemical oscillator that generates heartbeat. *Drosophila* can serve as a model for studying basic molecular mechanisms of human cardiac function.

ONE SUCH ADVANCE that definitely rules out human subjects is his study of *Drosophila* courtship songs, a frivolous-sounding enterprise that involves depositing male and female fruit flies in a small, clear plastic chamber — a honeymoon suite — and recording the male's mating entreaties. Dowse places the vocalizations into two categories: a humming "sine song," and "tone pulse song," a buzz produced through rapid vibrations of the wings.

Drosophila courtship songs are astounding in their ethereal complexity. Songs of one species other than *melanogaster* (there are an estimated 900 species worldwide) even include a "female rejection sound."

So? Through collaborations with Jeffrey Hall, who is in the process of retiring from Brandeis and has joined Dowse at UMaine, the courtship research has focused on the *cacophony* mutation, which — you guessed it — causes cacophonous mating songs in male fruit flies. And *cacophony* just happens to involve an ion channel defect that also affects heartbeat frequency and regularity.

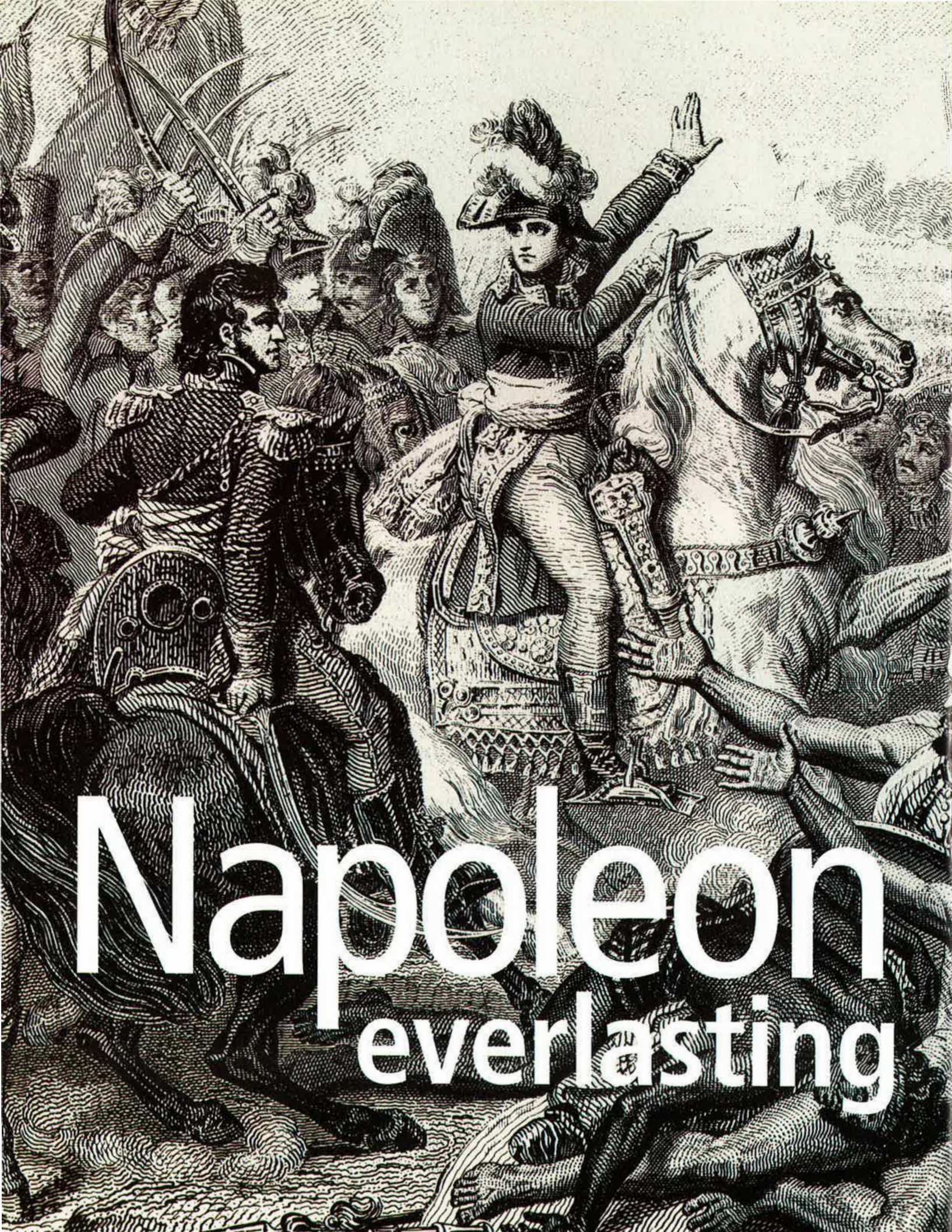
"We're apparently looking at the same thing in heart as in song," says Dowse, stopping well short of any Valentine's Day sentiment. "It's an intriguing connection that we're continuing to study." Allison Cox has made *cacophony* and courtship songs her master's degree research project.

Down in the basement of Murray Hall, Dowse proudly shows off his collection of dozens of fruit fly-filled test tubes, each containing the food mixture that *Drosophila* like to eat best: molasses, agar, malt, brewer's yeast, cornmeal. Each tube houses a different mutation, ordered directly from the nation's premier fruit fly nursery, the Bloomington Stock Center in Indiana, or generously donated by colleagues.

It's a deceptively simple, understated operation that belies the importance of what he's done to help unravel the genetic mysteries of *Drosophila melanogaster*, and its related species, *Homo sapiens*.

"You can do so many things with flies," Dowse says, still marveling after all these years. ■





Napoleon
everlasting

UMaine historian studies the emperor's centuries-old influences on modern-day Europe

By Wayne E. Reilly

hE WAS SHORT of stature and long on military might. From paintings of the era, he is pictured as a general riding into battle on a white steed, the classic three-cornered hat perched sideways on his head, or as an emperor, posing on his throne or in his study, medals adorning his chest, his right hand tucked into his waistcoat. To the French, he was a hero; to much of the rest of the world, a conquering tyrant. Waterloo was his downfall.

No matter how much or little you know about Napoleon Bonaparte and his reign (1799–1815), the fact is, you know OF him. That's how far-reaching is the man's mythology. The military genius who made himself emperor of much of Europe died nearly 200 years ago after being exiled to a small island in a desolate stretch of the south Atlantic. Yet vestiges of his memory linger and references to his reign have even made it into the lexicon. (Today, it's unfortunate if someone has a Napoleonic complex or has met his Waterloo.)

It's estimated that more than 220,000 books have been written on Napoleon since his fall from power — more books than about any other historical figure except Jesus Christ, according to historian and author Paul Johnson.

“There is a myth around Napoleon. He is the fulfillment of the American Dream, so to speak,” according to University of Maine Professor of History Alexander Grab, whose research on Napoleon spans almost 20 years. “He was a person who rose from a relatively obscure background to become the most powerful statesman in Europe, a major ruler, an emperor. Unlike Alexander the Great and Charlemagne, Napoleon did not inherit the throne. He has fascinated people because of this.”

Napoleon Bonaparte was only 26 when he was appointed commander of French troops on the Italian front. He was 30 when he became first consul; 35 when he crowned himself emperor. His many military victories and the important legacies he left to France, including the Napoleonic Code, which stressed legal equality and property rights that are still the foundation of French civil law today, also explain the considerable interest in him, says Grab.

But for all we still find fascinating about Napoleon, there is much we don't know. Some of the truth has been shrouded in mystery or sensationalized, the result of propaganda Napoleon himself orchestrated. Today, one of the most visible debates is about whether Napoleon was poisoned or died of stomach cancer at age 51 at Saint Helena.

To understand the Napoleonic period, one must look beyond the military campaigns and his private life and study the economic, social, administrative and cultural aspects of his



Napoleon Bonaparte's tyranny and triumph were skewered by satirists and romanticized by artists of his day. Indeed, the self-crowned emperor orchestrated his own propaganda to memorialize his legacy. Many of those same characteristics and quirks immortalized in art have fascinated scholars through the ages, making him a cultural icon.

Above: Napoleon, Crowned by Time, Writes the Civil Code, Salon of 1833. Oil on canvas by Jean Baptiste Mauzaisse, Chateaux de Malmaison et Bois-Preau, Rueil-Malmaison, France. Image courtesy of Réunion des Musées Nationaux/ArtResource, N.Y.

Left: Detail from Battle of the Pyramids. 1798. Engraving. Napoleon leads the French against the Mamelukes.

The Napoleonic regime had a Janus face: reform and innovation combined with subordination and exploitation.

Alexander Grab

reign, says Grab. And to do that, one must look beyond France.

“Napoleon was as much a part of European history as he was of French history,” says Grab, whose latest book on the emperor, *Napoleon and the Transformation of Europe* (2003), took first place in the International Napoleonic Society’s annual book competition last year. “A critical component of Napoleon’s historical role was his effort to consolidate French hegemony throughout Europe and establish himself as its dominant ruler.”

NAPOLEON NEARLY succeeded in uniting Europe two centuries before the Euro. He reshaped the map of Europe by annexing foreign territories, creating new satellite states, shifting borders, toppling dynasties and imposing new governments. Across the continent, from Madrid to Warsaw and from Hamburg to Naples, he conscripted young men and imposed taxes to support his Grande Armée. With collaboration from the 10 European countries in the Napoleonic Empire, he imposed his most significant policy after 1806, the Continental Blockade, which virtually ensured French economic domination and shut out his fiercest enemy, Britain.

In addition to the overt acts of exploitation and conquest were reform programs established by Napoleon that transformed and modernized the infrastructure of many European countries, sparking nationalism. His reform policies included the creation of a centralized state with a professional bureaucracy based on merit, as well as secondary schools, state police forces, national markets and secularization of church property.

The intensity and depth of the reform programs varied across the continent. In the countries of the “inner empire,” such as Western Germany and Northern Italy, Napoleonic reforms thrived and endured.

However, massive resistance in Spain limited the effect of the Napoleonic reform policies in that country. Opposition by the nobility in the Grand Duchy of Warsaw and the Kingdom of Naples prevented certain reforms, such as full emancipation of peasants.



Napoleon nearly succeeded in uniting Europe two centuries before the Euro. He reshaped the map of Europe by annexing foreign territories, creating new satellite states, shifting borders, toppling dynasties and imposing new governments.

*An Attempt to Swallow the World !!! 1803.
By George Moutard Woodward.
Image courtesy of the Bullard Napoleon Collection,
Brown University Library*

POLICIES NAPOLEON launched as a French and European ruler, reformer and military commander were closely linked, says Grab. In his view, France’s role was to provide a model for the improvement of the rest of Europe, while Europe’s function was to acknowledge the supremacy of the French structure and supply the resources to aggrandize the French position in Europe.

“Napoleon was a catalyst of modernity on a European scale,” Grab says. “By building the central state, abolishing the privi-

leges of the church and nobility and weakening their grip on power, advancing the interests of the bourgeoisie, proclaiming legal equality and promoting economic unity, Napoleonic rule paved the way for the modernization of Europe.”

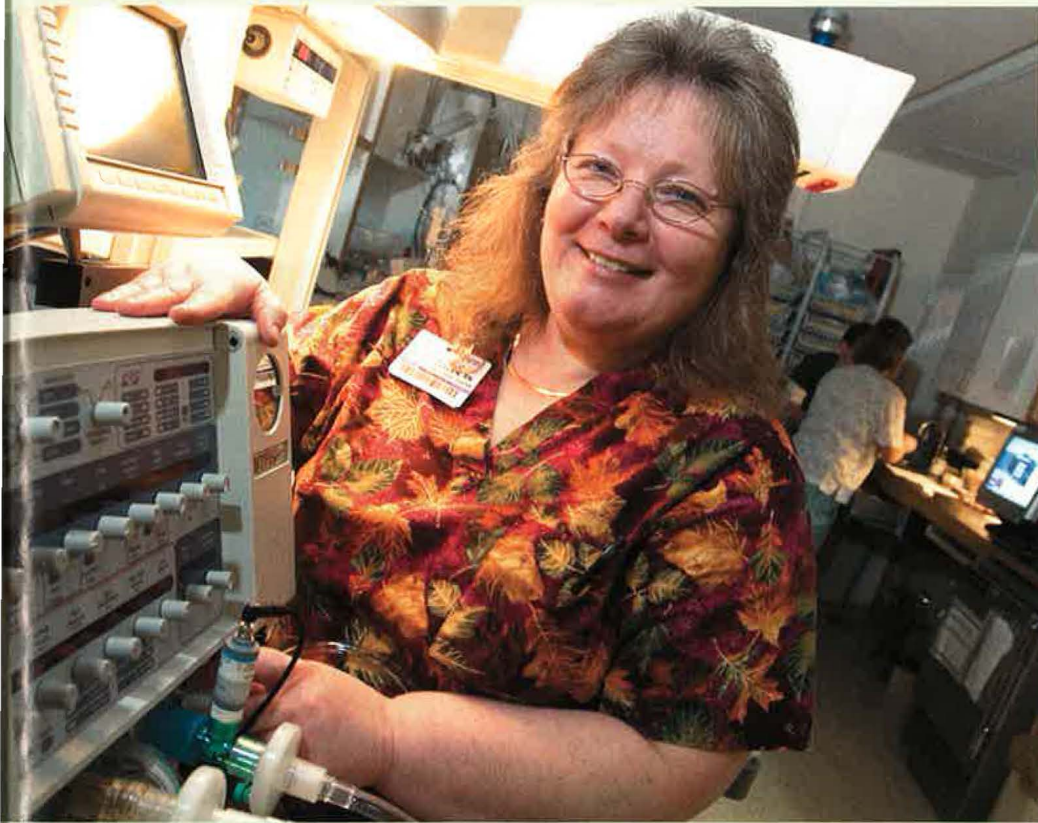
Another reality: After victorious allies wiped out much of Napoleon’s territorial organization in Europe and deposed his governments in 1815, many restored rulers kept the infrastructures for raising taxes, recruiting soldiers, maintaining law and order, and dealing with the church.

Napoleon’s victories “sent a clear signal to European rulers that modernization of state apparatus based on the French model was indispensable if they wanted to survive and play a role in the international arena,” Grab says.

The Napoleonic regime, he says, had a Janus face: reform and innovation combined with subordination and exploitation. Romantics portray him as a “Man of Destiny”; his critics characterize him as the “Corsican Bandit.” Grab resists efforts to romanticize or vilify. The fact is, Napoleon came from a Corsican family with connections to the French establishment. A brilliant opportunist, he ruthlessly took advantage of the moment and of others’ weaknesses to seize power. His reforms were constructed on the intellectual legacy of the Enlightenment, using the building blocks of the French Revolution.

“Without the changes of the French Revolution and the national army, there would be no Napoleon. Without the fact that France was one of the richest and most powerful countries in Europe, there would be no Napoleonic victories,” he says.

We must examine the Napoleonic achievements within those contexts, Grab cautions. “The idealization of any leader, no matter how powerful and accomplished he or she is, will be in general a misconception.” ■



As a graduate student, registered nurse Susan Cullen developed a neonatal transport and triage database, and a training curriculum for healthcare providers who work with substance-exposed newborns.

Photo by Bill Drake

Nursing research improves critical care for Maine's newborns

UNIVERSITY OF MAINE graduate student Susan Cullen touches the lives of many of the premature babies born in the northern two-thirds of the state, from Waterville to Madawaska.

Cullen is a clinical nurse educator in the Rosen Neonatal Intensive Care Unit (NICU) at Eastern Maine Medical Center (EMMC) in Bangor. For the past four years, she has assisted with infant stabilization education to neonatal staff, as well as to healthcare providers in central, eastern and northern Maine.

EMMC's neonatal outreach education programs teach skills such as neonatal stabilization and resuscitation techniques, as well as recognition and management of neonatal narcotic abstinence syndrome (NAS), a condition of infants born to mothers with

substance abuse issues. Adequate stabilization of infants prior to transport by ambulance from a community hospital to one of Maine's two tertiary centers is essential for optimal infant health outcomes.

"Maine has the lowest infant mortality rate of all of the states for 2005," says Cullen. "I have to believe that education, communication and standardization of practices have much to do with that statistic."

Cullen, who comes from a family of nurses, started her career in critical care in 1973 at Maine Medical Center in Portland. At EMMC, she worked for several years as a resource nurse and as a member of the Clason Intensive Care Unit staff before joining the NICU. In 2002, she became a clinical nurse educator. Three years earlier, she had returned to college to obtain her bachelor's and master's degrees.

"In medicine and nursing, information changes so quickly," says Cullen, who was a registered nurse with 26 years of professional experience when she enrolled. "I came back to school because I felt that I was falling behind in technology skills. Both UMaine and EMMC have given me the tools to develop my skills and expertise."

Cullen, in collaboration with Paula Corsaro, database specialist in EMMC's Healthcare Research Department, has developed a neonatal transport and triage database to be used as a quality assurance and research tool. Education concerning vital neonatal indicators can be tracked and the confidential records can assist researchers.

In addition, as part of her master's research, Cullen responded to the influx of substance-exposed infants in the region by helping to create an educational program to assist healthcare providers in the identification, stabilization and treatment of NAS infants. Her educational outreach efforts also extend to the parents of these infants who need heightened awareness and the skills to care for these often challenging newborns.

"The bottom line is the health of the baby," Cullen says, "The sooner a sick baby is stabilized, the better he or she will do in the long run. The goal is to decrease the length of stay, morbidity and mortality through better techniques and modalities of stabilization and transport."

Research on issues relating to nursing has implications for patient care, Cullen says. That's why, now that she completed her master's degree in December, she expects, at some point, to start work on a Ph.D.

Whales Inside

UMaine graduate student's research is piecing together the life histories of finbacks

By Margaret Nagle

Photos by Carl D. Walsh



Daniel DenDanto was an undergraduate at the College of the Atlantic in 1989 when he did his first whale articulation, a finback skull. Three years later, his first professional installation was for the Bar Harbor Whaling Museum. He is now a sought-after, national expert on marine mammal skeletal articulation. In 2004 alone, he did three. They included his eighth articulation, and his largest: a 46-foot bull sperm whale that is now the centerpiece of the Nantucket Whaling Museum. The 80,000-pound whale floundered near Nantucket in 1997 and, despite rescue efforts, died two days later. Eventually, the carcass was stripped and the bones buried to begin the cleaning process. They then were placed in cages in the ocean and stored in a barn until DenDanto and his team could begin the eight-month project.

FOR DANIEL DENDANTO, there is no better place in the world to be than in a 16-foot rubber boat miles off the coast of Maine and within yards of the largest mammals on Earth.

Extreme whale watching.

Out of the hundreds of hours he has spent in the open North Atlantic in the past decade studying the little-known lives of fin whales, DenDanto has had four close calls. One summer when filming a BBC documentary with cinematographer Peter Scoones, a right whale came under their boat and lifted it out of the water. Another time, a fin whale collided with his small, inflatable craft. Once, as DenDanto was filming a mother whale and baby, the pair turned and came toward him. “We grazed flipper to flipper (a.k.a. DenDanto’s scuba fin) as I back tread to avoid their flukes,” he says.

In the fourth situation, he and his colleagues were biopsying a group of three live animals when one of the whales got close enough to go eyeball-to-eyeball with DenDanto.

“Those are wow moments; immense, impressive situations. At the same time, I’m also very aware of the inherent danger. Whale biologists work at the edge of the envelope where bad things can always happen,” says DenDanto, who quips that he always goes to sea with his wallet because “I want my wife to get the life insurance.”

DenDanto, of Seal Cove, Maine, a University of Maine Ph.D. student, is one of the world’s authorities on fin whales, *Balaenoptera physalis*, which

Out

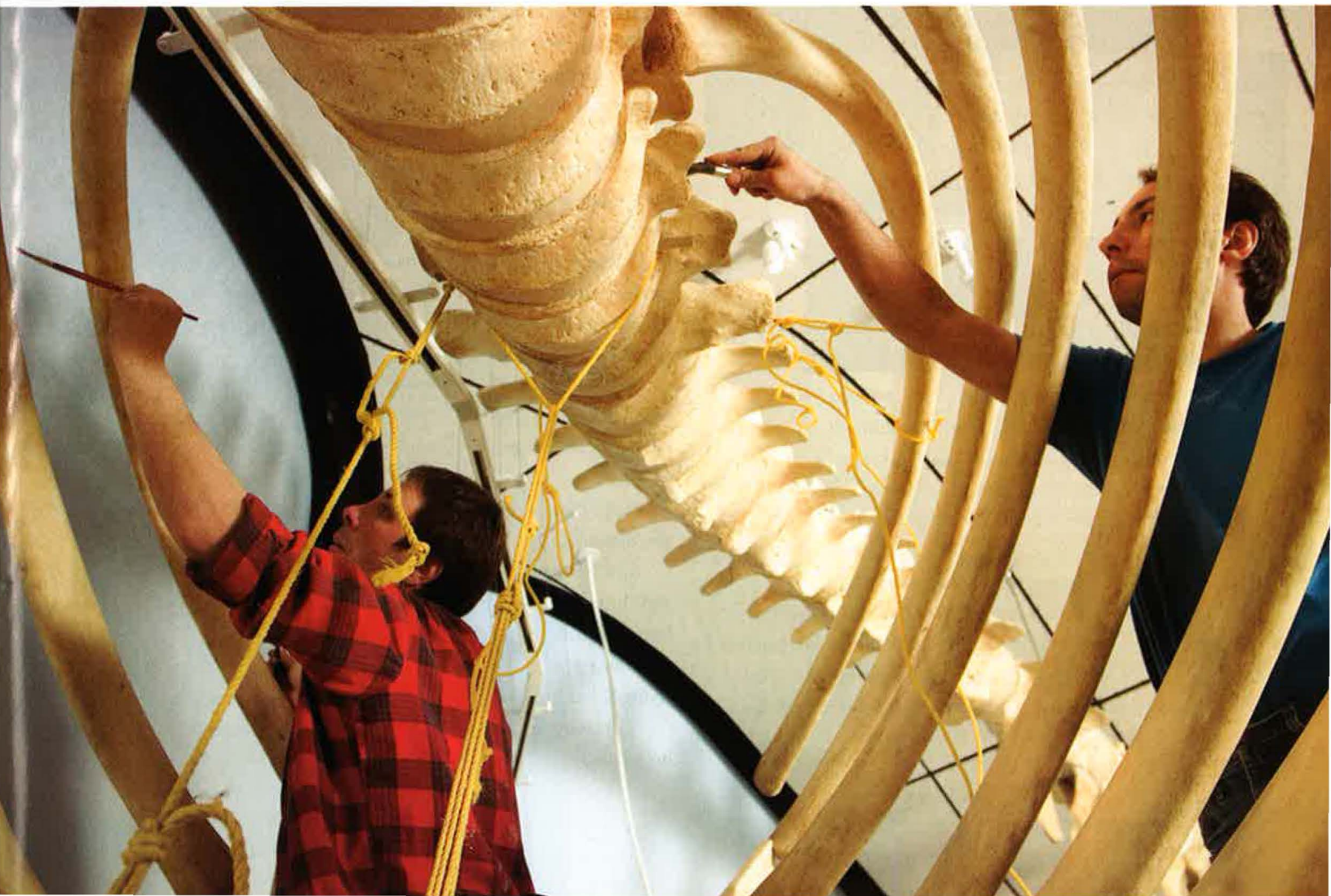
can grow to more than 88 feet long and weigh up to 70 tons. One of the fastest great whales, finbacks are capable of bursts of speed up to 23 miles per hour (20 knots) and have been dubbed the “greyhound of the sea,” according to the American Cetacean Society.

For more than 15 years, first as an undergraduate at the College of the Atlantic (COA) in Bar Harbor, Maine, then as a UMaine graduate student and scientist with COA’s marine mammal laboratory, Allied Whale, DenDanto has conducted research to better understand finbacks in the wild. His expertise in ocean mammals developed to the point that he started doing skeletal articulations¹ for museums and schools. Today, he is one of the nation’s leading experts in marine mammal skeletal articulation, a sideline that is putting him through graduate school and allows him to focus on his primary research subject: finbacks.

“The oldest lactating fin whale we know of was 97 years old and possibly still having babies,” DenDanto says. “When you have that long a life and



A broken tooth and abscess may have resulted in an infection in the 25-year-old sperm whale that beached in Nantucket in 1997. Daniel DenDanto, below, right, and his brother, Frank, put the finishing touches on the ribs and vertebrae in the Nantucket Whaling Museum.





Flatbed trailers were rented to transport the whalebones to Seal Cove, where the final degreasing was done and structural reconstruction begun. Starting with the 14-foot skull, which alone weighs 1,400 pounds, Daniel DenDanto boiled the bones in a huge vat installed in his backyard to remove residual oil. Chris Tremblay, top photo, feeds the fire during the 24 hours required to boil the skull. Then the skull is power washed.

interaction with other individuals, you have the potential to develop a society or culture. Are the individuals in the Gulf returning year after year because of a common food source or because there's some sort of meaning to the grouping? The data suggests the individuals we're seeing annually are not randomly associated, that they may migrate in long-term, multiyear affiliations."

DENDANTO IS ONE of those rare people who said he wanted to study an animal as exotic as whales when he grew up, and he did just that. He was 7 when the size, grace and longevity of the largest Earth mammals caught his imagination. To this day, his family isn't sure how a kid growing up in landlocked Middletown, N.Y., who summered in the Finger Lakes region, became so fascinated by whales and their ocean habitat.

In 1987, DenDanto enrolled at the College of the Atlantic to study with noted whale biologist Steven Katona, now COA's president. DenDanto's first interest was in the anatomy of whales and their physiological adaptations to the marine environment.

It was while working as a research assistant at Allied Whale that DenDanto began his study of fin whales. He started exploring biological questions in the hopes of answering long-held mysteries, such as where the species goes to breed when it migrates in the winter, and whether there is a social structure within the population.

Finbacks are found in oceans around the world, but they don't move between ocean basins. Annually, they migrate to areas of food productivity, like the Gulf of Maine. In these environments, they develop feeding strategies and associations with other individuals.

Whales are the largest, most abundant natural consumers in the North Atlantic coastal ecosystem; therefore, they have the largest impact on the region's marine environment. Yet scientists know so little about them.

"The reason we don't know much is because they're fast; businesslike and difficult to approach," DenDanto says.

Answers may be found in analyses of fin whales' DNA. Since 1991, and throughout his years as a UMaine graduate student, DenDanto has been collecting biopsy samples from live fin whales in the Gulf of Maine. Now as a Ph.D. student working with UMaine evolutionary biologist Irving Kornfield, DenDanto is studying fin whale demographics.

"For example, you can set your calendar by the return of George (a fin whale named after Washington because it was the first to be recog-

nized through photographic identification) off the coast of Bar Harbor the third week in June,” he says. “And he’s been doing it now for 25 years. We want to know the meaning behind individuals that tenaciously come back to this place.

“Doing sociological research could provide a model for understanding how the species is organized globally, including subpopulations or herd boundaries. That’s important information for managing the species.”

IN THE NORTH ATLANTIC, DenDanto and science colleagues, as well as many COA students, make close approaches to the finbacks. Aboard small, inflatable boats launched from research vessels or Mount Desert Rock Marine Research Station, DenDanto and his crews photograph whales that surface, hoping to

document distinctive markings and other features to help the analysts make photographic identifications.

On these up-close-and-personal encounters, DenDanto also uses a crossbow-like instrument that shoots modified arrows into the skin of the whale to retrieve a pencil eraser-size tissue sample. In his genetics research at UMaine, DenDanto first tackled the logistics of fin whale DNA identification, matching the molecular fingerprints found in tissue samples with photographic identification of the cetaceans. Now in his Ph.D. work, DenDanto is exploring the fin

whales’ life history, combining knowledge of an individual’s sex with sighting histories and kinship affiliations, such as siblingship and paternity. He is using the more than 300 biopsy samples collected during 11 field seasons in the North Atlantic.

“After years of biopsy collection, the data set is now large enough to do some testing,” says DenDanto, talking about what is one of the world’s largest discrete genetic samplings from finbacks, combined with photo-identification tracking, the Allied Whale North Atlantic Finback Whale Catalogue. “For me, it is the Holy Grail, where I seek answers to the questions.”

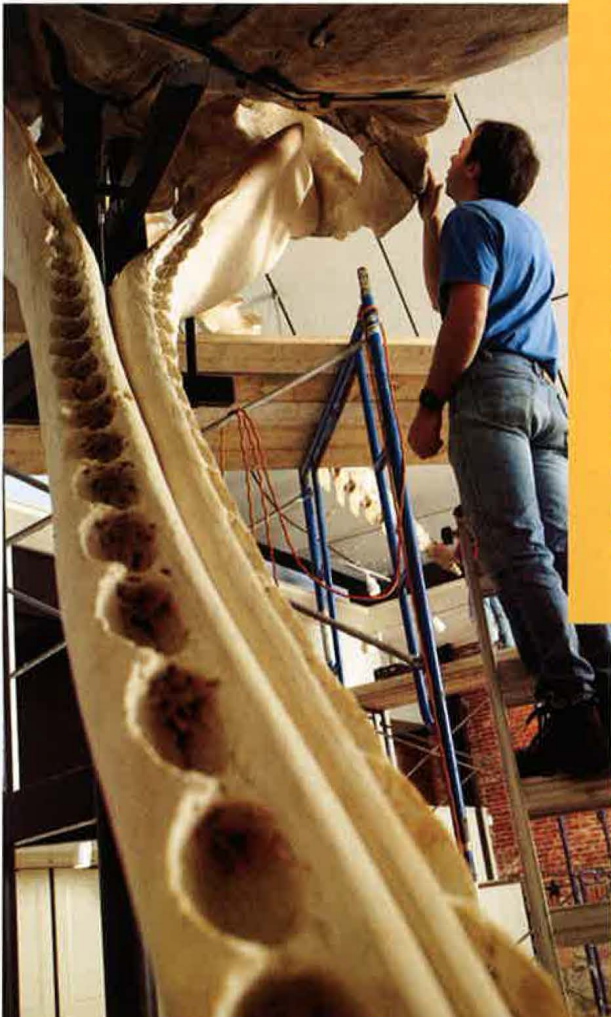
This academic year, DenDanto is analyzing his data in the laboratory. When he’s not doing that, he’s a teaching assistant in an undergraduate class. Or he’s assisting in the Molecular Forensics Laboratory, directed by Kornfield.

At the College of the Atlantic, DenDanto is now a research associate. He also is a senior whale scientist with Allied Whale, and station manager of the Mount Desert Rock Marine Research Station, located 25 miles offshore in the Gulf of Maine.

However, DenDanto’s first love is direct contact — being hands-on — with whales, whether in an articulation project or on the water. Their mystery and beauty are never far from his mind.

“I enjoy going out on the ocean. I’m driven like other people in my family. I come from a long line of workers. For me, (understanding finbacks) is like working to become an Eagle Scout. I couldn’t stop until I got to the goal. I got it at 13. Whales are not unlike that for me.” ■

Using steel rods and epoxy, the 3,500 pounds of whalebones were reassembled in modules and delivered to Nantucket in December 2004. “There is an artistic component to this,” says Daniel DenDanto. “I don’t want people to see any of the structural assembly; people should see the bones without the steel and wires. I go to great pains so people will not see what’s holding them up.” Another way DenDanto’s whale installations stand out is in their authentic poses. After 15 years of working with whales in the wild, he is familiar with their movements and hopes to capture that drama in sculpture.



NEUROSCIENCE in the K-12 classroom

COGNITIVE NEUROSCIENTIST and clinical psychologist Herbert Weingartner will bring his extensive experience in mind/brain research to the University of Maine as the 2005-06 Shibles Distinguished Visiting Professor in the College of Education and Human Development.

An acclaimed researcher who has held top leadership positions at the National Institutes of Health, Weingartner will work with UMaine faculty to develop a blueprint for applying basic cognitive neuroscience knowledge to practical problems associated with development and education, and to build an interdisciplinary approach to investigating the various psychological and neuroscience bases of human intelligence.

During his UMaine visits in the next 18 months, Weingartner will work with faculty, students, educators and policymakers.

The cognitive neuroscience initiative within the College of Education and Human Development focuses on emerging brain research and its implications for teaching and learning. Employing the latest in brain imaging technology, faculty researchers and students will observe cognitive functioning and development in children and adults, and determine what adaptations need to be made in pedagogy to affect growth and development of cognitive abilities.

The initiative will feature interdisciplinary approaches among faculty in child development, education, psychology and the biological sciences.

WITH PASSAGE OF A jobs bond last November, the University of Maine Laboratory for Surface Science and Technology (LASST) will receive \$2 million to enhance its nanotechnology research and development capabilities.

The monies will be invested in state-of-the-art microfabrication and nanotechnology equipment for LASST's "clean room," advancing capabilities in such areas as semiconductors, sensors, precision manufacturing and biomedical technology.

For example, the equipment will facilitate research on biomedical



New Nano Capabilities

Five small, high-tech Maine companies that produce miniature smart sensors and detectors already have emerged from LASST research. New products are being commercialized to monitor contaminants in our environment, assess food quality and diagnose health problems.

microinstruments that one day could provide automated drug delivery, disease diagnostics and implantable biosensors.

Like the 2003 bond that allowed UMaine's Advanced Engineered Wood Composites Center to expand and subsequently land a \$6.2 million U.S. Army research program, the latest LASST funding is expected to allow UMaine to continue to attract multimillion-dollar R&D grants from federal agencies, hire and train a skilled workforce in Maine, and provide resources for businesses.

Racing Conditions

HORSES HAVE BEEN RACING on tracks for centuries, but the conditions of the surfaces they run on are still characterized in vague, qualitative terms, such as fast and hard, or wet. To improve track conditions, as well as the safety of jockeys and horses, a University of Maine mechanical engineer has prototyped a machine that can quantitatively evaluate track shear strength and stiffness.

Associate Professor Michael Peterson has developed a device that can be mounted on the back of a vehicle and taken to the track, where, based on biomechanics, it replicates the strain rate and loads applied by horse hooves to the soil. Working like a dual-axis drop hammer with a synthetic hoof attached, the machine can collect load, acceleration and velocity that are used to estimate the stiffness of each of the layers of the soil, and the shear strength of the soil.

Peterson has found that the loading and load rates that occur in the bones of the horses with each stride can be affected by the composition of the track base layers up to a foot below the surface.

The robotic system, developed in collaboration with researchers at Colorado State University, was tested at Santa Anita Park, and has been used at other tracks, including Hollywood Park, Fairplex and

Del Mar. It is now providing quantitative data from tracks around the country and is being used in conjunction with ground penetrating radar to evaluate base layer.

The goal is for the data to help maintain, control and standardize track surfaces, regardless of weather.



A NEW RESEARCH-BASED CURRICULUM is designed to help middle schools change the subtle yet hurtful ways girls fight and bully one another. "From Adversaries to Allies: A Curriculum for Change," developed by researchers and students at the University of Maine and Colby College, offers strategies for girls to relate to one another and better understand stereotypical messages that often lead to behaviors such as betrayal, exclusion, rumor mongering, teasing and harassment.

The curriculum will be piloted in 10 Maine schools, then evaluated and refined. It is **available** to any interested school, according to Mary Madden, an assistant research professor in the UMaine College of Education and Human Development. Madden coauthored the curriculum with Lyn Mikel Brown, professor of education and women's, gender and sexuality studies at Colby.

The curriculum is based on research by Madden and Brown, and others in the past 25 years who examined the ways adolescent girls interact and express themselves as they struggle to find a place in a culture that overvalues beauty, romance and perfection.

While girls who are allies aren't necessarily friends who hang together outside the curriculum group, they are willing to value differences, understand experiences girls share and support the right of girls to be all they can be, according to Mary Madden and Lyn Mikel Brown. This taking control is an important social action goal of the curriculum.

"Girls too often come to see themselves and each other as bodies to be looked at or as girlfriends of popular boys," say Madden and Brown. "It's not surprising, then, that adolescent girls are most likely to compete and fight with other girls over boys, sexuality, attitude and appearance."

While the subtlety of "girlfighting" is often under the radar screen of educators, the pain of targeted girls is obvious to their parents. "What girls do to one another can be awful," Madden says. "We want girls to understand how the culture sets them up to be cruel to one another through unrealistic images and expectations. This causes insecurity, which girls often divert from themselves by targeting another more vulnerable girl."



Helping Adversaries Become Allies

Surveying Stewardship Strategies

A UNIVERSITY OF MAINE cultural anthropologist is studying landowners' stewardship strategies for Maine forests in an effort to better understand management decisions.

James Acheson, professor of anthropology and marine sciences, says the timing of the forest management study is important because ownership of Maine's 17 million acres of timberlands and the entire forest products industry are changing rapidly. Maine's forest industry generates \$5.6 billion in gross economic benefits.

Acheson, an expert on resource management and governance, will work with a



team of interviewers to survey representatives from timber companies, pulp and paper companies, small private landowners and forest contractors.

The study, funded by an \$85,000 National Science Foundation grant, is one of the first of its kind for the nation's most heavily forested state. Acheson's preliminary research has turned up a plethora of studies on forests and forest management practices, but little information on the attitudes of landowners, who may employ vastly different management techniques.

By asking about social, cultural, economic and political factors behind management decisions, Acheson hopes to gain better insight into conditions under which decision-makers do or do not conserve forest resources.

Words of Love

In observance of Valentine's Day, we asked Burton Hatlen, director of the National Poetry Foundation at the University of Maine, to cite six of his favorite poems about love:

"Tonight I've watched / The moon and then / The Pleiades go down. / I am in bed alone."

*Sappho, Fragment 52
(Complete fragment,
translated by Mary Barnard)*

"Song: Sweetest Love I Do Not Go"
John Donne

"That Time of Year Thou Mayst in Me Behold"
William Shakespeare, Sonnet #73

"To His Coy Mistress"
Andrew Marvell

"Asphodel, That Greeny Flower"
William Carlos Williams

"Anniversary Poem"
George Oppen



Gardeners Behind Bars

UNIVERSITY OF MAINE Cooperative Extension Master Gardeners are at work in the Kennebec County Correctional Facility helping inmates learn to grow food for themselves and the hungry in the area.

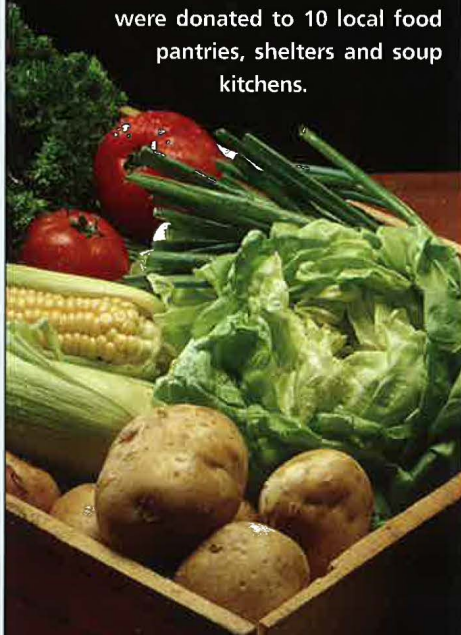
It all started in 1996 when an acre was donated to the correctional facility for inmate projects. Seven years later, inmates were tilling 15 acres. That's when correctional facilities officials sought expert assistance from the University of Maine Cooperative Extension Master Gardener Program.

Officers John Matthews and Michael Gagnon, and Chief Deputy Randall Liberty enrolled in the 40-hour program offered by Kennebec County Extension, learning the fundamentals of plant biology, soil composition, and insect and disease control. Then they shared that expertise with the inmates involved in the garden project.

More than 150 Kennebec County inmates have participated in the farm project since its inception, with an average of 15 inmates per day traveling to the site.

This past fall, inmates harvested enough produce to save the jail \$9,200.

In 2004, 8,000 pounds of potatoes were donated to 10 local food pantries, shelters and soup kitchens.



Seeing the forest through the trees



A NEW DECISION-SUPPORT TOOL developed at the University of Maine helps forest managers evaluate a complex set of variables when trying to determine how and when to best thin the spruce-fir stands of northern Maine.

ThinME is a computer program created by Department of Forest Ecosystem Science researchers Robert Seymour and Robert Wagner, and Cooperative Forestry Research Unit and United States Forest Service colleague KaDonna Randolph. Its customized ArcView GIS computer interface is capable of converting the complex, multidimensional data necessary for developing effective thinning prescriptions into an easily understood, two-dimensional graph known as a nomogram.

The computer program allows foresters to select the best thinning strategy based on a variety of biological and financial variables. The

nomograms graphically illustrate a range of thinning options that meet specific criteria determined by the user, allowing forest managers to consider factors as diverse as

Finding better ways to commercially thin Maine's forest is a high priority for forest managers in northern Maine. ThinME has provided a new approach to help optimize what is a highly complex problem in forest management.

annual growth rate, tree size and financial value when developing overall management plans.

Current forest models do not

allow forest managers to view the trade-offs among important physical variables and production goals associated with commercial thinning in quite the same way.

Results from ThinME are being evaluated on a dozen study sites across Maine in what is called the Maine Commercial Thinning Research Network. Various thinning prescriptions have been applied to test plots that include the annual measurement of more than 12,000 trees. Measurements from these plots are being used to test the predictions of ThinME and to improve the model over time.

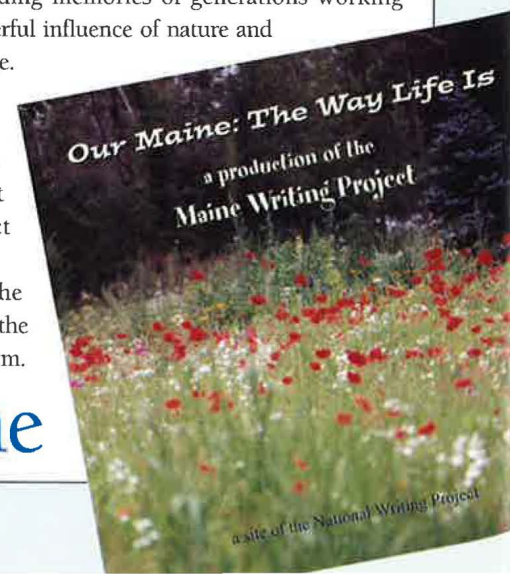
HOMETOWN PEOPLE and places throughout Maine were the inspiration for stories, poems and essays by 22 students from Machias to Skowhegan who wrote about what it means to grow up in Maine.

"Our Maine: The Way Life Is," a CD production of the Maine Writing Project at the University of Maine, features the students in grades 3-12 reading their works that reflect some of the state's themes and traditions, including memories of generations working together, the connection to land and sea, the powerful influence of nature and the importance of roots in the inevitability of change.

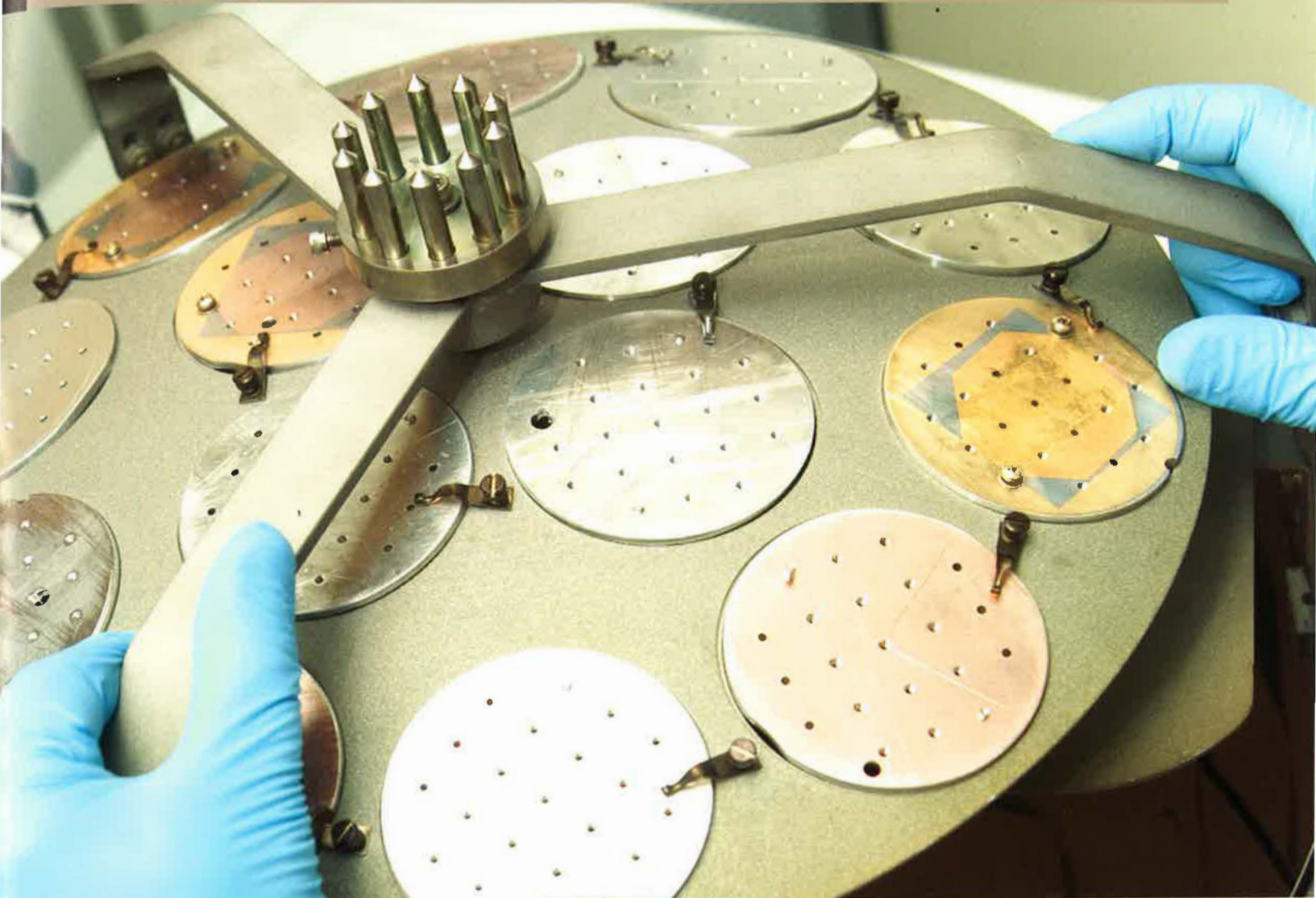
The 29-minute CD comes with a teacher's guide, which includes ideas and activities for creating place-based writing and production opportunities. Submissions for the CD were sought from students of the 186 Maine Writing Project teacher consultants across the state.

The Maine Writing Project, an affiliate of the National Writing Project, is dedicated to improving the teaching and learning of writing across the curriculum.

Growing up in Maine



lasting impression



A QUARTER-CENTURY ago, the Laboratory for Surface Science and Technology (LASST) at the University of Maine was established to investigate the surface and interface properties of materials, from the atomic to macroscopic scales. Today, this interdisciplinary research center is integral infrastructure supporting some of UMaine's most sophisticated, high-tech research. Faculty and staff in physics, chemistry, electrical and computer engineering, chemical and biological engineering, food science, marine science, and microbiology cooperate at LASST to develop a wide range of microelectronic devices, microsystems and nanostructures. Funding from state, federal and industrial sources advances LASST's basic and applied research, and technology transfer in such areas as sensors, detectors, composites, paper and biotechnology. Graduate and undergraduate students join faculty, postdoctoral researchers and visiting scientists in explorations of materials science, surface physics and chemistry, bioengineering, nanotechnology, biophysics, device fabrication and sensor technology. LASST is instrumental in a number of progressive UMaine initiatives, including its two National Science Foundation IGERT programs: Sensor Science Engineering and Informatics, and Functional Genomics.

For nearly 100 years, the Senior Skull Honor Society has represented some of the best University of Maine students. The top 1 percent of senior men is chosen for the prestigious society based on leadership, character, campus and community involvement, and outstanding academic achievement.

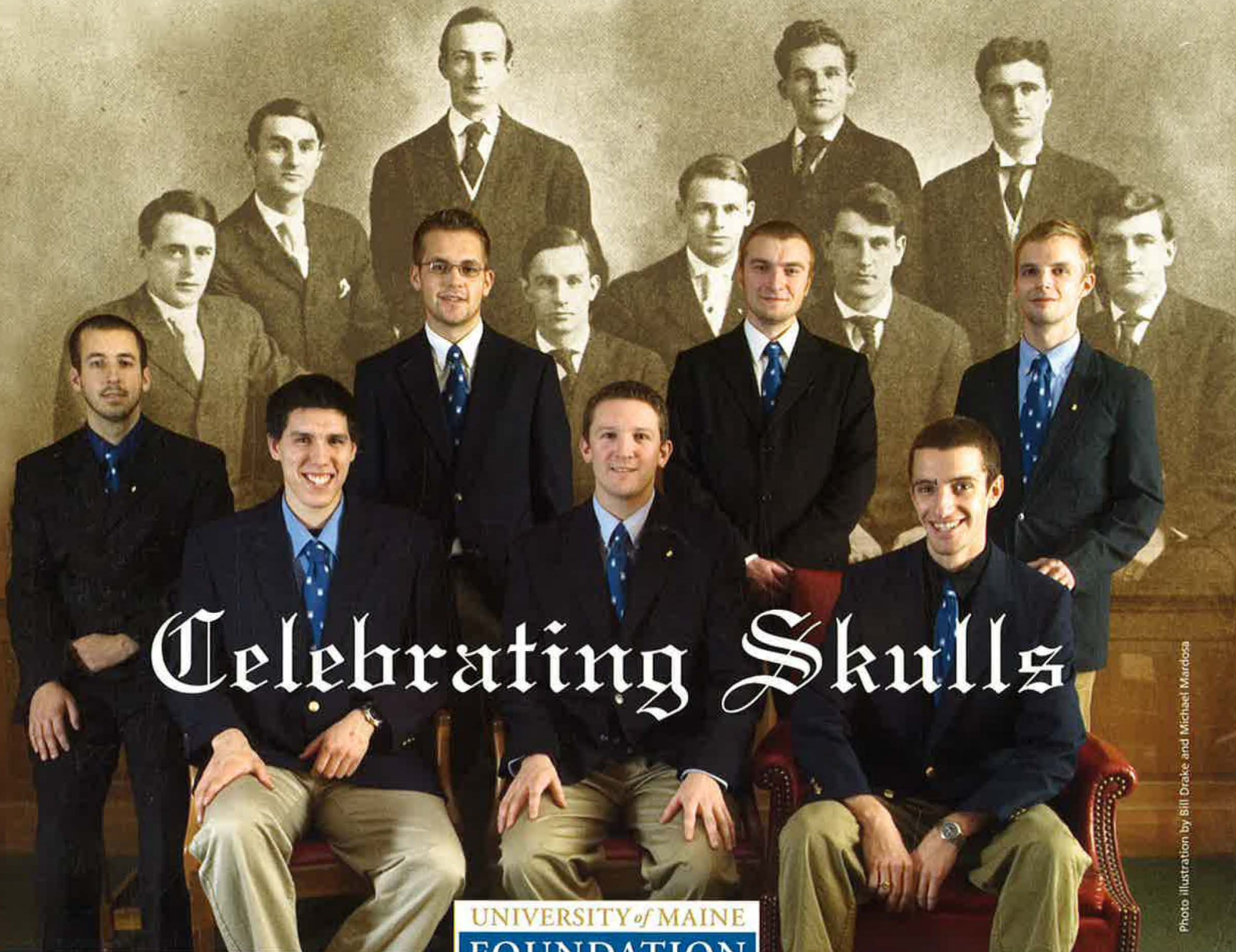
Eleven students founded the Senior Skulls in 1906. Their goal was to “publicly recognize, formally reward, and continually promote outstanding leadership and scholarship, and exemplary citizenship within the University of Maine community.”

In the past century, more than 1,250 UMaine men have been inducted, including 10 students who are now members of the Senior Skull

Centennial Class of 2006. The newest members are majors in business/finance; elementary education; microbiology; and computer, civil, mechanical, electrical, information systems and chemical engineering.

Now an endowment fund has been established in the University of Maine Foundation to help ensure the group's continued longevity and viability for many years to come. The Senior Skull Centennial Fund also will allow future classes the flexibility to support the university and surrounding communities with new and creative initiatives.

Seven of today's Senior Skulls appear in this photo illustration with nine of the 1906 members.



Celebrating Skulls

UNIVERSITY of MAINE
FOUNDATION

Photo illustration by Bill Drake and Michael Mardosa