The composers

Superpowered

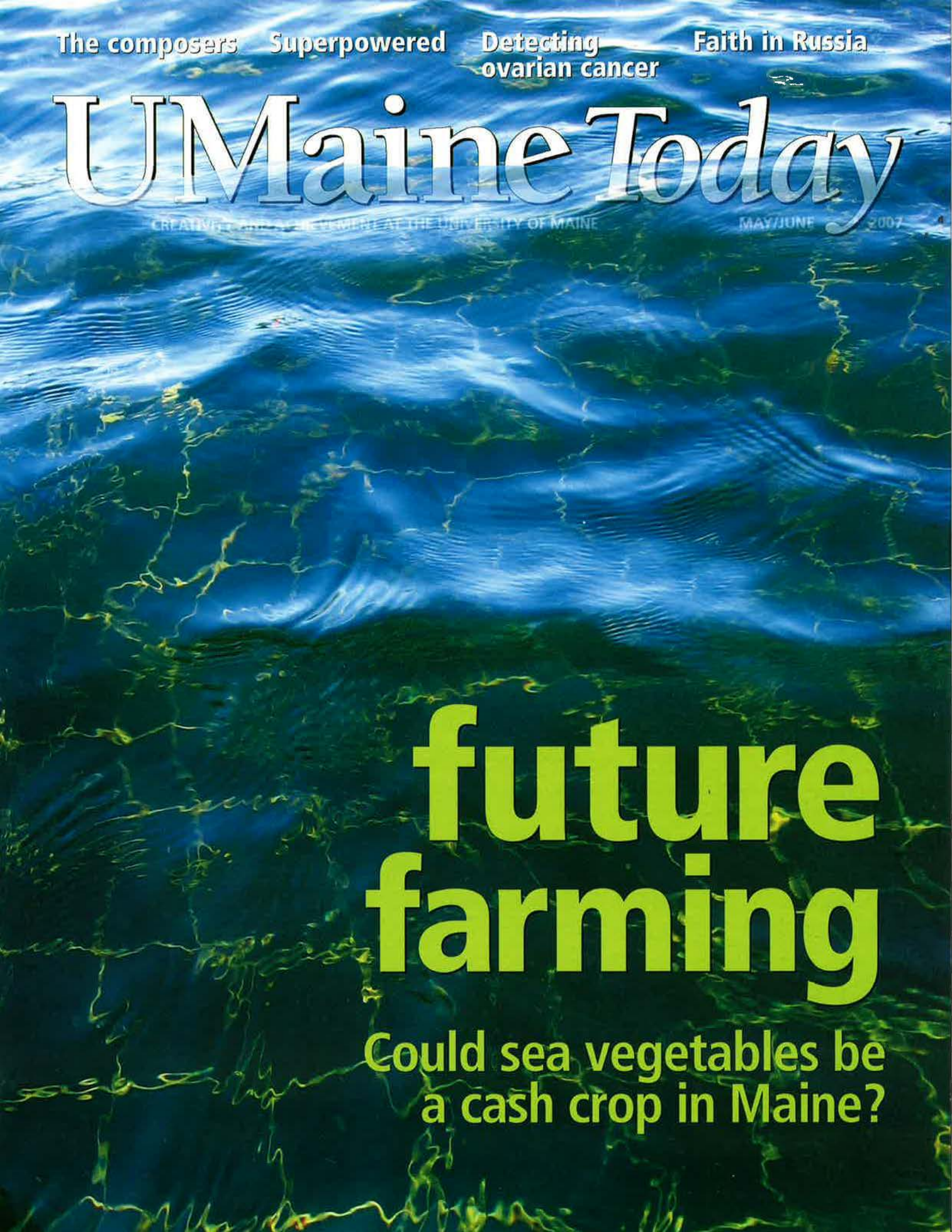
Detecting ovarian cancer

Faith in Russia

UMaine Today

CREATIVE AND SCHOLARLY ENDEAVORS AT THE UNIVERSITY OF MAINE

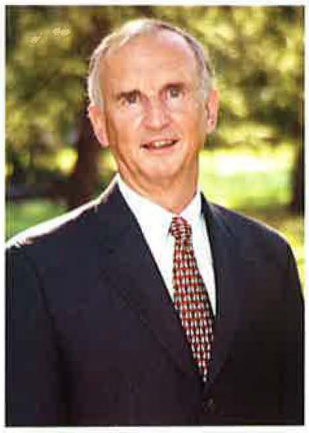
MAY/JUNE 2007



future farming

Could sea vegetables be a cash crop in Maine?

President's Message



OUR NATION AND OUR WORLD often depend on universities to take the lead in affecting societal change. This is most appropriate, since institutions like the University of Maine have many unique attributes, most of which are related to the presence of a scholarly community and bright, talented, motivated students. Moreover, university communities are expected to develop leaders, and we know that we can do that most effectively when we take leadership in helping to address some of the broad concerns that affect us all.

That is why I am very proud of UMaine's ongoing efforts to lead the way in energy conservation and environmental sustainability. I recently signed the American College and University Presidents Climate Commitment. Modeled after a similar pledge many of our nation's mayors signed, this document commits us to meeting certain targets and working toward what's called "climate neutrality."

While that is a highly visible and important element of UMaine's focus and commitment, it should not overshadow the outstanding work being done all through our community to help UMaine become a model institution for reducing its negative environmental impact while increasing efficiency to save money. Much of our activity in this area is driven by students and supported by our faculty. We have tapped the academic expertise of faculty and students in areas like engineering and climate change, getting their help in finding ways to achieve our goals. This has been an effective partnership and we are seeing good results.

For example, UMaine's aggressive recycling program has reduced our waste stream by 45 percent. UMaine uses approximately 30 percent renewable power, and our maintenance staff uses environmentally friendly cleaning products. Our efforts to employ modern technology to save electricity were recently recognized in a formal way by the state's Public Utilities Commission, which awarded UMaine a $50,000 incentive check to help continue with the installation of energy-saving lighting on campus.

Our agenda is aggressive, and we are determined to continue this momentum. The payoff, in terms of saving money, improving the environment, and modeling good citizenship for our students, will be significant indeed.

Robert A. Kennedy
President

ON THE COVER: University of Maine researchers are experimenting with the use of nori nets to farm native species of *Porphyra umbilicalis*. Here, 4-week-old germlings appear as dark red speckles on the net filaments. The germlings will grow to commercially viable blades within several months. UMaine marine biologists are studying environmental cues that affect reproduction in Maine's native red algae species in order to control net seeding. In particular, they are examining an asexual reproductive pathway in *P. umbilicalis* to determine if blades can be produced in a manner that is more cost effective for commercial production. See related story on page 2.

Photos by Nic Blouin

UMaine Today

Director of University Relations
Joe Carr

Editor
Margaret Nagle

Designers
Michael Mardosa, Carol Nichols, Valerie Williams

Staff Photographer
William Drake

Printed by University of Maine Printing and Mailing Services

Readers are invited to send comments to: **umainetoday@umaine.edu**

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.

UMaine Today is produced six times a year by the Department of University Relations, 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: Executive Director of Equal Opportunity, 101 North Stevens Hall, University of Maine, Orono, Maine, 04469-5754, 207-581-1226.

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

Printed on recycled paper.

1865 THE UNIVERSITY OF MAINE
A Member of the University of Maine System

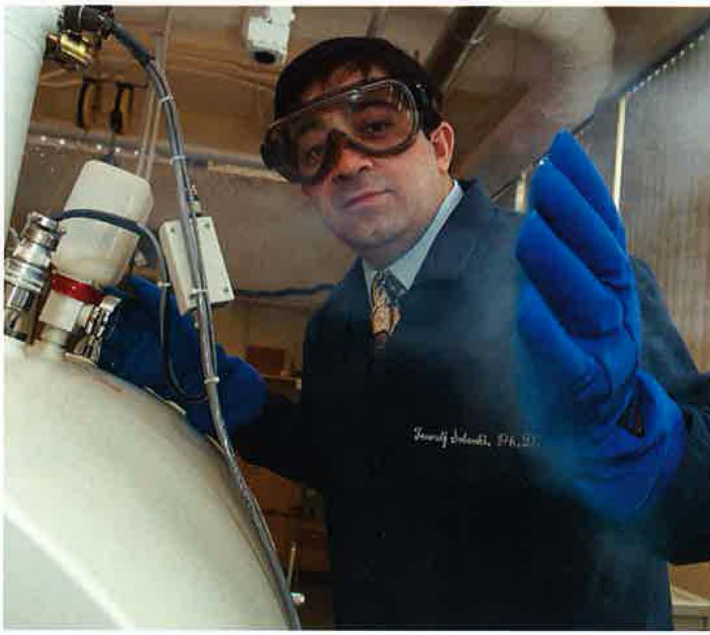
Visit us online at www.umaine.edu/umainetoday
for UMaine's daily news, and the online version of UMaine*Today*.

contents

2

14

8



18

features

May/June 2007 Volume 7 Issue 3

2
Nurturing Nori
Ph.D. student Nic Blouin is studying the reproductive biology of red algae as part of ongoing research into its commercial viability.

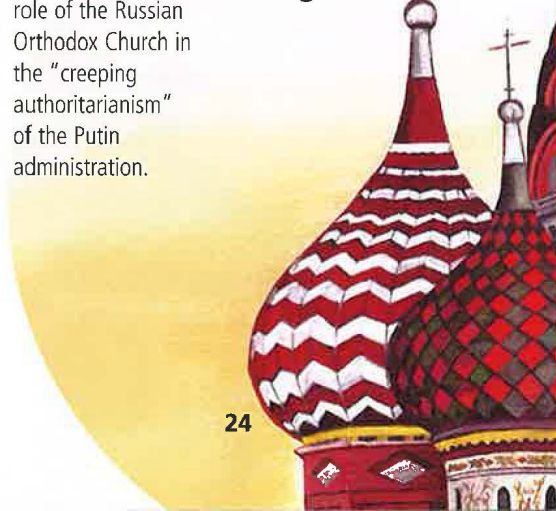
8
The Composers
Four student composers share their love of music and how they put their own spin on sounds.

14
Superpowered
Supercomputing and visualization technologies combine to create new frontiers for research and education.

18
Breath Test
Touradj Solouki is using sensors to detect biomarkers in human breath that can determine a person's health status, including early detection of ovarian cancer.

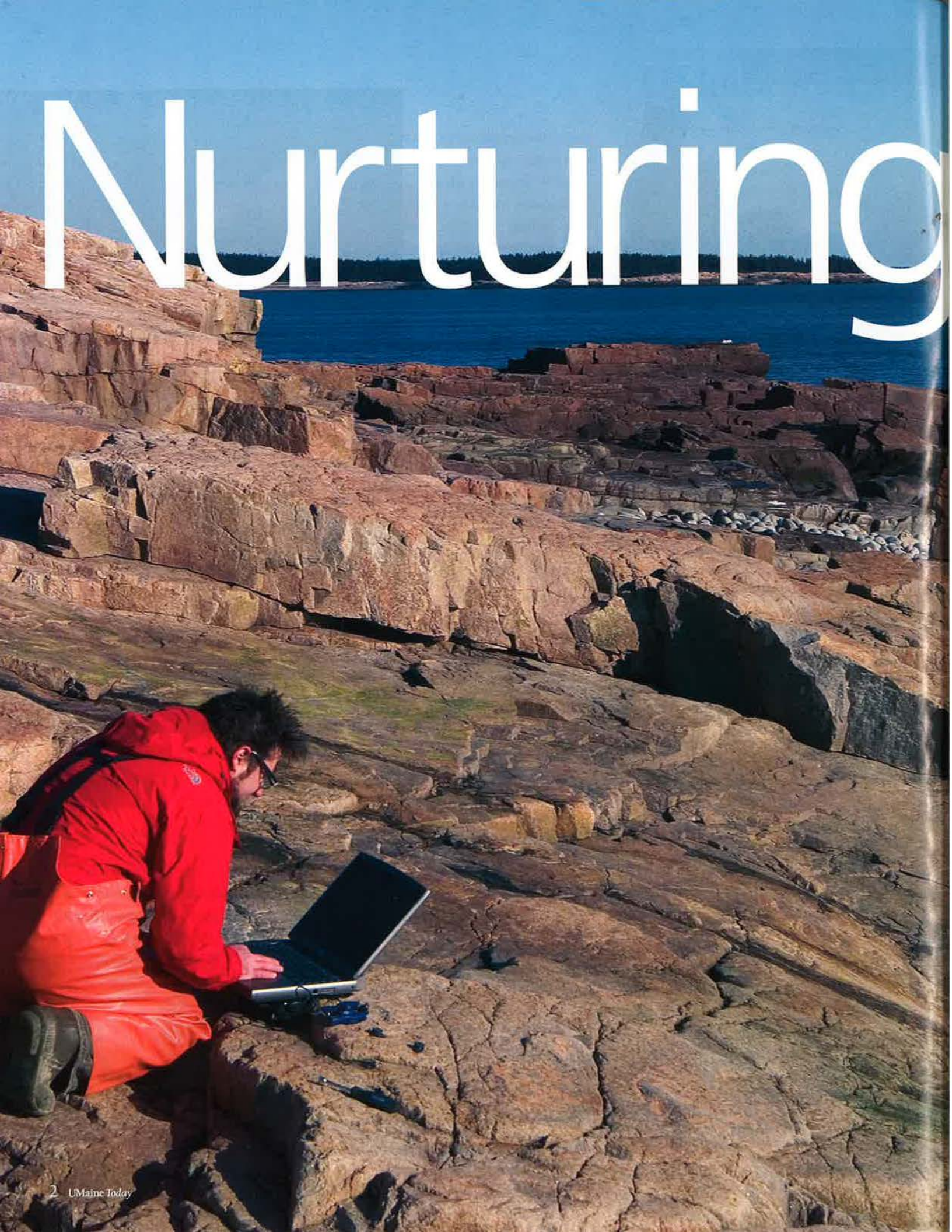
24
Faith in Russia
Political scientist James Warhola looks at the role of the Russian Orthodox Church in the "creeping authoritarianism" of the Putin administration.

Departments
Students 6, 12, 22
Perspective 17
Insights 26



24

Nurturing



nori

UMaine marine biologists study the reproduction of red algae to cultivate the sea vegetables' nutritional and economic benefits

By David Munson

ANKLE DEEP in a thick mat of rockweed, the brisk January air still heavy with the aroma of low tide, Nic Blouin is checking temperature sensors among the rocky crags and crevasses of Acadia National Park's scenic Schoodic Point. A doctoral student in the University of Maine's School of Marine Sciences, Blouin's research is focused on the reproductive biology of the red alga *Porphyra umbilicalis*, known as nori to the sea vegetable gourmand. While his research speaks to some of the most basic questions in marine biology, Blouin is doing much more than simply peeking into the sex life of marine algae. He's working to change how Americans look at food.

"You can use this one in a lot of different dishes: bruschetta, spanakopita, roasted potatoes," Blouin says of a reddish-brown blade of rather nondescript algae. "I like to dry it and use it as a seasoning."

Working with UMaine marine sciences professor Susan Brawley, Blouin is taking a multifaceted approach to studying nori, combining cutting-edge laboratory research with hands-on field trials that he hopes will jump-start a new economic engine in Maine: sea vegetable aquaculture.

The idea of using Maine's marine macroalgae as food is nothing new. The harvest of Irish moss for use as a thickening agent was once an important source of supplemental income for Maine fishermen, and several of the state's native algae have been marketed in various forms for decades. One Maine company, Maine Coast Sea Vegetables, has been in operation since the 1970s. But on a larger scale, Maine's potential as a provider of sea vegetables has remained largely untapped, due at least in part to the average American's lack of familiarity with the ocean garden.

"(Sea vegetable) aquaculture is a $6 billion industry worldwide. Nori alone is nearly $2 billion of that, and that comes entirely from Asia. Nori and other algae are high in protein. They're also a source of vitamins and omega-3 fatty acids. They're a very healthful food; we're just not used to eating them. Because there are so few people working on this in the U.S., and because there is so little known about its basic biology, you have to spread yourself around a little bit," says Blouin, whose lab and field commitments combine to create a very demanding schedule. "I have projects going on both sides — in basic research and in economic development."

AS PART OF HIS thesis, Blouin worked to develop reliable techniques for cultivating *P. umbilicalis* commercially. With funding from Maine Sea Grant, Maine Technology Institute and the U.S. Environmental Protection Agency, Blouin developed methods for using dried material briefly reimmersed in seawater to create a special brew of

Photo by Nic Blouin

A microscope offers a close-up view of a 4-week-old *P. umbilicalis* germling attached to a filament on a nori net. University of Maine researchers are combining basic and applied science to explore the domestication of native species of *Porphyra*, also known as nori or laver. On Schoodic Point, Ph.D. student Nic Blouin uses remote sensors anchored to the rocks to better understand how changes in water temperature affect nori reproduction.

Nurturing nori

reproductive spores for seeding the polyethylene nets used for growing the nori.

After being thoroughly soaked with the reproductive "tea," the nets were set out in a custom-made, 24-foot-long raceway, where the growing conditions are optimized for the young plants. By managing temperature, circulation, drying intervals and nutrient inputs, Blouin gathered the initial data that could provide the foundation for large-scale cultivation of native nori in Maine waters.

"A lot of what we are doing with *P. umbilicalis* involves adaptations of other technologies, bringing them together in one uniform way," says Blouin. "The idea is to streamline the process so that we can transfer that technology to future (sea vegetable) farmers."

A NATIVE OF the North Atlantic, *P. umbilicalis* has a potential advantage over Pacific species of nori, such as *P. yezoensis*, used in Asia's large-scale aquaculture operations. *P. umbilicalis* reproduces exclusively asexually along the Northeast coast. Commercial nori farmers spend more than half of the yearlong growing season coddling the tiny, inedible filamentous phase of the alga's complicated life cycle. In China, Japan and South Korea, gigantic warehouses shelter shallow tanks filled with billions of clamshells, each tinted with the pink stain of nori in its filamentous state. *P. umbilicalis* produces asexual spores that begin as tiny versions of the adult blade, effectively pressing fast-forward on the algae's life cycle.

By utilizing the asexual *P. umbilicalis*, Maine nori farmers could bypass the expensive, time-consuming filamentous phase, speeding production, eliminating seasonality and reducing overhead costs.

The cultivation of nori and other marine algae could prove to be the perfect complement for other forms of aquacultural enterprise. Preliminary studies conducted by Blouin near salmon pens in Cobscook Bay suggest that net-grown nori could be incorporated into multicrop aquaculture. Dubbed Integrated Multi-Trophic Aquaculture (IMTA), this approach to ocean farming is critical to the development of stable and sustainable food production in the Earth's oceans.

In Cobscook Bay, Blouin is measuring the degree to which nori nets and finfish aquaculture might complement one another. Effective IMTA methods promise not only additional economic returns, but substantial environmental benefits as well, potentially minimizing nutrient inputs while maintaining marine ecosystems.

"A lot of what we are doing with *P. umbilicalis* involves adaptations of other technologies, bringing them together in one uniform way. The idea is to streamline the process so that we can transfer the technology to future (sea vegetable) farmers."

Nic Blouin

BLOUIN'S DOCTORAL research now focuses on unraveling the mysteries of reproduction in this red alga at the genetic level. Mortar and pestle in hand, he grinds samples of *P. umbilicalis* and extracts the genetic material using targeted viruses, creating a library of nori RNA. Then he identifies and sequences unique genes to determine the genetic controls for sexual and asexual reproduction in the genus.

Identifying the genetic triggers for asexual reproduction in *P. umbilicalis* may provide important insights into similar mechanisms in other species, offering researchers better understanding of the

A native of the North Atlantic, *P. umbilicalis* has a potential advantage over Pacific species of nori, such as *P. yezoensis*, which spends half a year in an inedible phase. Because it reproduces asexually, *P. umbilicalis* matures to harvestable size quicker and its growth is not restricted to a season, making it a great candidate for year-round aquaculture.

At UMaine's Center for Cooperative Aquaculture Research in Franklin, Maine, Nic Blouin is working to develop reliable techniques that could be used for cultivating *P. umbilicalis* commercially.

Nori pressing by Nic Blouin

evolution of sex and greater control over the cultivation of sea vegetable varieties chosen for size, speed of growth, flavor or other traits.

"There's no seasonality: *P. umbilicalis* is present year-round in the Northeast," says Blouin. "If we can build an understanding of what triggers its asexual versus sexual reproduction, we may be able to get at those triggers in related species. We might be able to trigger asexual reproduction in *P. amplissima*, another local species that can grow a blade that is almost a meter long. It's another *Porphyra* species that would make a great candidate for aquaculture."

BLOUIN AND Brawley see tremendous potential in expanding sea vegetable aquaculture in North America. From speaking at conferences and forums to helping to organize the highly successful Sea Vegetable Celebration Day on the UMaine campus, Blouin and Brawley are not only in the lab, they are in the trenches, bringing sea vegetable aquaculture innovation to the surface. So far, average Americans have been slow to embrace the idea of getting veggies from the sea, but they're coming around.

"Aquaculture has been undersupported in this country, especially sea vegetable aquaculture. In contrast, Asian governments have invested huge amounts in support of aquaculture," says Brawley. "We have an opportunity now, because of the growth of finfish aquaculture, to develop ways to combine the two — a good thing, both commercially and for the environment."

From sushi bars to snack foods, products containing farmed sea vegetables are slowly growing in popularity in the U.S. For now, Blouin and Brawley plan to continue down the path they started, doing basic research and market development to find new ways to make sea vegetable aquaculture a viable enterprise in the U.S. ▮

Geriatric mental health essential for sustaining quality of life

By Margaret Nagle

FOR THE PAST FIVE years, Jason Charland has been a direct care provider in a group home for adults with mental illness, assisting residents with daily living tasks and recreational activities, supporting social skill development and administering medications. The experience prompted him to pursue a master's degree in social work at the University of Maine.

"What I really understood is the impact you can have on an individual's quality of life," he says. "Providing interaction and support is very rewarding."

In the Master of Social Work (MSW) Program, Charland has worked as a field student, then as a graduate research assistant in UMaine's Center on Aging. He has been involved in varied Center on Aging projects, including researching the transportation needs of elders with chronic illness, elder abuse screening and education in the primary care setting, and prescription drug conference planning.

Charland's full-time job as a direct care provider also gave him a unique perspective on a research project designed to improve services for the elderly with mental health issues in the state. He developed a training program on geriatric mental health for direct care providers and compiled information on elder suicide prevention for the Maine Joint Advisory Committee on Select Services for Older Persons, and the Maine Department of Health and Human Services.

The joint advisory committee and the department were charged by the legislature with addressing issues in a law passed in 2005 to improve access and delivery of mental health services to older adults.

CHARLAND DEVELOPED a five-hour training curriculum for direct care service providers working with Maine's older adults in long-term care, residential and home care settings. The educational program covers aging myths and keys to healthy aging, late-life depression and elder suicide risk, Alzheimer's disease and dementia, other mental illnesses, management of difficult behaviors and substance abuse.

"All older adults have unique needs," Charland says. "Becoming aware of those needs when it comes to mental health will help the quality of services direct care workers provide."

The effects of chronic illness, multiple medications and isolation complicate mental health issues in elders. In some settings, the social network for the elderly is reduced to other residents and the facility's staff.

"That's why it's so important for the staff to be supportive and understand symptoms and behaviors presented as the result of mental illness, offering a safe and caring

Jason Charland's three major recommendations for identifying at-risk older adults involve more frequent depression screenings for elders in primary care settings, coordination of elder suicide prevention efforts and training for "gatekeepers," such as volunteers who deliver meals.

environment in which to keep the person's dignity and respect intact," he says. "Support can offer some relief."

In long-term care facilities, there is a prevalence of mental health problems in elders, as well as high turnover and a shortage of direct care workers, Charland says.

It is estimated that more than 60 percent of persons in nursing facilities and 53 percent in residential care have mental health diagnoses. Charland cautions that a small percentage of the elderly population is in institutional care, and these numbers do not reflect mental health issues of the general population of adults age 65 and older.

Training staff in how to deal with mental health problems has been shown to improve patient outcomes, including fewer depressive symptoms and better management of aggressive behaviors. Staff members have greater job satisfaction and better job performance.

"Understanding the best ways to interact with presenting behaviors can impact the older adult's quality of life," says Charland. "This is a proactive approach to increase preventative skills of workers to anticipate and redirect disruptive behaviors."

CHARLAND ALSO COMPILED research on best practices for addressing elder suicide. He found only two states, Oregon and Pennsylvania, have formal elder suicide prevention plans in place.

"Most state suicide prevention programs are targeted to youth, but now Maine is starting to take a lifespan approach inclusive of all age groups."

In Maine, more than 18 percent of all suicides — approximately 30 a year — occur after age 65, which mirrors the national average. Nationally, the rate of suicide among white men age 85 and older is 4.6 times greater than the rate for all ages.

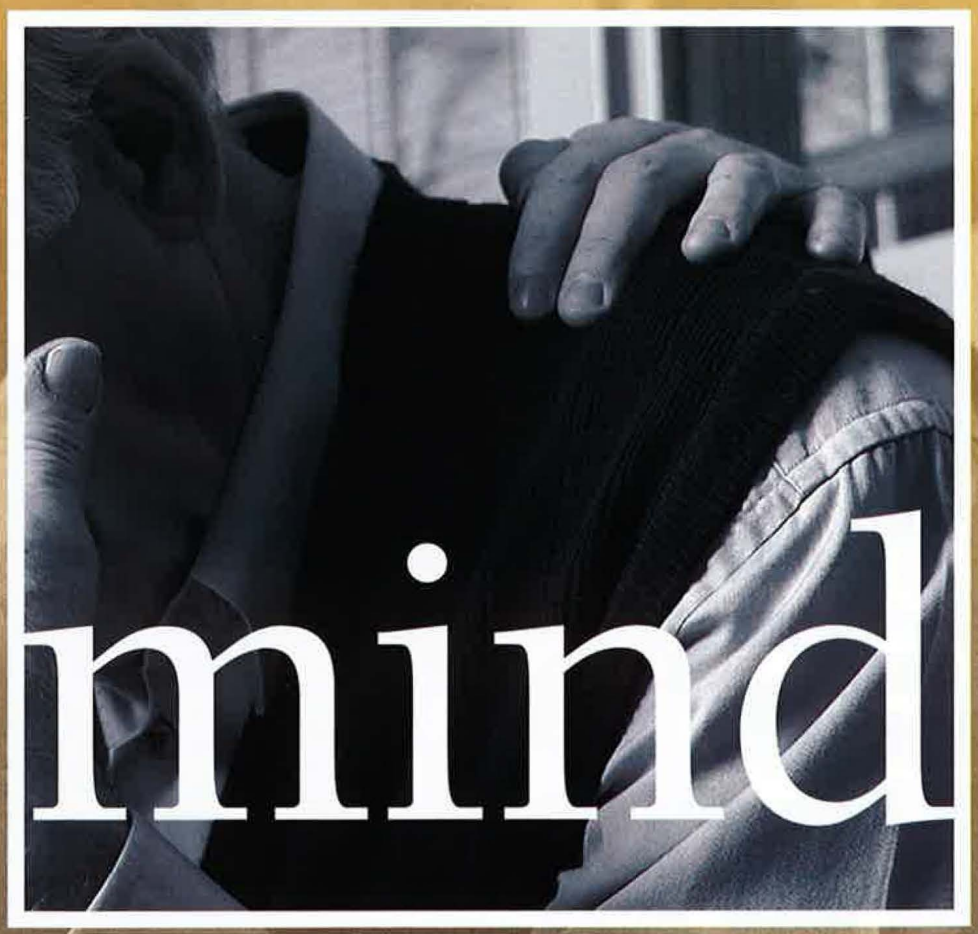
Among the risk factors for elder suicide: loss of spouse, living alone, access to lethal means, and physical and mental illness.

Charland's three major recommendations involve more frequent depression screenings for elders in primary care settings, coordination of elder suicide prevention efforts with the existing Maine Youth Suicide Prevention Program, and training for "gatekeepers," like volunteers who deliver meals, in order to identify at-risk older adults and refer them for help.

"The most compelling finding was that screenings for depression by primary care physicians have the most promising effect," Charland says. "Older adults trust their doctors and are willing to talk to them about mental health issues when they may not want to go to a psychologist or psychiatrist."

Above all, when caring for elders with mental health issues, it's important to see the people, not their disease or challenging behaviors, says Charland, who completes his graduate work in May.

"It's been a great opportunity to work on these two projects knowing the end products will be used in one way or another to positively impact the lives of older Mainers." ▮



The Composers

UMaine student musicians put their own spin on sounds

By Margaret Nagle

SOME OF THEM hear our world differently. Others just communicate most effectively through notes. The best know instinctively that they can build a better mousetrap.

They all think outside the box.

The result: inventions with the potential to add to the repertoire.

Composer Beth Wiemann knows these enterprising students well. If serious student composers are at the University of Maine, they eventually end up at her office door in the School of Performing Arts, armed with a portfolio of compositions and arrangements that they started in high school or completed in the beginning of their college careers.

These are the students "predispositioned" to putting their own spin on sounds.

"Some are naturally drawn to playing with noise," says Wiemann, a UMaine associate professor of music who offers advanced courses in composition for students with portfolios. "Composing is having fun with sound."

For other music students, Wiemann also teaches a general music composition course in which each has to write a woodwind solo, a song and a chamber work for more than two instruments. Students also have to develop an electronic piece from sounds that they record and modify themselves.

The bottom line is how to effectively communicate through music.

COMPOSING AND PERFORMING are not always symbiotic. Typically, performers interpret the music on the page. Seeing and hearing music often triggers a different response in composers.

Wiemann remembers being a junior high school student contemplating becoming a singer/songwriter until she found herself in the choir and thinking, "Some of this music doesn't work and I can do better."

Many a composer starts just that way.

In any given year, Wiemann has three or four student composers who come to UMaine with portfolios and a desire to perfect their passion with her mentoring and the advice of other School of Performing Arts faculty. Each comes with different skills, educational needs and repertoire.

Wiemann mentors one-on-one, composer to composer.

"I respond to what they do, suggesting ways to make (the music) clearer and better for the performers," Wiemann says. "They have to write with the goal of satisfying the performers, the audience and themselves. For instance, if they're writing music to portray a certain mood, they need to be sure the performers are getting that off the page and can then get that across to the audience."

SOME STUDENT COMPOSERS Wiemann has taught have gone on to careers in music. They include Juraj Kojs, who was introduced to electronic music studying with Wiemann and who is now completing a doctorate in composition and music technologies at the University of Virginia.

For other young composers, writing music remains a preoccupation.

It's hard to predict how much composing will be part of a student's life once he or she graduates, Wiemann says. Few composers make a living at writing. They arrange, teach, perform. Often composing is what they do on the side.

Not all student composers are music majors. But if Wiemann mentors them, they are serious about fine-tuning their art.

STUDENT COMPOSERS' works debut on campus in UMaine musical ensemble performances. This spring, a student composers' concert featured new and original works by artists that included junior Sara Richardson and seniors Philip Trembley, Seth Morton and Robinson Marks.

The musical styles varied widely. The works were short, no longer than eight minutes. One or two of the pieces brought to mind works by established artists.

"Young composers have been inspired by various people and that's OK," says Wiemann. "Part of this has to do with learning as they're doing.

"It doesn't matter that it's all new. The minute the piece is finished, it's not new anymore any way."

Success is "getting pieces off the ground." The composers cross their fingers that the new media technology in the electronic pieces doesn't glitch and the performers don't look at the music and say it's too difficult or unworkable for their instruments.

It's a "grounding" experience for any composer.

"For some of them, this is a way of communicating, contributing and making connections with colleagues, with faculty members and performers of their music," says Wiemann. "Getting people to play the pieces and writing for pre-established ensembles are the basic ways composers interact with the musical world."

Philip Trembley is a percussionist and a composer. But ne'er the twain meet.

He is passionate about percussion because of its diversity, versatility and challenge. Percussion instruments — from timpani, tambourine and triangle to marimba and vibraphone — provide "a full spectrum of sound." A percussion performance is as exciting to hear as it is to watch.

"You have to practice 10 times more because of the different instruments and their respective techniques," says Trembley, a fourth-year music major who came to UMaine from Newport, Vt., to study with percussionist and Professor of Music Stuart Marrs. "I spend time learning to play rather than composing for it."

When it's mood and emotion he wants to evoke, he composes for other instruments.

"It's always good to walk out of a concert hall having heard a piece that sounds cool, but it's a whole other thing to hear a work that moves you to tears or makes you think. That's the kind of music I'm drawn to," he says.

Trembley, whose influences include Philip Glass, Rachmaninoff, James Horner and Ihsahn, writes in the 20th-century classical genre, but also actively performs and composes in the underground rock and metal genres.

"I'm more attracted to darker sounds, which is why I'm drawn to timpani the most," he says. "If you hear one of my pieces, chances are you'll hear it in a minor as opposed to a major key."

For Trembley, composing often begins by making two decisions: the mood to convey and instruments to use.

"I like to play the melody in my head, starting on piano. Then I switch through brass and woodwind and strings, hearing what strikes me as the best sound," he says.

Trembley has played drums since age 12. As a high school junior, he took a course in Musical Instrument Digital Interface (MIDI) and wrote *In Terrorem* for string quartet and *The Alarum* for brass quintet.

Next year, Trembley plans to attend graduate school to pursue his other passion — digital recording. His goal is a career that would allow him to be a freelance performer, composer and recording engineer.

"I'm particularly interested in the technology. It's great as a composer to come up with an idea, record it and be able to change this or that."

When **Seth Morton** enrolled at UMaine in 2002, he was torn between two passions. He majored in music his first year, then "chemistry won out." Sort of.

"I can't imagine not doing music," says the fifth-year senior chemistry major from Lewiston, Maine, "but I decided I was more interested in writing stuff so others could sound really good. I'm not a soloist. I have a band sound. It's like how some choral performers sound better in a group."

Morton is a tuba player in four UMaine music groups. At athletic events, the Pep and Marching bands have performed nearly 30 of his musical arrangements.

Last November, the 63-piece Symphonic Band debuted his original composition, *The Passing of the Torch,* a work depicting the setting of the sun and rising of the moon. The piece took him a year to perfect.

"*The Passing of the Torch* is my favorite because I put so much into it," Morton says. "I put it in a key with a lot of flats and intentionally wrote hard parts for effect. I wanted it to be challenging and fun for the band, and exciting for the listener."

Morton has been composing and arranging music since ninth grade, about the time he turned from his sax to a piano, and listened a lot to Jim Brickman.

One day he asked his school's band director to let him borrow a tuba for a week. With the help of one of his uncles, Morton learned to play it in that time.

Student composers, clockwise from top left, Philip Trembley, Sara Richardson, Robinson Marks and Seth Morton. Original works by each of the artists are on the Web (www.umainetoday.umaine.edu/composers)

In his junior and senior years in high school, Morton did an arrangement of *Amazing Grace* for the school chorus and wrote *A New Day on Saturn*, an original composition, for the band.

"I visualize my music just as I do chemical structures," he says of the composing process. "Both have color. In music, there are colors in my head depending on the mood or key or style."

Morton is headed to graduate school in the fall. But again, he's torn between fields of study — chemistry and nuclear engineering.

His goal is to teach college chemistry and to get some of his music published.

Sara Richardson knows the million-to-one odds that a young artist can make it as a singer and composer.

She just doesn't see any reason she can't be that one in a million.

"From my dad, I learned that anything is achievable," says Richardson of her biggest musical influence, who is a pianist and singer. "Both my parents are huge supporters, making it easier to believe."

Richardson has been singing all her life, but it wasn't until her junior year in high school that she really found her voice.

"Before I got a lead in a play, I'd been an extra all my life," she says. "I started taking singing lessons to keep up my voice for the show."

Richardson studied music at Wheaton College for a semesters before transferring in 2005 to UMaine, closer to her Washington, Maine home.

Richardson's first original composition was performed in public last winter. *Untitled* featured her on piano, accompanied by two of her friends. The new music took her five minutes to compose.

"It's kind of beyond my control," says Richardson of the process of writing music. "I don't necessarily think of it as a conscious effort. Usually, I get a feeling that I have to write a song, and I go find the chords on the guitar.

"I find I can only write the words after I've found the music," she says. "Music is a language in itself. Once I find what I want to express in musical notes, I can back it up with the lyrical elements."

Richardson is a soprano in the folk/Indie tradition whose music is as thoughtful as it is optimistic and sometimes whimsical. Her musical muse is Joni Mitchell.

"I see life as something we shouldn't waste trying to figure out. There's energy wasted being confused and depressed," says the junior majoring in music. "I hope listeners feel at peace with my music."

When she graduates next year, Richardson is bound for Boston or New York City. She hopes to perform and find a record label.

Robinson Marks' quest to find his place in music — and finally appreciate its depth and breadth — has taken a circuitous route.

The California native grew up hearing classical music recordings and his dad's stories of being a rock drummer. But it wasn't until Marks was a member of a church choir for five years beginning at age 7 that he got his first "rigorous immersion" into powerful musical performance.

In grade school, Marks took up the trumpet. In high school, he got a guitar from his father. Later came piano and drums.

In high school in Orono, Maine, he formed a rock band, Husqvarna, and started writing.

Marks studied at McGill University for three semesters, then joined a band named Shoot the Piano Player in which he played drums. When the power-pop-styled group relocated to New York City, Marks studied at the Institute of Audio Research in Greenwich Village for a year.

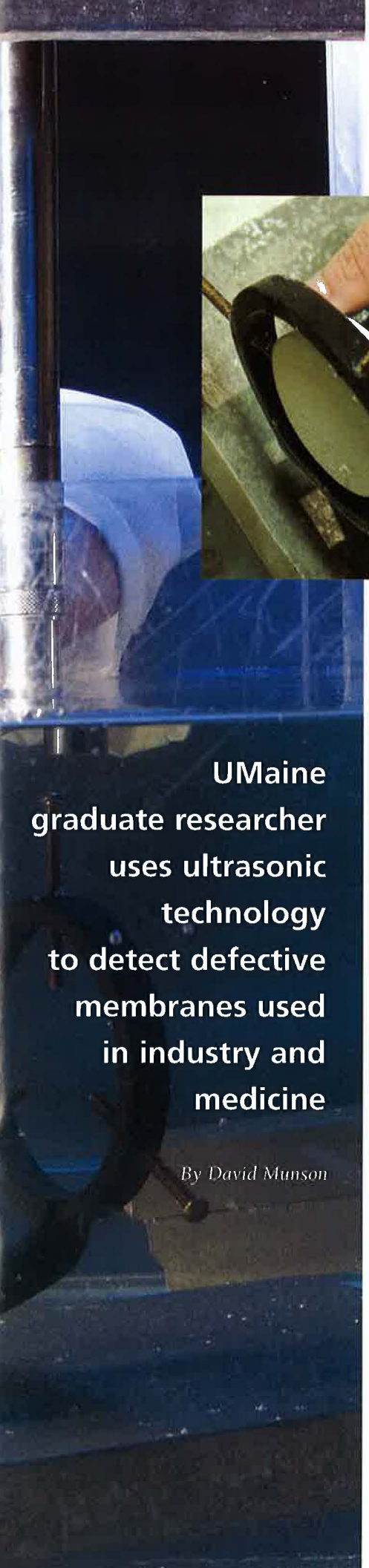
"I was learning about recording music and the techniques that influence the ways music comes out of the speakers," says Marks. "But I came to realize that I wanted to delve more into the purely musical side of things. That's when I came back to Maine."

Since enrolling at UMaine in 2004, Marks says he's been exposed to a daunting variety of music.

"I like the idea of doing a lot with a little," says the senior music major. "Some might call this minimalist, but really the idea is at work in all sorts of music — classical, folk, hip-hop, and, of course, pop. Recently, I've been interested in emulating Steve Reich's music, and also Bartok's."

For a student composers' concert on campus, Marks contributed an electronic keyboard piece. He's thinking about writing a work for a jazz combo. And he plans to compose a trio for piano, cello and violin, instruments his mother and brothers play.

"My musical inspiration has come from different composers, bands and music teachers. But a fundamental influence was my dad. I'd be playing drums with him and he was always saying to keep it simple, stop doing crazy drum fills and keep the beat solid." ▮



UMaine graduate researcher uses ultrasonic technology to detect defective membranes used in industry and medicine

By David Munson

FILTER FACTOR

REMEMBER THAT KID in fifth grade who took apart his dad's new watch just to see how it worked? Deconstruction is great in theory, but it won't buy a new timepiece.

The idea of destroying something just to see if it is working properly goes against the grain, yet for many manufacturing processes, the destruction of filtration membranes for testing purposes is an unavoidable part of quality control. University of Maine doctoral candidate Lin Lin is working to change all that, applying ultrasonic technology in ways that can locate the defect without the destruction.

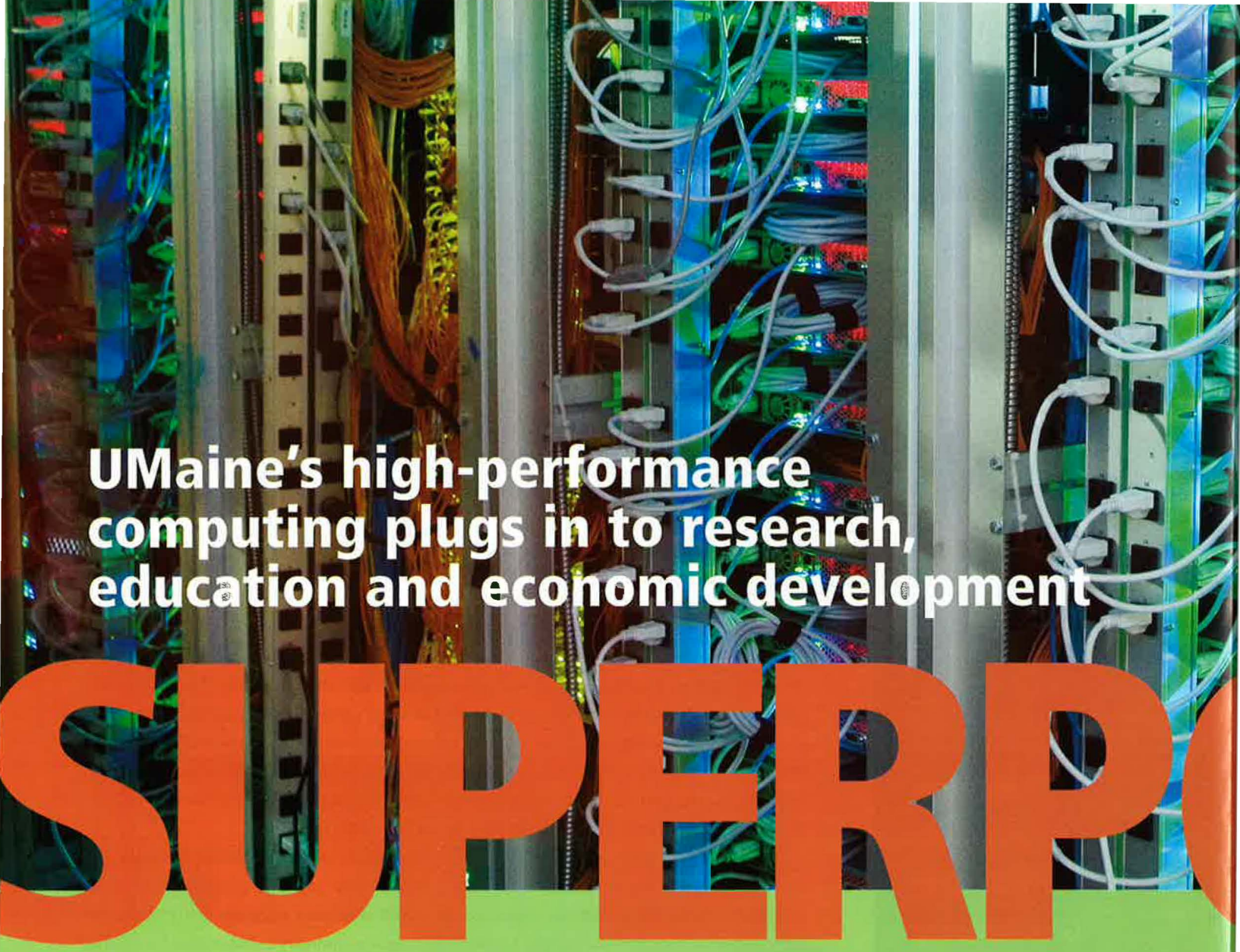
"By using ultrasonic techniques, we can conduct tests in real time without removing the membrane from the manufacturing process," says Lin, whose work has captured the attention of Millipore Corp., and Exxon-Mobil, among other companies. "Traditional testing methods required that a sample of the membrane be removed and sent to the lab, which interrupts the process and never directly answers the question regarding the quality of the membranes as they are used."

Under the guidance of UMaine mechanical engineering professor Michael Peterson, Lin is quickly becoming the leading expert in the use of ultrasonic waves for the study of membranes, and is working to develop important new tools for both research and industrial applications.

With such applications as the filtering of active viruses from vaccines and the removal of impurities from water, membranes are a critical part of thousands of manufacturing processes. Making sure they are operating at maximum efficiency can save time, money and even lives. Lin's master's work at UMaine focused on developing ultrasound testing techniques that could be easily conducted outside the lab — techniques that Millipore hopes to apply to quality control in manufacturing. The testing method allows large area defect detection without interrupting the pharmaceutical manufacturing process.

Lin's doctoral research focuses on the basic science behind the action of membranes. By comparing the behavior of reflected sound waves at the interface of sample membranes and the fluids in which they are immersed, her work is helping scientists better understand how pore size and other factors affect membrane function. Industry collaborators have helped support Lin's work and have shown a strong interest in the potential it has for improving manufacturing processes.

"Membranes are incredibly important in our lives, but there is so much of the basic science that we still don't know," says Lin. "Oil companies, pharmaceutical companies, the Navy — many applications depend on an understanding of how fluids and porous materials interact. This is a really big market, and there are a lot of questions that we need to answer." ▮



UMaine's high-performance computing plugs in to research, education and economic development

SUPERP

WHEN IT COMES TO TECHNOLOGY, small is definitely big. By the mid-1980s, electrical engineers and computer specialists had succeeded in stuffing the 10,000-pound computer into the 10-pound bag, and the trend toward tiny simply accelerated from there. From razor-thin cell phones to MP3 players hardly larger than a stick of gum, the devices we depend on for work and entertainment have been put, quite literally, in the palms of our hands.

For some technologies, however, small size can still be a drawback. Anyone who has leaned in close to his or her computer screen trying to make out the details of a thumbnail photo or undersized illustration can attest to the frustration little images can cause. Limited image resolution and monitor size constraints have been a serious hurdle for researchers, hampering their ability to translate large sets of data into easy-to-interpret graphics. Expansion programs and screen magnifiers could offer grainy enlargements of smaller images, but researchers who wanted to scrutinize their work in all of its oversized, densely pixilated glory had nowhere to turn. Until now.

University of Maine Associate Professor of Electrical and Computer Engineering Bruce Segee and his talented team of student engineers have developed a visualization system for computer images that allows users to combine multiple monitors to create oversized images without sacrificing resolution. The system promises computer users — from scientists to seventh graders — an opportunity to see the big picture.

"A researcher could link together monitors in parallel to look at data in the lab, or a middle school class could coordinate its laptops to examine a Web page or work together on an experiment," says Segee, as one of his undergrads adjusts the image on a 4-foot-square assemblage of monitors in his lab. "It's high performance, high resolution. It's a very powerful learning tool."

The work is partially supported by a National Science Foundation Major Research Infrastructure grant, awarded to Segee and several other UMaine researchers, including Yifeng Zhu, also in electrical and computer engineering; James Fastook of computer

OWERED

By David Munson

science; Huijiue Xue, Fei Chai and Steven Cousins in marine sciences; Peter Koons in geodynamics; and Kiran Bhaganagar in mechanical engineering.

Segee's device, which utilizes special software that divides the image and coordinates its distribution to any number of monitors, is already proving to be a valuable tool for scientists who specialize in computer modeling. Three-dimensional images, created using thousands or even tens of thousands of data points, can be easily viewed in their entirety on Segee's supersized visualization monitor.

"In my research, what I display are animations of ice sheets as they go through their theoretical cycles. I look at a picture every 100 years or 500 years over the course of the 100,000-year cycle, so I'm looking at at least 200 time slices. That's a lot of pictures, representing an incredible amount of numbers," says Fastook, UMaine computer science and climate change professor.

"My work is totally dependent on computer technology to provide a graphic display of what's happening. What Bruce has done with his wall of monitors is to provide a larger, higher resolution display than I could buy, at a much lower cost than the largest displays that are currently available. Not only can you view a large picture and share it with a group, you can walk up close and examine the fine details. It's a very nice device."

SEGEE IS TARGETING THE NEXT GENERATION of scientists and engineers as well, working with Caleb Carter and Roger Blanchette, graduate students in computer engineering; Adam Tibbetts and Brian Tomassetti, undergraduates in electrical engineering; and Emily Albee, a graduate student in education, to make the new visualization system a reality for Maine's middle schoolers. He envisions a simple, easy-to-use program that teachers could access through the Web, allowing them to use their students' laptops in the same way that Segee uses linked monitors in the lab.

From interactive maps of the world to detailed diagrams of a microchip, a broad range of images could be easily viewed by groups

The power of visualization is clearly demonstrated on a bank of monitors that serves as the prototype for UMaine researcher Bruce Segee's latest device. Specialized software divides an image into the appropriate number of pieces, which are then distributed to monitors to create an oversized version of the original. From simple digital files to incredibly complex computer simulations, images displayed on similar monitor mosaics will offer users the big picture without compromising resolution.

of students, offering an exciting new perspective on learning.

"Middle schoolers don't need more to learn, they need tools to help them do more with what they already have," says Segee, who was recently awarded the Butler Professorship in Electrical and Computer Engineering. "This project is not about the wall of monitors, it's about what you can do with it."

Multiple-monitor visualization systems are far from the first of Segee's forays into supersized computing systems. Since 2001, he has been a driving force behind UMaine's supercomputing program, when funding was used to build a 208-node cluster supercomputer based on Pentium III processors. The supercomputer's current incarnation, located in Target Technology Center, boasts an IQ of more than 500 (measured in CPUs, of course). It cranks out millions of computations per minute, 24 hours a day.

Originally developed for projects funded by the military, the system is unique among supercomputers in that its computational powers are based not in one specially designed device, but in the collective capabilities of hundreds of off-the-shelf home computer CPUs.

"At any given time, computers have a maximum clock speed, a minimum transistor size and other limitations that we're simply stuck with until the technology develops further," says Segee. "What we have done here is push the operating speed faster than the limit by using multiple computers (with) each (doing) a little piece of the work. The big advantage of our supercomputer is that it is much less expensive because it is made up of individual components that are mass produced. The first supercomputer cluster that we built here using the Army grant cost about half of what just the annual service contract would cost for a single, custom-built supercomputer with comparable abilities."

HIGH-PERFORMANCE COMPUTING at the University of Maine has proven good for business in the state. Corporate users include Applied Thermal Sciences, a Sanford-based business that has been a valued partner since the supercomputer's inception, assisting in the design, characterization and tuning of the cluster.

Large companies also using the facilities include giants such as Raytheon and Honeywell. Smaller companies include DN American, Combustion Research and Flow Technology, and ANGEL Secure Networks.

"Some companies prefer that we not publicize what they do," says Segee. "We do our best to balance the needs of a business with the mission of a public university. We're a resource for the state, we're here for everyone, but that doesn't mean we'll give someone's trade secrets to their competitors."

Many companies find that the facilities at the University of Maine allow them to do computations in a few days that may otherwise take weeks or even years to run.

"A facility like this represents a major investment in space, cooling and personnel to make it run," says Segee. "It just makes a ton of sense for a business to worry about the computation it wants to perform, and not how to build, house, power, cool and maintain the computer to do it."

Humming away in its dark, air-conditioned room, the UMaine supercomputer collective quietly does its work in electronically coordinated harmony. At any given time, as many as 100 different research projects are being conducted by the system, each one allotted the necessary time and computing ability it requires according to an automated master control.

The system is kept at maximum operating efficiency by computer specialists John Koskie and Justin Bronder, who monitor the supercomputer around the clock, making repairs and adjustments whenever problems arise.

"We have so many different kinds of projects go through here, it's incredible. From climate change to molecular movement, from ice flows to hypersonic missiles, our clients are modeling a huge range of processes," says Segee. "We have built a lot on what we learned from that first cluster. Overall, it has been an enormous success." ▮

Native plant species

Question: What are the benefits of using New England's native plant species as ornamentals in the home landscape?

Answer: One of the main benefits is that plants that are native to this area are very easy to grow here. They have learned to survive in the Northeast over thousands of years, developing strategies to deal with the pests, pathogens and environmental conditions. Many of them are hardy and easy to maintain, and their beauty is often overlooked. Maine has a huge variety of native plants that, with the help of focused selection programs to develop new cultivars, are just as beautiful as the imported plant species that are so often seen in nurseries and garden stores. Because they thrive in the growing conditions found in our area, there really is no good reason not to plant them in the home landscape.

Question: What other advantages do natives have over other ornamentals?

Answer: One very important advantage has to do with the overall health of the environment. By using selected native plants and their cultivars, gardeners can be confident that what they are planting will not become an invasive plant. Many of the invasive species that threaten ecosystems in the Northeast came here as ornamental plantings from Europe and Asia. Natives also are adapted to local climate and, in some cases, require less care.

Question: What opportunities do you see for Maine's horticulture industry with regard to native plants?

Answer: There is tremendous potential for developing new, marketable cultivars of native plants in the Northeast. There hasn't been a lot of effort invested in the development of native species to emphasize their beauty. Cultivars that bring out the plants' unique colors, sizes, shapes and other qualities would appeal to a large market. Their development represents a huge opportunity for horticulturists.

Question: What resources would you recommend to those interested in planting native species?

Answer: University of Maine Cooperative Extension has put out two excellent publications dealing with native plants: *The Maine Native Plants Source List* and *Gardening to Conserve Maine's Landscape*. These and other Extension publications can be ordered online (http://extensionpubs.umext.maine.edu).

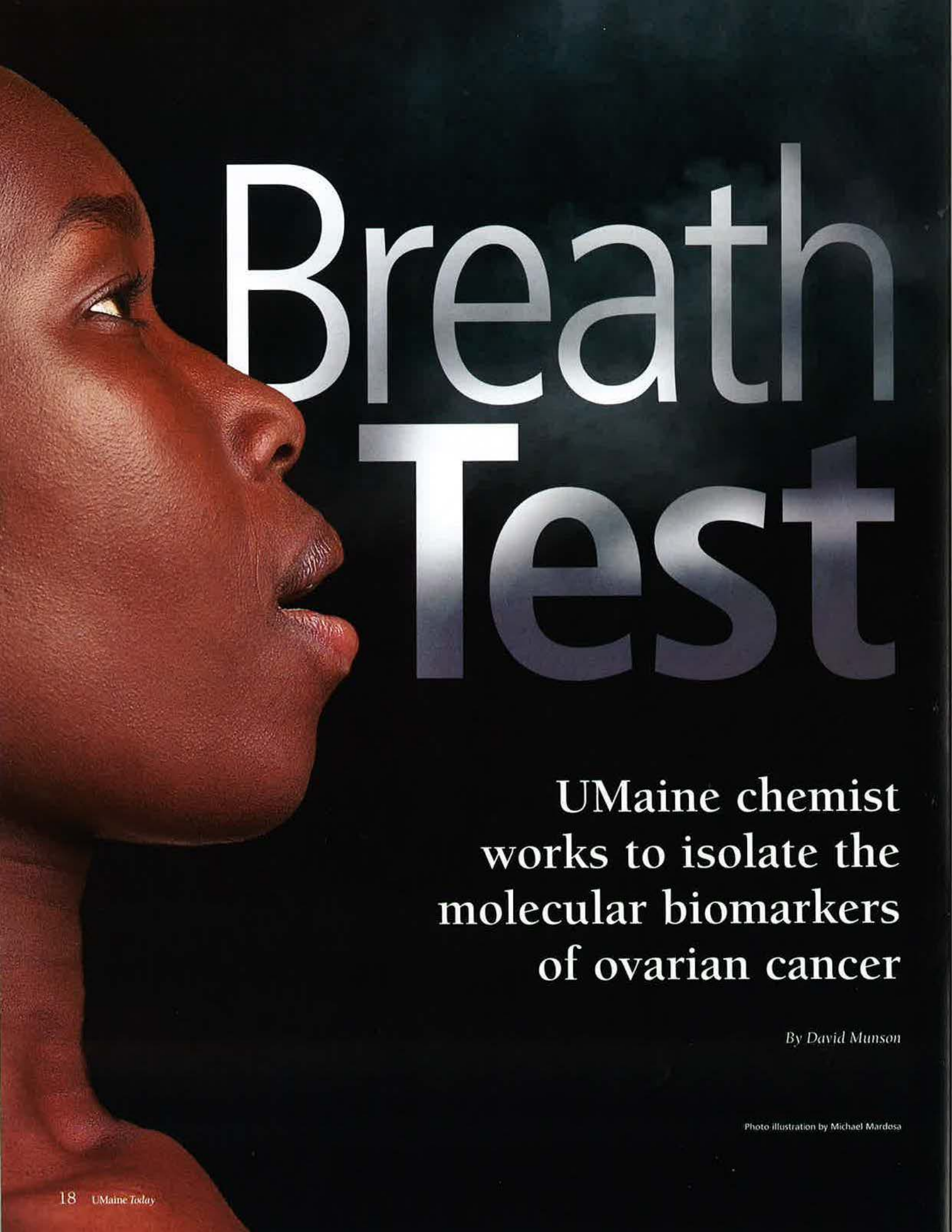
Donglin Zhang

Title: Associate Professor of Horticulture

Research focus: Conservation and utilization of plant germplasm, especially native and introduced ornamental plants

Years at UMaine: Eight

Milestones: Applied DNA markers on ornamental cultivar discrimination and genetic diversity (Japanese plum yew, boxwood, lilac and flowering peach). Found an effective way to propagate native plants, such as sweet fern, hobblebush viburnum, blue iris, etc.



Breath Test

UMaine chemist works to isolate the molecular biomarkers of ovarian cancer

By David Munson

Photo illustration by Michael Mardosa

With all the ways in which human beings are different, breathing is one pursuit that remains decidedly universal. We may eat different foods, speak different languages and live different lifestyles, but the rhythmic pumping of our lungs is the same around the world. However, scientists are discovering that the molecular makeup of a breath may be as unique as the person from whom it was exhaled. Thousands of molecules, set adrift within a cloud of carbon dioxide, nitrogen and other gases, appear in precise combinations that can be identified and interpreted. And the story they tell can, quite literally, mean the difference between life and death.

University of Maine chemistry professor Touradj Solouki, working in collaboration with researchers at the Pine Street Foundation in California, is applying advanced techniques in chemistry and proteomics to uncover the hidden signs of disease that linger in a human breath. Armed with electron guns, ion cyclotron resonance mass spectrometers, and other futuristic tools of the trade, he operates a device that is, in effect, an incredibly effective molecular trap — a trap he is using to delve into the secret life of cancer.

With nearly $500,000 in funding from the Department of Defense Ovarian Research Program, Solouki is using specialized molecular isolation techniques and one of the Northeast's most powerful superconducting magnets to isolate and identify molecules contained in a human breath. By comparing the molecular components found in a healthy person's breath with those found in the breath of a cancer patient, Solouki and his team hope to identify specific biomarkers that indicate the presence of ovarian cancer. While ovarian cancer is the fifth leading cause of cancer deaths in women, the disease has a 90 percent survival rate if detected in its early stages.

"We already know some potential markers for diabetes and high cholesterol that are present in human breath. The goal now is to find the biomarkers for ovarian cancer so that a sensor that uses this noninvasive method can be developed for use in hospitals," says Solouki, while recharging the lab's massive magnet with liquid nitrogen. "The device includes both high- and low-pressure instruments, so getting the different components to work together was a challenge. But by putting them together, you realize tremendous advantages."

Breath Test

The device professor Solouki and his research team have constructed is known by the rather unwieldy acronym PC/GC/FT-ICR MS, or Preconcentrator/Gas Chromatography/Fourier Transform Ion Cyclotron Resonance Mass Spectrometer. By linking several state-of-the-art technologies and standardizing the methods by which sample molecules are analyzed, Solouki has developed a greatly improved isolation procedure for examining individual molecules.

Homing in on individual molecules is no easy task, but the ability to do so is already opening new doors in chemistry, biotechnology and other fields. Solouki and his research group have used the technique in a variety of applications, from identifying biomarkers and disinfection by-products in drinking water to determining the country of origin for a sample of gasoline. The ability to isolate and manipulate molecules such as those exhaled in a breath is particularly important to the growing fields of proteomics and metabolomics.

Simply defined, proteomics is the large-scale study of the structures and functions of proteins. The human body contains more than 2 million different proteins, each with its own dynamic structure and function. In addition to modern genomic and DNA studies, understanding proteins — from the relatively short insulin molecule to giant muscle-forming proteins such as titin — and their functions is critical to improving human health.

Solouki and his team are able to separate the molecules that make up complex mixtures, such as the components of a human exhaled breath, by forcing them to sort into like groups as they travel through hundreds of meters of fine tubing. A specialized coating on the inside of the tube affects the movements of each type of molecule in a different way, causing them to segregate. The molecules are then captured in a device that is cooled by liquid nitrogen, remaining in a state of suspended animation at 200 degrees below zero, waiting to be released into the grip of a very strong superconducting magnet.

In the magnetic field, the molecules are ionized with a beam of electrons. The ionized molecules are trapped and their translational motion is further restricted using a combination of a strong magnetic field and an electrical field. These trapped ionized molecules can be identified according to the specific natural cyclotron frequencies at which they spin.

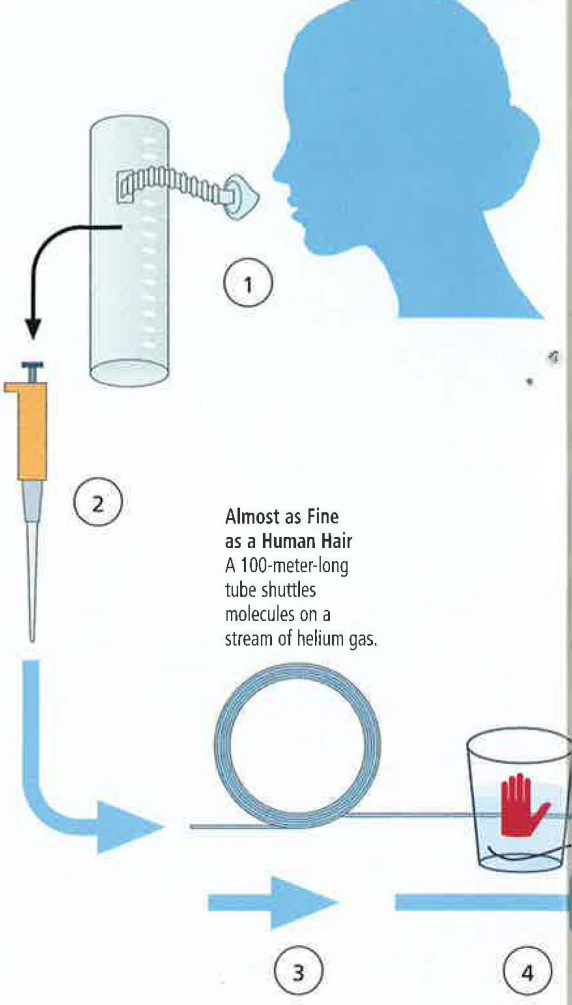
Solouki's collaborators at the Pine Street Foundation published a study in 2006 on the detection of early- and late-stage lung and breast cancers using samples of exhaled breath. In the study, dogs were used to "sniff out" cancer patients using only their highly sensitive noses. Breath samples from 86 people diagnosed with lung or breast cancer were presented to five professionally trained scent dogs, along with samples from 83 healthy controls.

The dogs were able to correctly identify or rule out lung and breast cancer at both early and late stages with an accuracy of more than 90 percent.

Researchers suspect that, unlike normal cells, cancer cells emit different metabolic waste products. Solouki's molecular identification techniques promise to determine the source of those differences, providing not only a new way of detecting cancer, but also a greater understanding of how the disease affects the body.

In the current project, Pine Street Foundation researchers will recruit ovarian cancer patients and control subjects, and apply the same methods used in the breast and lung cancer study — training dogs to detect the disease in samples of exhaled breath. Those same breath samples will be analyzed in Solouki's laboratory at UMaine to obtain a comprehensive and detailed inventory of the chemical compounds found in the breath of ovarian cancer patients.

"Canines have been used for a long time for detecting explosives and illegal drugs, and they are just starting to be used for biomedical purposes," says Solouki. "Dogs have shown a high rate of success in distinguishing between normal and abnormal



A CONVERGENCE OF TECHNOLOGIES

Solouki brings together multiple devices to create an advanced research tool

1) A breath sample is collected and catalogued for later use.

2) A tiny amount of breath is extracted from one of the samples for analysis and injected into the PC/GC/FT-ICR mass spectrometer.

3) A tube 100-meters long, 50-micrometers wide with a specially treated inner surface turns the breath sample into a linear sequence of like molecules, sorted by molecular weight, polarity and other characteristics.

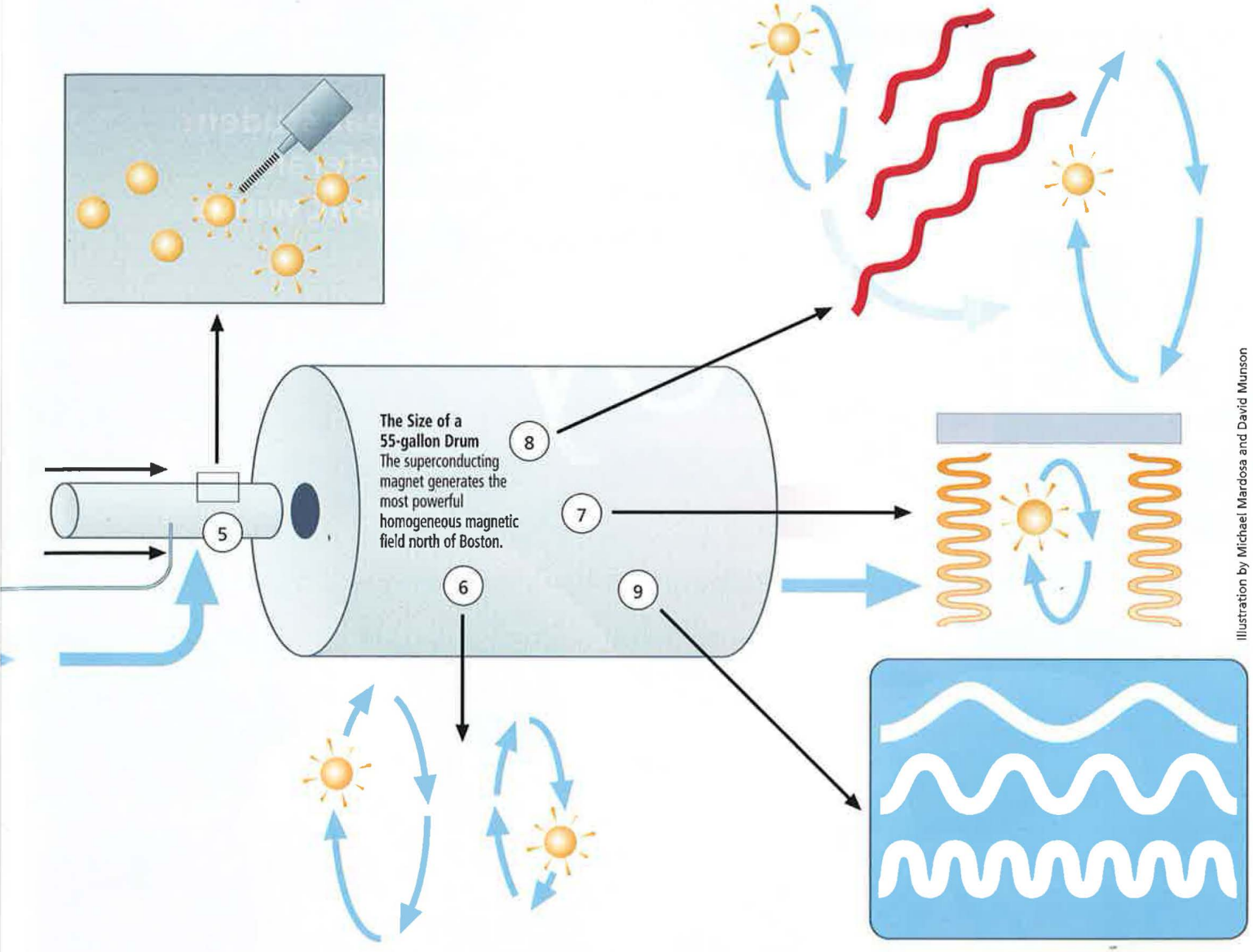


Illustration by Michael Mardosa and David Munson

4) Like groups of molecules are frozen in a -200°C liquid nitrogen bath until they are released with a flash of heat from a wire filament. From there, they enter the mass spectrometer for analysis.

5) Inside the mass spectrometer, an electron gun zaps the neutral molecules, transforming them into charged ions that can be manipulated more easily inside the superconducting magnet.

6) In the chamber's powerful magnetic field, the ions begin to orbit, with each ionized molecule type spinning with its own specific frequency, which is inversely proportional to its mass.

7) Inside the Ion Cyclotron Resonance (ICR) cell (a device composed of six copper plates inside the magnetic field where ions are actually trapped), two opposing "trap" plates emit controlled electrical fields that further restrict the movements of the spinning molecules in the magnetic field lines' direction.

8) Two additional opposing "excitation" plates inside the ICR cell emit a combination of electric waves in the radio frequency range that increase each molecule's orbit, allowing easier analysis of its characteristic frequency.

9) Two "detection" plates "read" the spinning patterns of the trapped molecules and translate them into sinusoidal waves, which are separated from one another using a mathematical operation (Fourier transform) and compared to standards, allowing each molecule in the mixture to be accurately identified.

breath samples associated with different types of cancer, and what we hope to determine is exactly what it is that the animals can detect. The ultimate goal of this research is to look at a patient's breath and biological fluids to build a picture of how they all relate. We want to know what is happening in the body at the molecular level so that we can develop better treatments."

The project is the first to use analysis of exhaled breath for early detection of ovarian cancer. Unlike blood tests, biopsies and some other cancer detection methods, the breath analysis approach is a truly noninvasive diagnostic technique.

Once the biomarkers for ovarian cancer and other diseases are identified, a sensor could be developed for quick, accurate testing in hospitals and doctors' offices, increasing the chances of early detection and significantly improving the odds of successful treatment.

"The potential for using these techniques in the diagnosis and treatment of disease is almost limitless," says Solouki. "This project could really improve our ability to detect cancer in time to control it." ▮

UMaine first-year student and Iraq war veteran spreads his artistic wings

Bat boy

By Margaret Nagle

"Everyone who's not been accepted or misunderstood can identify with Bat Boy. I've been misunderstood plenty of times in my life. For me, one line in the play says it all: 'I know I'm strange, so help me change.' Because I see myself in Bat Boy, this is my favorite role."

Jacob Cayouette

WHEN JACOB CAYOUETTE auditioned for a role in his first college musical, he didn't know the play about a lonely, pointy-eared, sharp-toothed boy discovered living in a cave. As a first-semester theater student at the University of Maine, all Cayouette hoped for was a bit part that would give him a few minutes in the footlights.

But Cayouette's acting and singing talents landed him the title role in UMaine's spring production of *Bat Boy: The Musical*. And while the casting call stunned Cayouette, it was no surprise to those who know him and his lifelong love of the stage.

"I've been acting — or acting out — in front of my family since I was 3," admits the Rockport, Maine, native. "I was the middle child trying to grab attention. I've always been in love with theater."

His parents, a Christian singing duo known as the Cayouettes, regularly toured the Northeast. When Cayouette and his two siblings were old enough, they joined their parents on stage. Cayouette performed with them until he was 10.

"My dad has a powerful voice. He's a real people person who likes to tell stories. My mom has great tone. She's quiet and musically diverse, playing piano, guitar and trumpet. She was the one who started my love for every type of music.

"I'm a tenor with a pretty high voice and decent falsetto range. I like to think I got a little of both my mom and dad's voices."

At Camden Hills Regional High School, Cayouette's first taste of theater came as a member of the chorus in a production of *Guys and Dolls*. It was the first of nine high school plays, including every musical, in which he took the stage and an increasing share of the spotlight. But to pursue his passion for theater and music, Cayouette made the tough decision as a sophomore to give up athletics, which he excelled in all his life.

"I loved sports," he says, "but music and theater were more fun."

Two months after graduating high school in 2002, Cayouette was in the Army. He enlisted, he says, because of Sept. 11, just as his brother had done a year earlier, and because a military career would give him two opportunities: money for college to major in theater, and world travel.

Cayouette turned 18 in basic training. That January, he and the rest of the 17th Signal Battalion headed to Iraq for a six-month stint.

"The military shows your breaking points," he says. "You get to know fear — and yourself — well."

When he was back in Germany where his unit was stationed, Cayouette submitted an audition tape for the U.S. Army Soldier Show, an annual touring company of amateur artists selected from active duty soldiers to spend nearly seven months performing a live musical review. He was selected to be one of 18 performers for the 2004 tour, which involved 110 shows in 57 locations worldwide before audiences of up to 10,000.

It was his first professional performance gig. And it went by all too quickly. By January 2005, Cayouette was back in Iraq, this time for a year.

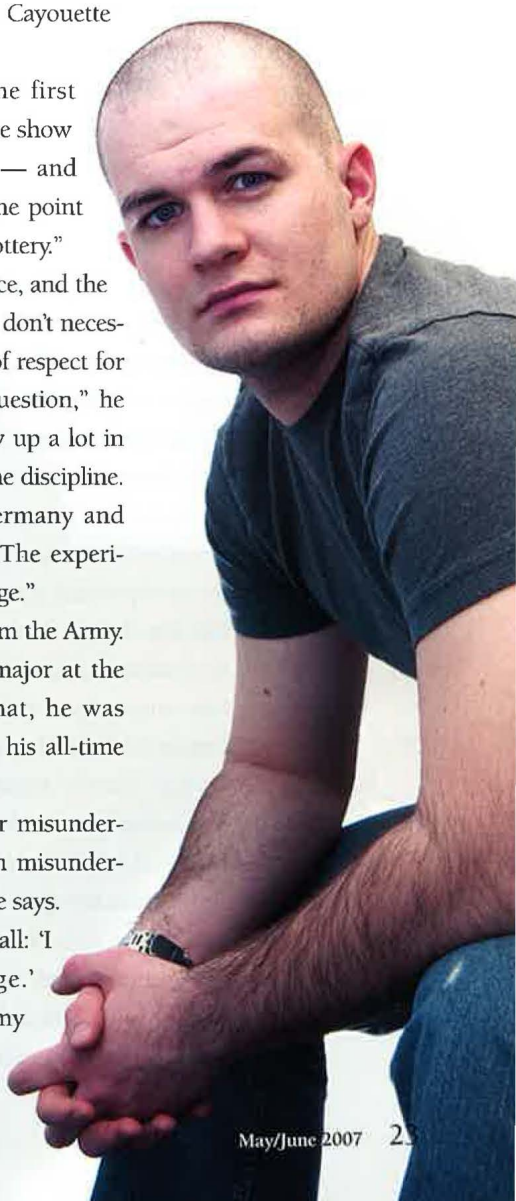
"I never wanted to go back after the first time," he says. "I heard halfway through the show that we had to return and I was upset — and scared. Everybody's scared. Then comes the point that you just do it. It's like winning a bad lottery."

Cayouette is proud of his military service, and the maturity and life experiences he gained. "I don't necessarily agree with the war, but I have a lot of respect for the soldiers who go and do it without question," he says. "I'm glad I joined the military. I grew up a lot in four years. I got in great shape and got some discipline. Traveled a lot, met my girlfriend in Germany and performed in a professional production. The experience also gave me a lot to work with on stage."

Last July, Cayouette was discharged from the Army. A month later, he enrolled as a theater major at the University of Maine. Not long after that, he was tapped for what he says is unequivocally his all-time favorite theatrical role.

"Everyone who's not been accepted or misunderstood can identify with Bat Boy. I've been misunderstood plenty of times in my life," Cayouette says.

"For me, one line in the play says it all: 'I know I'm strange, so help me change.' Because I see myself in Bat Boy, this is my favorite role." ▮



The Faith of Russia

UMaine political scientist studies the symbiosis of religion and politics under the Putin administration

By Dick Broom

RUSSIAN PRESIDENT Vladimir Putin has found religion, and religion has found Vladimir Putin. So far, their marriage of accommodation, though sometimes strained, appears to be serving them both reasonably well.

The Putin administration and the religious establishment — the Russian Orthodox Church — have reached out to each other to further their mutual interests, according to University of Maine political scientist James Warhola. Those who might have expected the church to object to what Warhola calls the "creeping authoritarianism of the Russian state" have been disappointed.

"Scholars disagree on many things about what is going on in Russia, but there is general agreement that not only has the church done nothing to obstruct this authoritarianism, but, if anything, has encouraged it," says Warhola, an expert on Russian political philosophy.

The church enjoys far more respect and privilege now than it did under communism, and doesn't want to jeopardize its influence and independence. For Putin, the church's support legitimizes his authority and use of power. He also recognizes the church's traditional role as a stabilizing influence in Russian society.

Contrary to its powerful image, the Russian government is actually quite weak in some respects, Warhola says. For example, it has been unable to control rampant crime and, therefore, needs the support of institutions that people respect, such as the church.

About 80 percent of the population of the Russian Federation is ethnic Russian, and three-quarters of them profess Russian Orthodoxy. Although public expressions of faith are the exception — perhaps 3 percent of Orthodox Russians attend church — the Orthodox church remains an important symbolic force in Russian culture.

"For more than a thousand years, being Russian and being Orthodox have been inextricably intertwined," Warhola says.

In the years following the breakup of the Soviet Union, Russian President Boris Yeltsin encouraged the Russian Orthodox Church to become active in public affairs. Putin has invited the church to play an even greater role. But both men have wanted the involvement of the church to be on their terms, according to Warhola.

That means that the administration listens to church leaders and even solicits their advice on issues in such areas as education and foreign policy. But the administration doesn't do anything it doesn't want to do. For example, it hasn't yielded to the church's call for chaplains in the armed forces.

Church leaders publicly supported Putin in his opposition to the United States' invasion of Iraq. The church also has given at least tacit support to some of the president's authoritarian policies that worry civil libertarians and many Western leaders.

"The church has viewed some of these policies as having a salutary effect on Russian society," Warhola says. "That was the case, for example, when the church strongly pushed the administration to restrict the ability of foreign missionaries to come into the country."

A law passed in 1990 officially separated church and state, and expanded religious freedoms. But seven years later, a new law strictly limited the activities of religious groups that were not among the country's well-established faiths, primarily Russian Orthodoxy, Islam, Judaism and Buddhism. The law was largely in response to the flood of foreign missionaries who began pouring into Russia after the fall of communism.

WARHOLA HAS PUBLISHED extensively on the role of religion in Russia. Last year, he was among the prominent scholars of Russian politics and religion invited to take part in a conference at Columbia University on "Orthodoxy and Identity in Post-Atheist Russia." He presented a paper, "Religion and Politics Under the Putin Administration," in which he concluded that, despite the low level of public religiosity displayed by Russians, the Orthodox Church will continue to play a significant role in defining Russian society and shaping the political landscape.

"It might even become an important force in restraining the state from descending into a full-scale reversion to a form of governance that is simply not accountable to the public nor to any social group, movement or force," he wrote.

Warhola also spoke last spring at an international conference on "Religion, Culture and Conflict in the Former Soviet Union and Beyond," hosted by the Russian Academy of Sciences in Moscow.

Most recently in March, he was one of the scholars at the international conference, "Islam and Orthodoxy: Confrontation, Cohabitation, and Comparison" in Vienna. In July, Warhola is headed to England where he has been asked to speak on Russia under Putin as part of a prestigious Oxford Round Table session on "Separation of Church and State: Rise and Fall?"

Warhola says Putin and other government officials meet regularly with Russian Orthodox Church and Moslem leaders. Moslems, most of whom are not ethnic Russians, make up about 15 percent of the Russian population and are concentrated mainly in the Volga River and Caucasus regions. The latter includes Chechnya, where separatists have been at war with the Russian army off and on for more than a decade. Putin sees the insurrection and acts of violence, which he labels terrorism, as spawned and inflamed by Islamic extremism. For the most part, though, Moslems in Russia are not religious radicals, Warhola says.

"The overwhelming majority of Moslems pursue a very moderate form of Islam and prefer an accommodationist stance toward the Russian state," Warhola says.

Largely, Moslems and ethnic Orthodox Russians have lived together peacefully for centuries. However, in the last few years, the Putin administration's antiterrorism campaign, which some see as anti-Islamic, has elevated tensions between the two ethnic-religious populations in some parts of the country.

The result is a troubling rise in a domestic form of "racist xenophobia," a fear and distrust of foreigners of other races. But in Russia today, racist xenophobic violence and discrimination are most likely to be committed, not against foreigners, but by ethnic Russians against nonethnic Russians.

The victims are sometimes Moslems, sometimes Tatars or members of other minority ethnic or religious groups. The small Jewish population in Russia often bears the brunt.

Putin has publicly called "ethnic hatred" one of the most serious threats to Russian society, and the Russian Orthodox Church has joined in condemning religious and ethnic intolerance.

Warhola says the state needs the church to exert all of its moral authority and social influence to help tamp down the hatred and curb the violence. Much is at stake, he says, perhaps even the country's political framework. ▮

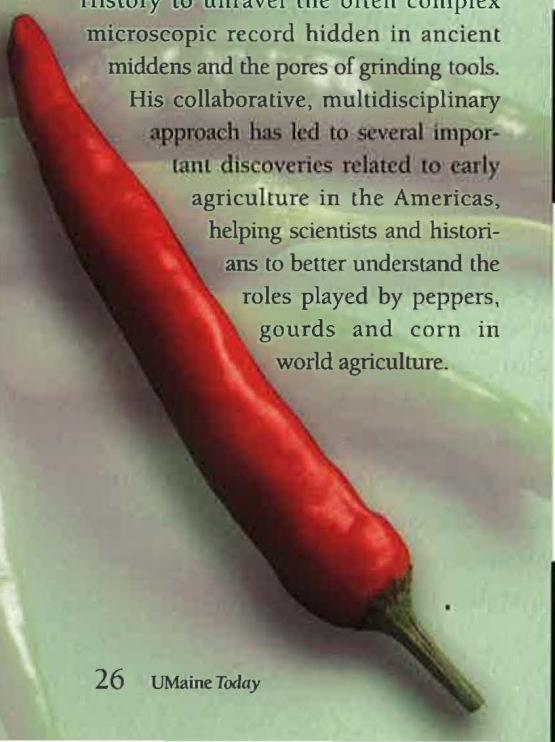
UMaine discovery spices up ancient menus

THE REMAINS of ancient food discovered in Peru by University of Maine anthropologist Dan Sandweiss are helping not only to push back the frontiers of agriculture in the Americas, but to further our understanding of how humans ate as much as 6,000 years ago.

Cutting-edge microfossil analysis was performed by Smithsonian archeobiologist Linda Perry and her team on samples collected by Sandweiss and his students at Waynuna, a dig site near Alca, Peru. The findings suggest that, in addition to corn and other staples, ancient cultures were growing chili peppers to spice up their diets thousands of years ago.

A study by Perry, Sandweiss and others, recently published in the journal *Science*, traces the history of the cultivated pepper through seven archeological sites in the Americas. Sandweiss' samples from Peru were the spark that inspired the project, and were the only hot peppers in the study that could be identified to the species level.

Sandweiss has made microfossil collection an important part of his research since the late 1990s, working closely with Delores Piperno and Linda Perry of the Smithsonian's National Museum of Natural History to unravel the often complex microscopic record hidden in ancient middens and the pores of grinding tools. His collaborative, multidisciplinary approach has led to several important discoveries related to early agriculture in the Americas, helping scientists and historians to better understand the roles played by peppers, gourds and corn in world agriculture.



NATIONALISM and NUCLEAR WEAPONS

WITH THE ELECTION of ultraconservative Mahmoud Ahmadinejad as president of Iran in 2005, the country started championing nationalism ahead of Islamic interests, and nowhere is that more visible than in promotion of its nuclear program, according to a University of Maine political scientist and expert on Iran.

"Iranians tend to support the nuclear program as a matter of national pride, something that is not likely to change as long as they do not believe the program threatens their security or impinges on their standard of living," says Bahman Baktiari, writing in the January issue of *Current History*. "Through the state media, Iran's leadership has popularized the idea that the nation's nuclear program is about much more than nuclear weapons."

Government propaganda portrays the country's nuclear activities as a remedy to Iranians' historical dissatisfactions and as a source of hope for the future. Ahmadinejad and other conservatives in Iran's government are successfully using the nuclear issue as a means to cement their own power through nationalist fervor. In this, they have been unwittingly assisted by President Bush, Baktiari says.

"No one has benefited more from American blunders in the Middle East than the conservatives in Iran who now control all the power centers," says Baktiari.

For years, Iranian leaders promoted Islamic interests ahead of national interests. But since the Iraq invasion, they reverted to the nationalist approach promoted three decades ago by Mohammad Reza Shah.

Prescription Ethics

TRUST IN MEDICINE is traditionally viewed as a one-way street of getting patients to trust their healthcare providers. What's often overlooked is the significance of physicians' trust or distrust of their patients.

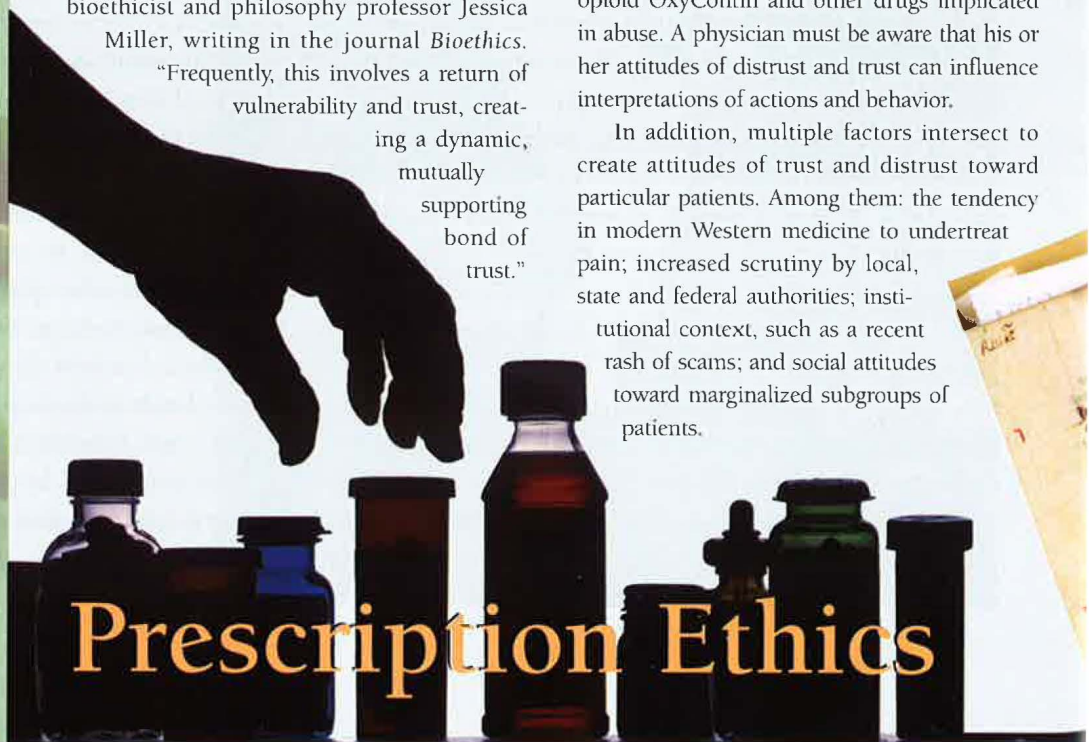
"Trusting another person involves being or making oneself vulnerable in some way to her, and expecting that she will respond appropriately and benevolently to that vulnerability," says University of Maine bioethicist and philosophy professor Jessica Miller, writing in the journal *Bioethics*. "Frequently, this involves a return of vulnerability and trust, creating a dynamic, mutually supporting bond of trust."

In a trusting physician-patient relationship, doctors see their patients as moral, not manipulating for ill-gotten or undeserved gain, or misrepresenting themselves or their illnesses. Mutual trust helps to ensure physician and patient are working together for a common good — the patient's health.

Mutual trust helps to ensure physician and patient are working together for a common good — the patient's health.

Physician trust in patients is particularly pertinent when treatment involves pain medications like the synthetic opioid OxyContin and other drugs implicated in abuse. A physician must be aware that his or her attitudes of distrust and trust can influence interpretations of actions and behavior.

In addition, multiple factors intersect to create attitudes of trust and distrust toward particular patients. Among them: the tendency in modern Western medicine to undertreat pain; increased scrutiny by local, state and federal authorities; institutional context, such as a recent rash of scams; and social attitudes toward marginalized subgroups of patients.



Telling stories

LISTENING to family members share stories about the work they do, including how they make a living, can reveal subtle clues about cultural identity, values and family boundaries, according to two University of Maine communication researchers.

Professors Kristin Langellier and Eric Peterson study family storytelling — performance of narrative communication — to better understand how class, race, ethnicity, culture, generation, gender and sexuality mark differences and create complexities in negotiating family-work boundaries.

Family storytelling about work often involves give-and-take among participants that shapes, interprets and contests meanings and identities. It is the dynamic struggle over meanings and the logistics of material sustenance — internal and external boundaries — that contribute to family formation and cultural survival, according to Langellier and Peterson, who published their findings in *Communication Monographs*.

Medieval water quality

UMaine Historian William TeBrake has spent the past three decades studying the medieval bylaws of Rijnland's water board that were essential to life in rural Dutch communities.

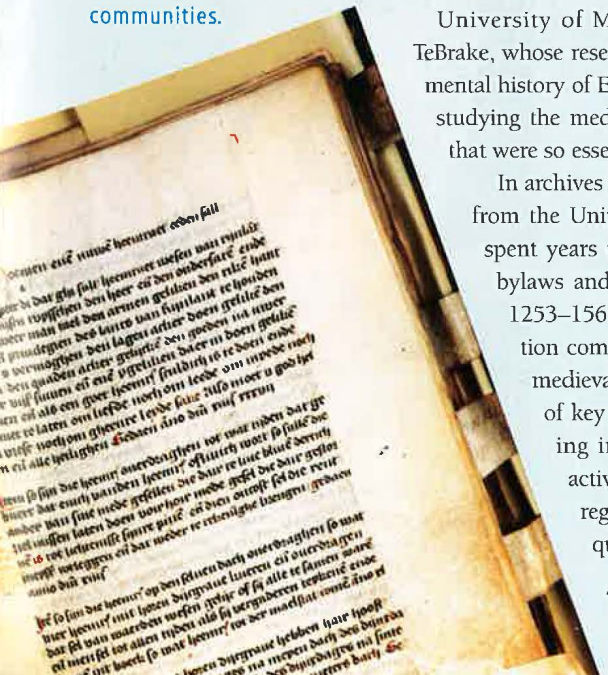
IN THE MIDDLE AGES, some of the world's most advanced hydraulic engineering and environmental policymaking occurred in the lowlands of Holland, where inhabitants faced a constant struggle to keep the sea out and inland wetlands drained.

The introduction of hydraulic engineering — the use of dikes, dams, sluices and drainage canals — was a turning point in the history of water management in The Netherlands. The innovations replaced small, shallow ditches that were highly susceptible to flooding.

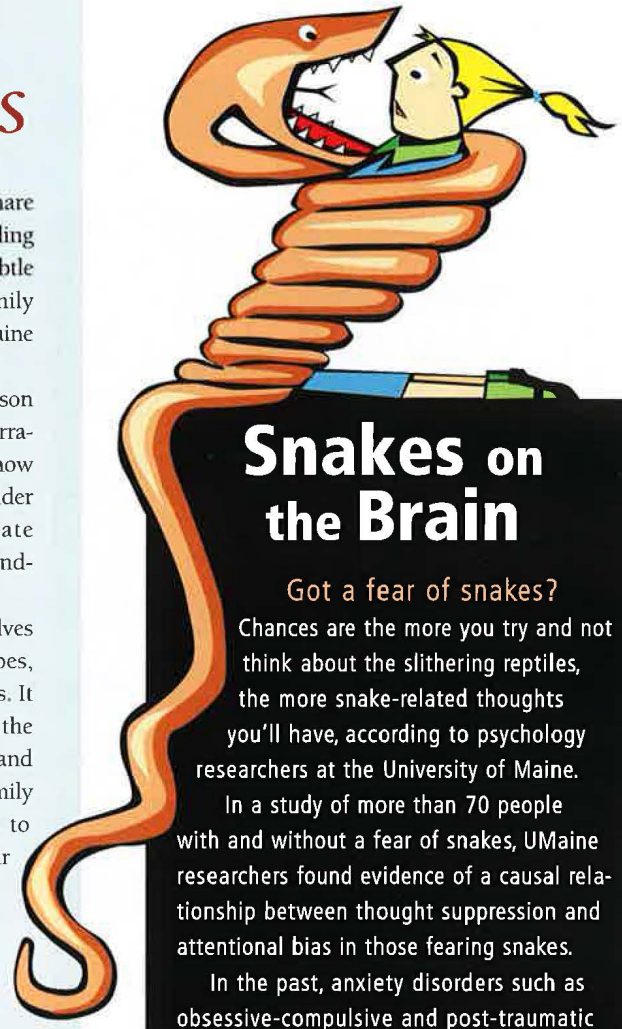
Then, as now, Dutch water boards governed the complex water control networks. Hoogheemraadschap van Rijnland, a water board near Amsterdam and The Hague that traces its roots in the late 12th century, is the oldest still in existence.

University of Maine Professor of History William TeBrake, whose research focuses on the social and environmental history of Europe, has spent the past three decades studying the medieval bylaws of Rijnland's water board that were so essential to rural life.

In archives in Holland and from microfiche loaned from the University of California-Berkeley, TeBrake spent years transcribing, editing and indexing the bylaws and decisions of the board trustees from 1253–1564. The result is a Web-based publication complete with summaries in English of the medieval transcriptions, an extensive database of key words and a glossary of terms, providing insight into the region's water-related activities — from shipping tolls and fishing regulations to measures to preserve water quality.



A page of a medieval Dutch manuscript in the Rijnland Archives, Leiden, The Netherlands: OAR #12. Image courtesy of William TeBrake



Snakes on the Brain

Got a fear of snakes?

Chances are the more you try and not think about the slithering reptiles, the more snake-related thoughts you'll have, according to psychology researchers at the University of Maine.

In a study of more than 70 people with and without a fear of snakes, UMaine researchers found evidence of a causal relationship between thought suppression and attentional bias in those fearing snakes.

In the past, anxiety disorders such as obsessive-compulsive and post-traumatic stress have been linked to thought suppression — a deliberate attempt to avoid thinking about certain subjects — and attentional bias or focus. But only one other study has explored the possibility that thought suppression could cause hypervigilance typical of anxiety disorders, including phobias.

Thought suppression and attentional biases are important processes in understanding the development and maintenance of clinical disorders, according to UMaine Professor of Psychology Jeff Hecker and graduate students Tamer Fawzy and James Clark, who published their study in a recent issue of the Journal of Anxiety Disorders. That's why it's important that future research seek to understand how people with nonclinical levels of anxiety can override a tendency to focus on fearful stimuli.

The relationship between cognitive avoidance and attentional bias for snake-related thoughts was the subject of a master's thesis by Fawzy, who is now in the clinical psychology graduate program at the University of Wyoming.

Additional depth in marine sciences

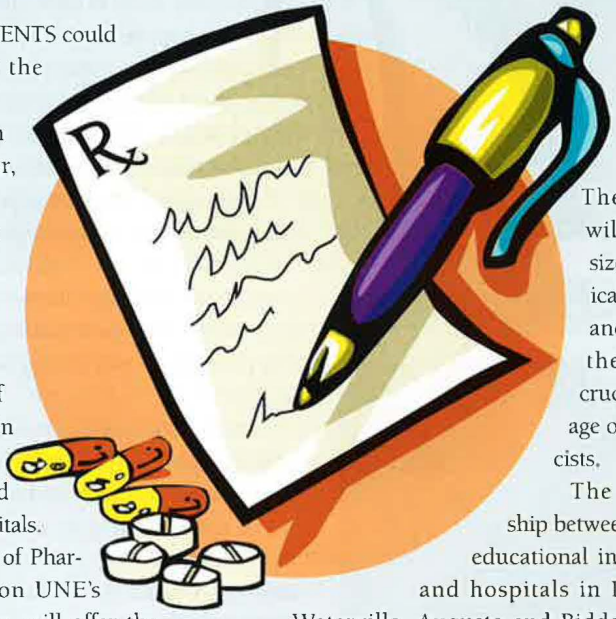
A UNIQUE ARRANGEMENT with the Gulf of Maine Research Institute (GMRI) in Portland, Maine, is helping further develop the University of Maine's reputation as a leader in marine ecosystem science by attracting two world-class marine scientists to the state.

Researchers Andrew Pershing and Jeffery Runge recently joined UMaine's School of Marine Sciences as joint appointments with GMRI, applying their considerable expertise in ecosystem modeling and zooplankton research toward a better understanding of the complex interactions that drive Maine's marine environments.

Pershing's research focuses on marine ecosystem modeling. He is widely recognized as a leader in the use of computer modeling and visualization techniques to better understand how the dynamics of the ocean environment influence fish and mammal populations over time. Runge's work examines how zooplankton populations are affected by temperature, wind, currents and other factors in cold-water ecosystems. Their work promises to help improve fisheries management practices and preserve the health of marine ecosystems in the Gulf of Maine.

At GMRI's state-of-the-art facility on Portland's working waterfront, Pershing and Runge will teach UMaine courses and advise graduate students. In addition, the research they conduct will provide students with an opportunity to benefit from the facilities and expertise available at both institutions.

Pharmaceutical partnership



UP TO 30 STUDENTS could be enrolled at the University of Maine this fall in a new two-year, prepharmacy program as part of a College of Pharmacy recently established by the University of New England in partnership with UMaine and four Maine hospitals.

The College of Pharmacy, located on UNE's Portland campus, will offer the subsequent four years of professional programming for students, leading to a Pharm D degree and careers as pharmacists or pharmaceutical scientists.

The college will emphasize biomedical research and address the state's crucial shortage of pharmacists.

The partnership between the two educational institutions and hospitals in Portland, Waterville, Augusta and Biddeford will allow UMaine's Graduate School of Biomedical Sciences to expand its teaching and research in pharmacology, metabolism, medicinal and natural product chemistry.

Who's Calling?

THIS SPRING, members of the University of Maine student chapter of the Wildlife Society field tested cell phone-based technology to see if they could "call" owls to determine how many there are and their whereabouts.

The students, most of them wildlife ecology majors, are among the volunteers who participated in the 2007 Maine Owl Monitoring Program (MOMP), an annual statewide survey coordinated by Maine Audubon and the Maine Department of Inland Fisheries and Wildlife. This year, March 9–April 16, from 1–4 a.m., they monitored three routes in Orono, Hudson and Brewer. Along each, the volunteers stop repeatedly to play taped calls of barred, long-eared and great horned owls, and to record any responses from the nocturnal birds.

In addition, the UMaine students also tested high-tech devices developed for Maine Audubon by the Massachusetts Institute of Technology Media Laboratory. The cellular devices have the ability to play recorded calls and listen for hours, documenting responses in a database.

One of the questions volunteers and engineers hope to answer is whether owls hear calls made miles away and, in essence, tire of responding when volunteer monitors near their locations, thereby biasing the data.

UMaine Wildlife Society members have participated in MOMP since 2002, a year after Maine Audubon's owl census started.

Photo by George Dooley

last impression

In February, U.S. Sen. Susan Collins and U.S. Rep. Michael Michaud were at the University of Maine's Advanced Engineered Wood Composites (AEWC) Center for a demonstration of a new product designed to protect American soldiers in combat.

The Modular Ballistic Protection System panels developed at UMaine fit inside tents, protecting troops from mortar fragments and other dangers. The panels feature a core of oriented strand board (OSB) encased in layers of fiberglass, covered with an outer layer of polypropylene.

Larry Parent, AEWC senior research and development program manager, and civil engineering graduate student Keenan Goslin led the UMaine team that developed the lightweight, portable systems for efficient and effective use in remote areas. The Modular Ballistic Protection System project is part of a $3.7 million contract with the U.S. Army Soldier Systems Center in Natick, Mass.

The panels are now ready for pilot manufacturing and demonstration by the Army. The first 20-foot by 32-foot up-armored tent kit was shipped this spring for use in Afghanistan. The kit was requested by the Army's 10th Mountain Division, which includes members of the Maine National Guard.

1865 THE UNIVERSITY OF MAINE
Department of University Relations
5761 Keyo Building
Orono, Maine 04469-5761

Change Service Requested

WILLIAM S. COHEN CENTER FOR INTERNATIONAL POLICY & COMMERCE

A DECADE AGO, the William S. Cohen Center for International Policy and Commerce was established at the University of Maine to support scholarly research and activities that contribute to finding solutions to political, military, and economic challenges faced by the United States in the 21st century.

Today, as a cornerstone of UMaine's new interdisciplinary School of Policy and International Affairs (SPIA), the center named for the former U.S. Senator and Secretary of Defense from Bangor, Maine, has the potential to help the university achieve its goal of developing one of the top international affairs and policy schools in the country.

The creation of SPIA improves UMaine's ability to apply its collective expertise to helping define relevant issues and create timely solutions in areas such as international, economic and environmental policy, and international relations.

An endowment for the support of the William S. Cohen Center is managed by the **University of Maine Foundation.**

Photo by Tracey Attlee

Former Secretary of Defense William Cohen, left, talks with University of Maine President Robert Kennedy at the start of a two-day conference this spring in Washington, D.C., "Nuclear Weapons and the Middle East Region: A New Round of Proliferation?" sponsored by UMaine's William S. Cohen Center for International Policy and Commerce, and the National Defense University.

UNIVERSITY of MAINE FOUNDATION
www.umainefoundation.org

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

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