

Natural Instinct

Seeking Utopia

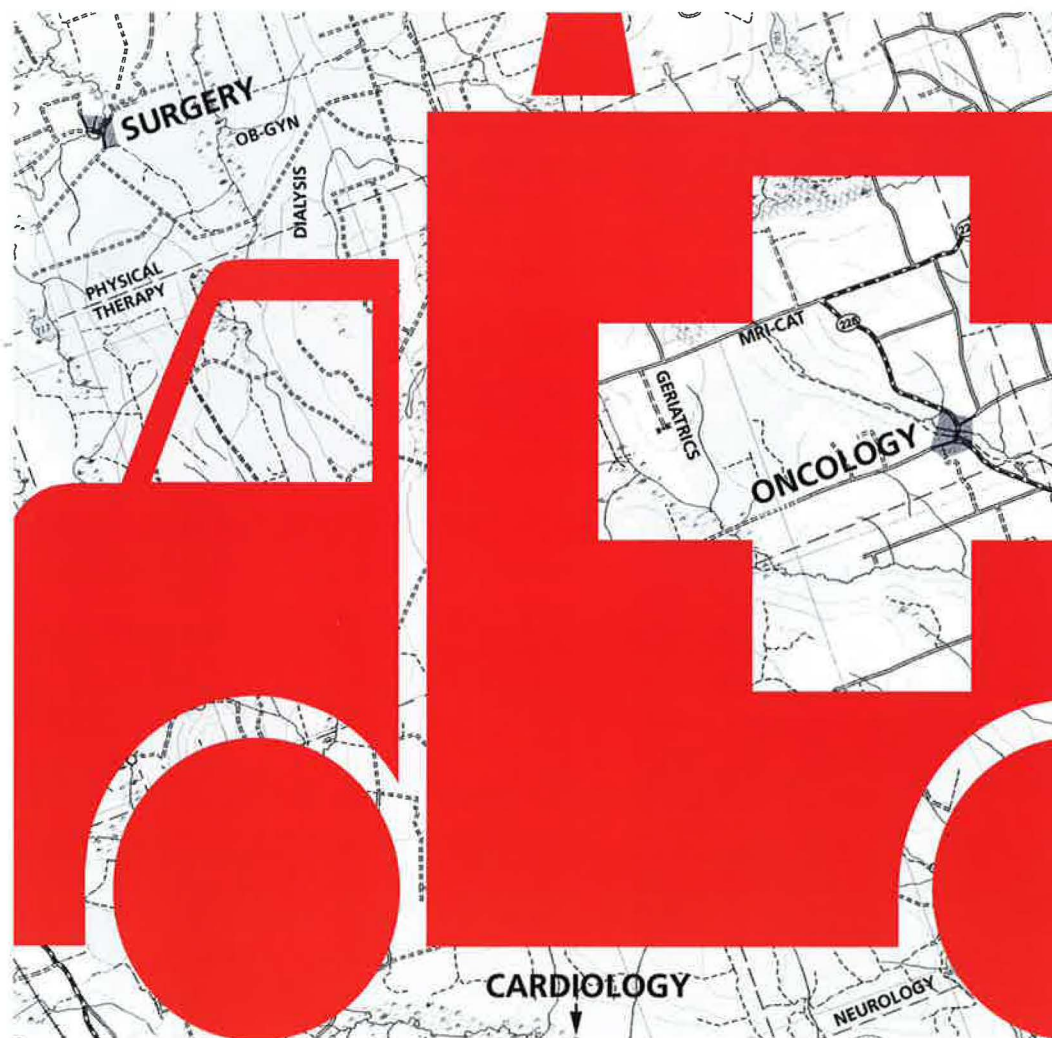
Mighty Cranberry

# UMaine Today

CREATIVITY AND ACHIEVEMENT AT THE UNIVERSITY OF MAINE

JANUARY/FEBRUARY

2009



## the road less **traveled**

What dilemmas do patients' rural realities pose for healthcare providers?

## President's Message



SO MUCH OF WHAT scientists and scholars do is rethink the world as we know it. Whether in response to a need or in the proactive pursuit to improve people's lives, researchers across the disciplines are continually challenged by the possibilities.

For them, "What if?" is a call to action.

At the University of Maine, such calls to action are found across the academic disciplines, epitomizing what the mission of a land-grant university is all about. Susan Groce is dedicated to the environment, both in her art and her internationally recognized efforts to pioneer nontoxic printmaking methods and techniques. Philosopher Jessica Miller, whose research focuses on ethical issues in healthcare, serves as Eastern Maine Medical Center's clinical ethicist, helping meet the

special needs that arise in a rural state like Maine.

Food scientist Vivian Chi-Hua Wu is one of the few researchers worldwide studying the natural ability of cranberries to fight food-borne pathogens. Across campus, Paul Millard and Mauricio Pereira da Cunha also have been conducting research to combat pathogenic bacteria by developing molecular sensors as detectors. That research served as a springboard for addressing a recent National Science Foundation call to develop sensor technologies to track the origin of explosives used in terrorist bombings.

By example, these researchers encourage our students to imagine a better world. In that way, they are in keeping with English scholar Naomi Jacobs, historian Howard Segal and the many faculty members across the arts and humanities engaged in utopian studies.

The sense of possibility is pervasive at UMaine. It's a great message for the new year.

Robert A. Kennedy  
President



ON THE COVER: Ethical issues in healthcare arise in both rural and urban areas. But rural healthcare providers in states such as Maine can face additional dilemmas when weighing the best treatment options for patients, whose access can be limited by geography and economics. For some rural patients, pursuing high-end treatment far from home can come at a high price, including loss of direct contact with their family and community support networks, impacting quality of life. When it comes to bioethics in rural settings, there are no easy answers, according to University of Maine philosopher Jessica Miller. See related story on page 14.

# UMaine Today

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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 89 bachelor's, 92 master's and 30 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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For a quarter-century, the fragility of the environment, whether natural, constructed, external or internal, has been a consistent and rather elusive subject in Susan Groce's art.

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Naomi Jacobs' worldview has been shaped by her research in utopian studies, a field that has grown from relative obscurity to a broad examination of philosophy, popular culture, technology, communication and politics.

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Healthcare practitioners can face ethical dilemmas when helping rural patients weigh the feasibility of pursuing high-end treatments in urban areas versus local treatment sufficient to sustain their desired quality of life. That's where biomedical ethicist Jessica Miller can help.

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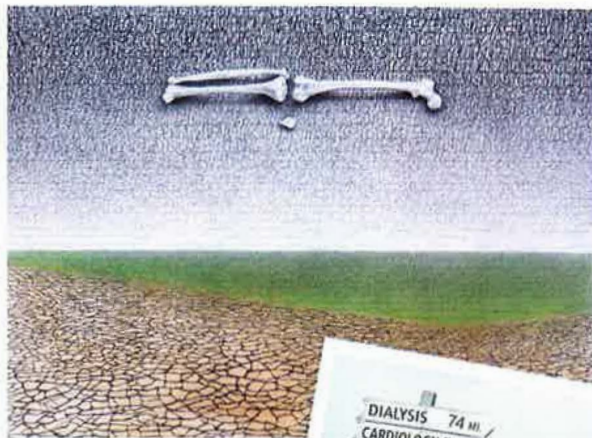
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Food scientist Vivian Chi-Hua Wu's research on cranberries is part of the ongoing fight to keep humans safe from food-borne illnesses.

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UMaine researchers are exploring how biological taggants could enable law enforcement officials investigating terrorist bombings to determine where the explosive materials were manufactured.



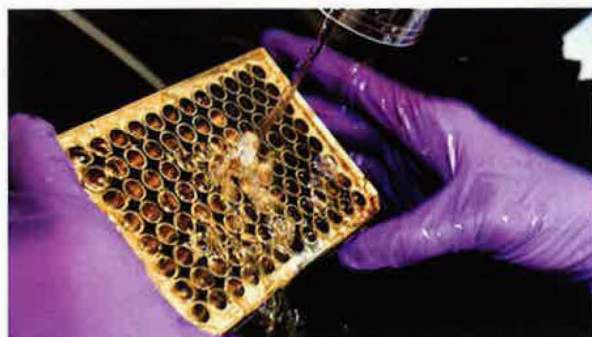
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**+Online**

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In *UMaine Today* magazine, +Online indicates the availability of additional content — Web-exclusive stories, video and audio clips, photo galleries, full-length versions of articles and a comprehensive editorial archive.



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# NATU

## SUSAN GROCE'S ENVIRONMENTAL AWARENESS

*By Kristen Andresen*

**T**O SAY SUSAN GROCE is down to earth is an understatement.

Her work — as artist, art professor and chair of the University of Maine Department of Art — is firmly grounded in the natural world. Nearly a decade ago, she championed UMaine's pioneering move toward safer printmaking processes. Today — as always — her subject matter reflects themes of sustainability and the impact of human behavior on the environment.

*Photos by Michael Mardosa*

*Passages I, II, III, Color Intaglio,  
Triptych 120" x 30"*

# RURAL INSTINCT

One series of drawings from her travels Down Under incorporates Australian soil, rubbed into the paper to achieve a burnt-orange hue. An upcoming, large-scale print installation, *Invasive Species*, juxtaposes macro images of hurricanes and military airfields with electron microscope images of leaves and seedpods. On a smaller scale, Groce's meticulously detailed travel journals are a meditation on pattern and rhythm, where words become graphic elements and images speak volumes.

Though each of her series has a distinct aesthetic, everything is interrelated; every piece informs the larger body of work. In March, selections from that body of work will be on display as part of the *4 in Maine* exhibit at the Farnsworth Art Museum in Rockland, Maine, showcasing four of the state's contemporary artists.

This is the latest in a long line of exclu-

sive shows for Groce. Her prints and drawings have been in more than 170 solo, invitational and juried exhibitions. In addition, she has served as a guest lecturer and visiting researcher — with a focus on safer print practices — at more than 40 art schools worldwide. In 2001, she was awarded a University of Maine Trustee Professorship.

We caught up with Groce in her immaculate, sun-drenched studio in Martinsville, a “suburb” of Port Clyde and Tenants Harbor, to find out what inspires her and how her work has evolved — and endured.

## **Describe how the natural environment and issues surrounding land use have influenced you as an artist and an educator.**

The fragility of the environment, whether natural, constructed, external or internal,

has been a consistent and rather elusive subject in my work in the past 25 years. Many of my pieces allude to invented places that exist, out of contextual time, in isolation or within zones of instability between pressures of urbanization and the fragility of the environment.

Often, my work explores the provisional nature of matter — how through environmental time, elemental forces such as wind, water, fire, as well as human activity, can dramatically alter our surroundings. What I find really fascinating is how these monumental changes seem to occur on the very edge of visibility and presence, affecting what we perceive as permanent.

In my work, I try to make visible the processes and forces that underpin these changes, forces that are so micro- or macroscopic that we fail to notice them on a daily basis.



Awareness of our changing environment, due to our own activity, is still a progression, and awareness and action can be isolated events. Converting to more environmentally responsible practices in making and teaching art is just one piece of a very complex puzzle.

## How has your work changed over time?

Over the years, I have incorporated new techniques, materials and processes, yet my work is still built on the same foundations. Safer printmaking is not the focus of my work, but it certainly is a more responsible way of working. The biggest change is that I now have the ability to align safer processes with work that is about the environment. One of the driving forces for this change was the incompatibility I had felt between my subjects and my materials. *Invasive Species*, a large-scale print installation that I am currently printing, brings together environmentally safer methods of production with a direct environmental theme.

## How has the safer printmaking program at UMaine evolved?

In the mid '90s, we were in transition from traditional to safer print materials and processes, including digital technologies. Now it's a question of refinement and adaptation as materials and their sources keep changing. We have made the transition to a complete system for handwork and photopolymer etching, as well as polyester litho plates. Still, there is constant innovation and experimentation. As always, we aim for a balance between the conceptual content of the work and the media or process. Printmaking has a long history of incorporating changing technologies.



## Tell us about your creative process.

My process is fairly simple. I take small notebooks with me everywhere. In them I gather source material — text and visual references filtered through travel experiences, itineraries, maps, observations, impressions, conversations and readings. Each entry is built on words and images that remind or evoke.

Next is a more in-depth exploration of these quick notebook references and observations through small-scale drawings, much like a rough draft with lots of edits. In this stage, text and images are integrated, layered and pushed to form new meanings, interpretations, orientations and perspectives.

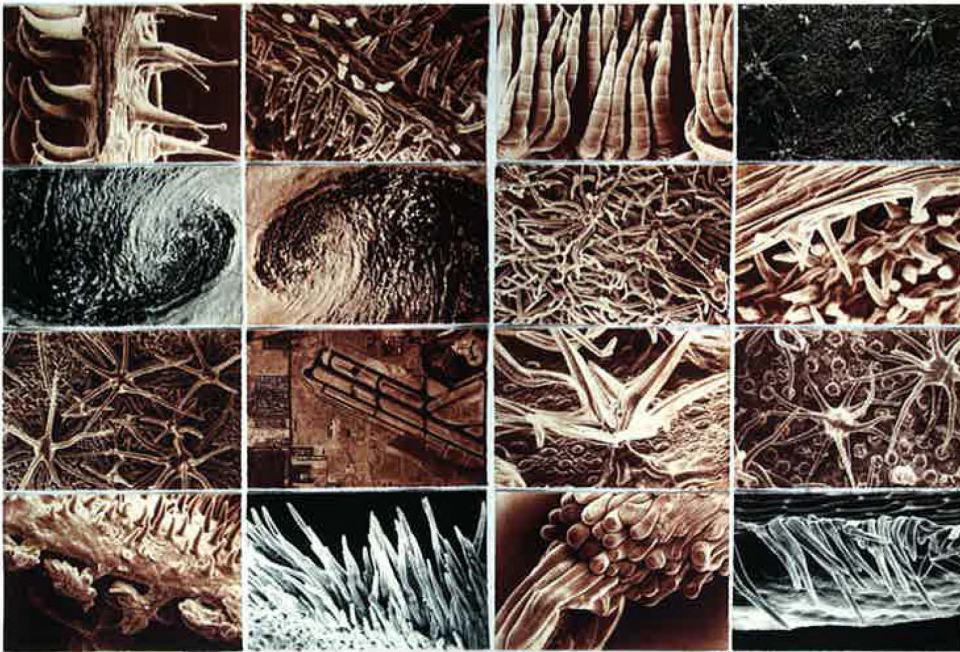
From piles of these small drawings, I distill and recombine text, images and ideas into large-scale mixed-media drawings and prints. The result is a mixture of fact, observation altered by memory, and imagination.

## What landscapes are most intriguing to you?

I am drawn to desert environments. Deserts are harsh, fragile, subtle, monumental and stark — full of contrasts. For me, desert locations are so streamlined that they provide both solitude and a clarity of vision. In a desert, it is so much easier to see how precarious and fragile an ecosystem can be.



Left: *Spiral*, Mixed Media Drawing, 4' x 7.5'  
*Unfolding*, Mixed Media Drawing, 4' x 7.5'  
 Below: *Invasive Species*, Intaglio Type,  
 Detail: 16, 9" x 6" segments of 216;  
 Full installation: 10.5' x 10'



### How have your world travels shaped your perspective?

Travel involves a change in perspective, perception and sense of time. Removing myself from my own routines and experiencing different viewpoints are essential to seeing things in different ways. In fact, reorientation of perspective is a major factor in my work.

Vantage points in my perspectives are often angled, aerial and skewed to create unexpected shifts that “unfix” an assumed viewpoint. I use the rationality of maps and a wide variety of diagrammatical and measurement systems to try to logically or scien-

tifically explain the references I make to a landscape or place that is, in the end, filtered through experience.

Sometimes it's as simple as re-creating surfaces, textures and purely visual elements, or using on-site materials such as pigmented dirt. When traveling, I take tons of photos to use later back in the studio. I also try to record areas from every possible viewpoint, often hitching rides in small planes for aerial views.

### What is the allure of working in such a large scale?

My larger pieces range from 5½ feet to 21

feet long, and in one installation, more than 10 feet high. Large-scale work involves real expanses of space, time and movement — an important reference for my work.

On space: I'm interested in navigating a somewhat difficult terrain between physicality and immateriality. Often in large-scale works I will angle and alter the ground plane to avoid the safe and grounded viewpoints that we normally take for granted. I have fun breaking the rules of common physical and spatial sense by creating illusionary forms that seem solid yet defy the laws of gravity, contain nonsensical angles and occupy unexpected spatial positions on a two-dimensional plane.

On time: I reference elements of time in my work by pulling together illusions of form and mass in the process of change: evolving, expanding, contracting or dissolving. I like to create ambiguity, to question whether the time referenced in a piece is an instant or an eternity, and whether time, through its presence, has the ability to transform.

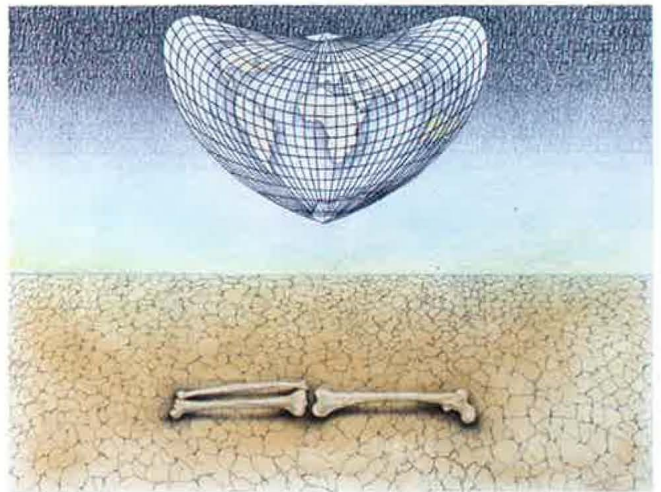
In some of my work, architectonic forms are appropriated and lifted out of context to undo what is time-bound and place-specific. I like to create a sense of timelessness.

On movement: In my work, illusions of three-dimensional forms often rotate and shift in multiple perspectives. The movement in the large-scale works — particularly of what would seem stable architectural forms — questions permanence, and how one can navigate through

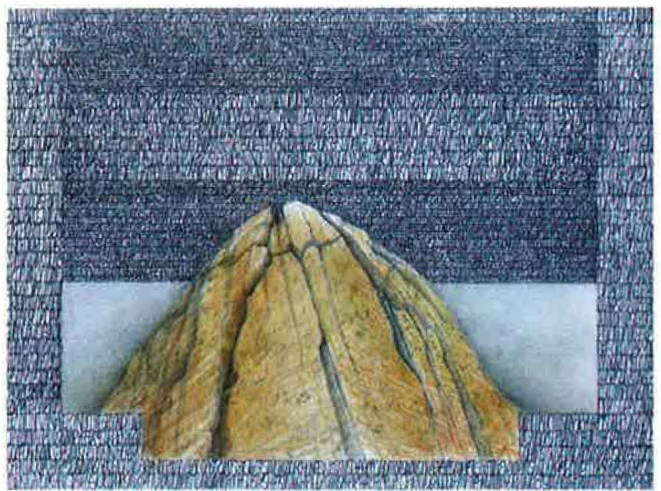
a changing landscape. Pace is important. Movement can be glacial (environmental time) or very rapid.

## What's next?

A good question; a tough question. My best work seems to come when I'm open to integrating new things within the context of ongoing work. That newness by definition means that what comes next will be something unanticipated. For now, I have an extensive series of large-scale mixed media drawings in the works based on my Australian journal, as well another photopolymer print installation planned based on aerial landscapes of compromised terrain. Also, practically speaking, when my chair term is over, I plan to spend a very long, uninterrupted period of time in my studio. ■



*Australian Journal – Earth and Bones, Graphite, Color Pencil, Soil, 11" x 14"*



*Australian Journal – Urulu, Graphite, Color Pencil, Soil, 11" x 14"*

## Four contemporaries

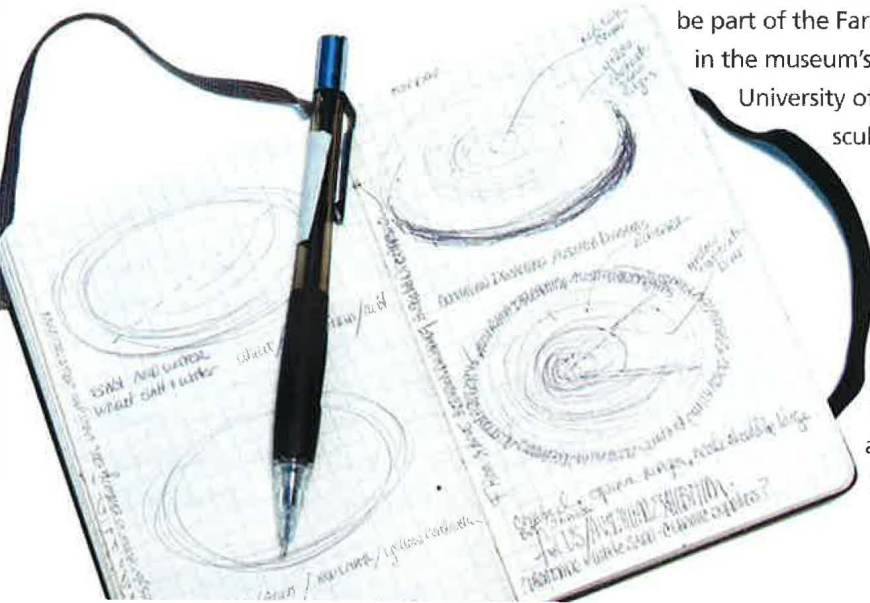
**W**HEN MICHAEL KOMANECKY first encountered Susan Groce's work, he was struck by her ability to shift scale and perspective — from micro to macro and back again — in both her imagery and technique. "She is an artist with a fertile imagination who approaches her work with great discipline," says Komanecky, chief curator for the Farnsworth Art Museum, Rockland, Maine.

That blend of creativity and care appealed to Komanecky, who invited Groce to be part of the Farnsworth's *4 in Maine* exhibition — in essence, four solo shows in the museum's contemporary art wing. Groce will be joined by former University of Maine art professor and installation artist Sam van Aken, sculptor Brian White and photographer Chris Pinchbeck.

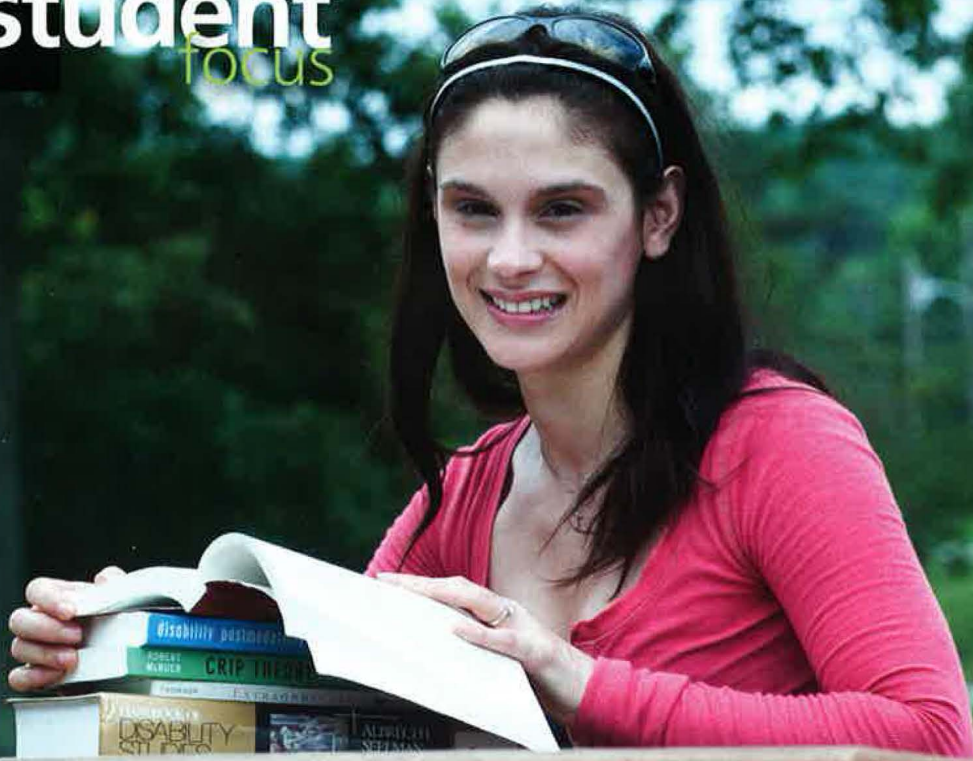
The exhibit is on display March 7–May 24.

"I think it offers a really fascinating glimpse of the work artists in Maine are now doing," Komanecky says. "This group demonstrates how vital and diverse the contemporary art scene is in Maine."

As a curator, Komanecky has a history of collaborating with university art faculty and museums, and he and Groce are working to strengthen the ties between UMaine and the Farnsworth.







**“Disability really does apply to everyone. Your body is always changing, and disability is part of those changes. If you live long enough, you’ll become disabled. It’s inevitable.”**

Julie-Ann Scott

## Disability as diversity

**J**ULIE-ANN SCOTT KNOWS about high unemployment among people with physical disabilities. She’s familiar with workplace policies and medical terminology focusing on what physically disabled bodies can’t do.

Scott would rather focus on what they can do.

As part of her doctoral research in communication at the University of Maine, Scott interviewed 26 professionals with physical disabilities who are not just surviving, but thriving in high-level careers — from doctors of philosophy to doctors of medicine. She hopes that the results will help shape educational and workplace policy.

“That means helping people understand disability not as a deficit, but as one more aspect of diversity, about what it means to be human,” says Scott, who received an award for the top poster at the Society for Disability Studies annual conference last year. “That’s not how we look at race or gender.”

In her research, Scott uses performance of identity analysis, which is based on the premise that a story both shapes and is shaped by the teller and the listener.

“Julie-Ann is very interested in the ways in which we tell our stories, the sense in which we talk about experiences,” says Kristin Langellier, a UMaine professor of communication who specializes in performance study, and Scott’s academic adviser. “Telling that story, we’re in a sense also producing the possibilities of who we are. It adds to the work in disability studies because it opens up the possibility that things aren’t already determined.”

Scott’s physical disability, spastic cerebral palsy, gave her an unanticipated advantage. Before meeting with her, many of those she interviewed asked if she was disabled. That common ground allowed her to do her research more effectively.

“When I write my dissertation, my conclusion will be taken out of the theoretical and translated” into language that educa-

tors and human resources managers can incorporate into academic and corporate disability guidelines, Scott says.

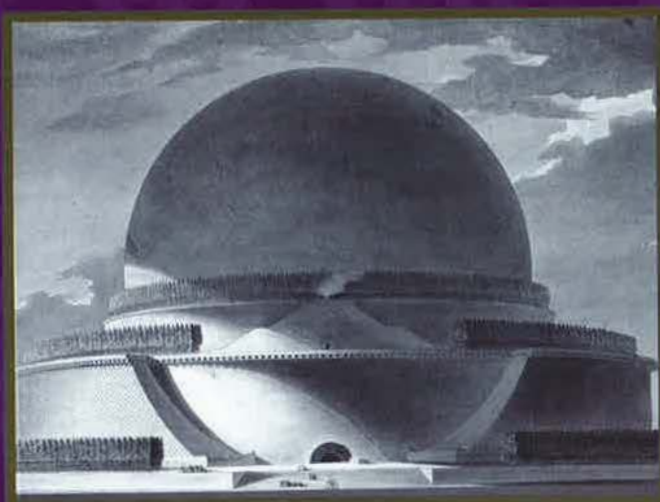
Most of the people she interviewed explained how they navigate a world that is not designed for people who move like they do. As a result, they developed valuable professional skills, such as the ability to relate to people, communicate effectively and problem-solve. They were able to do this, in part, because of the support networks they established and the adaptive technologies they incorporated into their lives.

Those with progressive conditions were constantly thinking ahead, planning for a time when they may not be able to walk or get to work on their own.

Scott says everyone should plan for physical limitations — even those who don’t have a disability or progressive disease.

“Disability really does apply to everyone,” she says. “Your body is always changing, and disability is part of those changes.”

Se



**Newton's Cenotaph**  
By Etienne-Louis Boullée, ca. 1785



**Walt Disney World**  
Photo courtesy of [WDWmemories.com](http://WDWmemories.com)

Utopia

Sir Thomas More's view of utopia, published in 1516. More was one of the first "to hold out the prospect, albeit faint, of actually establishing a perfect society and thereby altering human nature," says UMaine historian Howard Segal.



OSCAR WILDE ONCE said, "A map of the world that does not include Utopia is not worth even glancing at, for it leaves out the one country at which Humanity is always landing."

These days, utopian — and dystopian — pursuits are all over the map. You can find them on television, in such shows as *Extreme Makeover: Home Edition*, *The Swan*, even *Desperate Housewives*. They're at the movies, in everything from *Children of Men* to *The Truman Show*. And you can see them all over the Web, whether in the virtual world of Second Life or an online forum about German nationalism.

For Naomi Jacobs, chair of the University of Maine's English Department, utopias of the literary variety have shaped her worldview since the 1980s. As a young professor, new to the

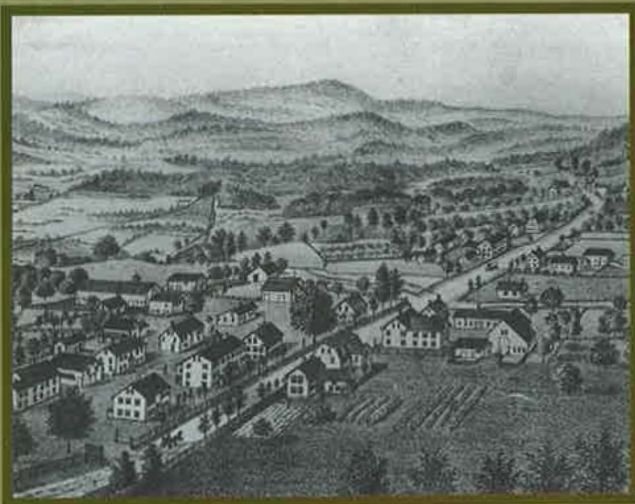
# Searching for utopia

**A UMaine scholar explores the possibilities and purpose of pursuing the 'ever-receding horizon toward which we must travel'**

*By Kristen Andresen*

Orono campus, she was eager to present an article she had written about Nathaniel Hawthorne's *The Blithedale Romance*, a novel about a utopian community. She saw an opportunity in the Society for Utopian Studies.

Sure, she had read George Orwell's *1984* and Aldous Huxley's *Brave New World*, two of the best-known utopian/dystopian works of fiction. But at the time, she never anticipated that this would become her primary research focus.



*Artist's View of a Shaker Village, Alfred, Maine*  
By George Norris, 1888, courtesy of University of Maine Fogler Library Special Collections

# Searching for utopia

"I went and I had such a good time," Jacobs says. "I fell in love with this group. I felt I had found my home as a scholar."

**T**ODAY, JACOBS still feels at home. She has served as the society's president and as cochair for five conferences, including one in Maine last fall, and has received the organization's distinguished service award for her decades of service. Since attending her first conference, Jacobs has seen the field of utopian studies grow from relative obscurity to a broad examination of philosophy, popular culture, technology, communication and politics.

"Now theoretical approaches are everywhere," Jacobs says. "Philosophy and cultural theory have been brought into the discussion. There's more of an interest in other media, in film, pop culture, video games and television. One of my colleagues is studying *Extreme Makeover* as a manifestation of the utopian impulse — of creating the perfect place."

In other words, if you think the concept of utopia is esoteric, think again. The utopian impulse — the search for a better world, if you will — is alive and well in nearly every aspect of mainstream society, from reality TV shows to news headlines and political dialogue.

Think back to the 2008 presidential campaign. Both candidates ran on a platform of positive change, reform, trans-

**"The point of utopia is not to create one perfect system, but rather to move us toward something better."**

Naomi Jacobs

formation. Both essentially said a change will do you good.

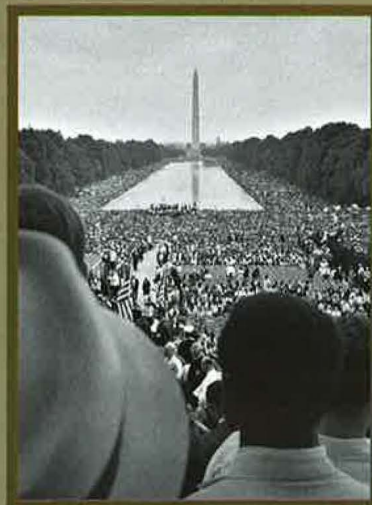
Remember the headlines about the Yearning for Zion polygamist sect in Texas? That's a perfect illustration of how one person's utopia can be another person's dystopia.

Every silver lining has a cloud, so why should utopia be any different? The very word "utopia," coined by Sir Thomas More in his 1516 book of the same name, can be translated as either "no place" or "the good place." Thus, it is "the good place that doesn't exist." It is, in a sense, intentionally flawed.

From a literary perspective, More's *Utopia* is the book that started it all. And at its very heart, it is "both ridiculous and divine." The traveler who describes the imaginary island is Raphael Hythloday, whose first name means "messenger of god" and second name means "speaker of nonsense."

"It's a very goofy book," Jacobs says. "More makes a lot of silly puns, and scholars have been debating his meaning for centuries."

Though More's book may be amusing, it is also profound. So, too, are the ideas that have sprung up around it. In litera-



Civil rights march on Washington, D.C.  
1963 photo by Warren Leffler, courtesy of the Library of Congress



*Extreme Makeover: Home Edition* in Maine  
Photo by Dianna Birkhead

ture, Jacobs points to such authors as Charlotte Perkins Gilman, who explores the concept of an all-female utopia in the 1915 novel *Herland*. In the 19th century, Edward Bellamy tied utopic ideals to economic efficiency. Ernest Callenbach's *Ecotopia* describes a society organized on the principle of sustainability.

**I**N HER OWN research, Jacobs has explored themes of embodiment and gender roles as they relate to utopian literature. Her landmark 1994 essay, "The Frozen Landscape in Women's Utopian and Science Fiction," examines the reasons why many female authors set their utopias in cold, lifeless places.

"I speculated that this was happening because of the ways in which reproduction can be restraining for women," Jacobs says. "The frozen landscape symbolizes a world in which gender doesn't matter."

Jacobs' recent work has focused on

the aesthetic ideal of a "natural" human body as a "common end point or limit to the utopian imagination, an untransgressable line of normalcy." Utopian worlds may be fantastical and the backdrops surreal, but the bodies remain recognizably human.

"Everything else may have changed, but the bodies stay the same," Jacobs says. "It seems we can't imagine a transformation of the human, even as we seek a transformed human life."

Jacobs doesn't teach courses in utopian literature as often as she'd like these days, but she says her students often approach utopian constructs with a healthy dose of skepticism.

"The automatic reaction is, 'This will never work,'" Jacobs says. "We have to talk about why that's not the point. Utopia is a thought experiment; its purpose is to provoke us to rethink the world as we know it."

Inevitably, one of Jacobs' students will say, "I would never want to live in a

utopia, because you can't know what happiness is without pain." Or "A perfect world would be boring." Jacobs uses these "easy answers" as a jumping off point for deeper questions: Are we willing to ground our happiness in someone else's pain? How much or what kind of imperfection is necessary to keep us from boredom?

"The point of utopia is not to create one perfect system, but rather to move us toward something better, through what's been called the education of desire," Jacobs says.

"If you're talking about a system where everybody will have enough to eat, where everyone has sufficient shelter and clothing, where the planet will be protected, where people have enough freedom to express themselves, but not so much that they would be hurtful to others, most people will sign on to that.

"We can debate whether a vision is plausible, but beyond that, what would it mean if this could be achieved? What do we learn about what's missing in our own world when we try to imagine what life could be?"

That sense of possibility — in literature, in pop culture, in life — is what keeps Jacobs and her colleagues interested. It is, as Oscar Wilde would say, what keeps utopian studies on the map.

"Today, we understand utopia as a process rather than a product," Jacobs says. "Instead of 'the plan,' utopia is being conceptualized as an ever-receding horizon toward which we must travel." ■



Miami Zoo

# Utopia's interdisciplinary discourse

**W**HEN YOU TALK about utopian and dystopian studies, it begins to sound a bit like the lyrics to *We Didn't Start the Fire*:

Disneyland and Second Life, communes and a Stepford Wife/Shaker village, Constitution, 1984/*Extreme Makeover: Home Edition*, Futurama's modern vision/*The Truman Show*, Sistine frescoes and an ecotour/*Brave New World*, "I have a dream" — and a basic income stream/ Online communiqués, pictures from a holiday/Thoreau, Huxley, Maine Yankee, Bob Ross painting happy trees/MLK, JFK. What else do we have to say?

At the University of Maine, there's plenty to say. Faculty in an array of disciplines are engaged in utopian studies, either as an area of interest or as their chief research focus.

UMaine history professor Howard Segal has concentrated on literary and nonliterary versions of how the world might be transformed through technological developments. His research has traced innovations such as the automobile and the Internet and, most recently, the now-defunct Maine Yankee nuclear power plant as a manifestation of the utopian impulse.

Though technology is his specialty, he is more interested in the relationship between technology and society and culture than in the "nuts and bolts" of how things work. And the outcome of technological developments is not always ideal.

"You don't have to be an expert to see that the Internet has not turned out to be a utopian paradise," says Segal, whose books include *Technological Utopianism in American Culture*, and *Future Imperfect: The Mixed Blessings of Technology in America*. "There's a difference between change of whatever kind and change that leads to a quantitatively better world."

The idea of a better world is what keeps Laurie Hicks, a professor of art, intrigued by utopian studies. Her current research focuses on the photographs tourists take while on vacation, and how they reinforce one's view of travel as utopia. She views the concept of utopia through the lens of social reconstruction and brings this into her art education classes, where the dialogue that arises around the utopian impulse plays a pivotal role.

"Teachers have the responsibility to help their students imagine a view of a better life for themselves and the world," says Hicks.

And that's where the utopian impulse comes in. It doesn't matter whether a better life is a goal that can be attained. Though aesthet-

ics, environmental issues and social concerns matter, they're less important than the actual act of imagining.

Philosophy professor Michael Howard's work is dedicated to "trying to sketch what a just society might look like." His recent research asks whether basic income — a guaranteed minimum income for all, without a means test or work requirement — could lead to a realistic utopia.

"Politics is constrained by the realities of power and must compromise what is ideal to achieve the best possible," Howard says. "Political philosophy is under no such constraint and aims to define the ideal, but such utopia may still be achievable."

In Michael Grillo's art history classes, a lecture about late Classical Greece may turn into a discussion about post-World War II America. A study of Renaissance images could lead to a discussion of how Italy's utopian visions came to a screeching halt with crop failures, massive bank collapses and the bubonic plague outbreak.

"I use utopian studies as a way to prize out certain ideas, certain illusions from that culture," says Grillo, whose research involves

## "imagine a view of a better life"

utopian order in early Renaissance Italy.

"Students have a strong

recognition of what utopias are because there are so many utopic voices in our own society. They also understand utopian visions as a means of permission to talk about ideals."

Ideals take on a different form in Gisela Hoecherl-Alden's research. The German professor recently studied how the Internet, film and television facilitate dialogue about national identity in post-Berlin Wall Germany — what she calls a multicultural utopia.

Hoecherl-Alden's research partner Laura Lindenfeld studies idealism of a different kind: the portrayal of food in film.

"You can look at food as this wonderful moment where we can all get along, but guess what? We're really glossing over a lot of things," says Lindenfeld, who links food films to issues of identity and nationalism.

That healthy skepticism is the type of critical thinking that keeps Segal and his colleagues intrigued by the idea of utopias and dystopias. In his 30-plus years studying the subject, Segal has seen the field of utopian studies grow into a rigorous intellectual discourse — and his own work has led the way.

"For me, utopian studies is a means to an end," says Segal, who directs UMaine's Technology and Society Project. "I want to know what utopia tells you about the person, the community, the society and the culture that produced it."



THINK A MAINE WINTER is tough? Pity the poor shrub enduring freezes, thaws, frost heaves. It's enough to make a woody perennial curl up and die.

Which is a bit of a problem for growers.

Enter Marjorie Peronto of University of Maine Cooperative Extension, who has teamed up with organic perennial growers Peter and Julie Beckford of Rebel Hill Farm in Clifton, Maine, to research the effectiveness of pot-in-pot overwintering. The technique is widely used in the South to reduce heat-induced stress on roots. In Maine, cold is the stressor.

"When you're growing perennials, you're relying on them to be able to make it through the winter, and our winters fluctuate in terms of temperature and precipitation," Peronto says. "Some years,

**"It's exciting because it's an economically viable way to overwinter potted woody plants in Maine."**

Marjorie Peronto

we'll have a nice blanket of snow. Some winters we don't get any snow and temperatures drop to the point where severe cold penetrates the ground and causes root damage."

There are several ways to prevent root damage, but each has its drawbacks. If growers raise woody perennials in pots, they can insulate the pots with thermal blankets above ground, but mice often nest under the blankets and girdle the stems. They can place potted shrubs in a greenhouse over the winter, but the cost of maintaining a greenhouse is prohibitive for some growers. Shrubs can thrive when raised in a field, but when growers dig them up, most of the roots are left in the ground.

"With a field-grown woody plant, the root system extends up to three times as wide as the drip line of the plant," says Peronto. "There's no way you can dig up all the roots and get them in a pot. You often leave between 75 percent and 90 percent of the root system behind. That is monstrously traumatic."

In Maine, many growers don't like to sell plants that have undergone such trauma, so they often purchase dormant bare root plants and pot them to sell in the spring. As a result, the plants haven't had enough time to develop much of a root system.

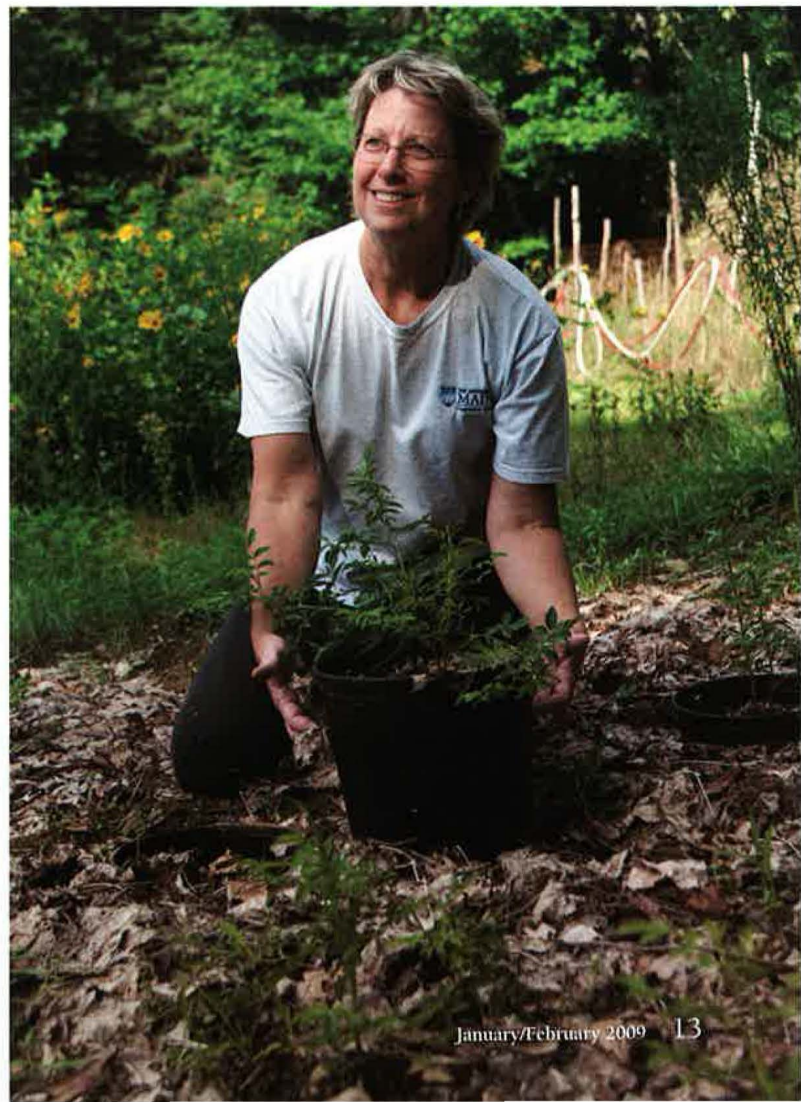
The Beckfords, who specialize in native herbaceous perennials, wanted to expand into shrubs. Because Peronto has an affinity for

both native plants and woody perennials, she jumped at the chance to research pot-in-pot, which combines the insulating benefits of field growing with the plant health benefits of starting — and leaving — plants in a pot.

In June 2008, she began planting native rose and chokeberry seedlings in 3-gallon pots, which were then placed in 3-gallon "socket pots" that are permanently sunk in the ground. She also planted seedlings in the field to see how the plants will fare in two different conditions.

The plants will stay where they are over the winter. This spring, if they have reached a marketable size, Peronto will unearth them and compare the results.

# Winter planting



Marjorie Peronto

Photos by Michael Mardosa

**Biomedical dilemmas confront medical practitioners treating patients far from urban areas**

# Healthcare's rural

By Aimee Dolloff

**In Maine, many rural areas** are defined not by name, but by their township and region numbers. Directions often don't include street names or route numbers, but rather rely on landmarks familiar to those who live there, such as the Jones farm and the old general store.

This lifestyle, so treasured by Mainers, often creates complications when it comes to accessing medical care. Increasingly, the question has become whether you can get there from here.

"There are the same ethical questions (as in big cities), but Maine's different because of its rural location and small towns," says University of Maine Associate Professor of Philosophy Jessica Miller. "Rural and urban areas share many ethical issues in healthcare, but some issues, like conflicts presented by overlapping relationships, are unique to rural settings. And others, like access to healthcare, can be more pressing in rural areas due to geography or economics."

Maine may be one of the least racially diverse states in the nation, but socioeconomic and cultural differences abound from Fort Kent to





# al realities

Bangor to Kittery. Providing appropriate healthcare to the residents of the region oftentimes is complicated by financial and employment status, family circumstances and the Maine tradition of independence.

As a result, healthcare providers find themselves having to help patients weigh the feasibility of pursuing high-end medical treatment often available only a long way from home and their support systems, versus more reasonable treatment available locally that would be sufficient for the patient's desired quality of life. The latter often requires less extensive follow-up care or travel.

These are issues that Miller, whose research focuses on ethical issues in healthcare, finds intriguing. They are circumstances that aren't often considered in bioethical discussions and studies that mostly focus on urban settings.

"It's too bad that most bioethics researchers and scholars assume an urban setting because they miss out on unique needs and chal-

lenges of doing bioethics in a more rural area," Miller says.

Miller has been able to incorporate her interest in medical ethics and rural healthcare into her work, both on campus when teaching biomedical ethics, and off campus in Bangor as Eastern Maine Medical Center's clinical ethicist.

**Part of the problem** is ensuring that people have access to healthcare, which is a struggle that the entire country is facing with more than 47 million people now uninsured, but Miller says there's more to making people healthy than going to a doctor. Even if someone has health insurance, it doesn't mean he or she has access to proper healthcare services.

"Nobody is really happy right now with the current system, and that's something I've seen change in the last 10 years," Miller says. "The United States spends a lot of money on healthcare, and the returns aren't that great."

**"Bioethics in a rural setting presents many challenges due to limited economic resources, reduced health status, an aging population, problematic access to care and caregiver stress."** Jessica Miller



# Healthcare's rural realities

Miller says providing basic healthcare to all residents is a start to improving the system, but it isn't the magic bullet to better health.

"We know, for example, that unemployment is associated with worse health, regardless of access to healthcare. It has to be something else, not just providing more access to healthcare," Miller says. "We need to look at the social determinants of health."

RESEARCHERS are **beginning to understand** that **social STATUS** and **factors NOT directly related** to A PERSON'S immediate health **are part** of the **HEALTHCARE CRISIS** of America.

For example, what happens when a patient who lives alone in the woods is ready to be discharged from the hospital with a post-recovery regimen that is difficult to self-administer? What's best for the patient in this situation?

When a primary care physician in rural Maine retires or relocates, an already overstressed system has to absorb hundreds more patients. All the health insurance in the world won't help if you can't find a doctor who is taking new patients, Miller says.

Researchers are beginning to understand that social status and factors not directly related to a person's immediate health are part of the healthcare crisis of America.

"There's a lot more than just healthcare to promoting health," Miller says.

**Providing equal** and ethical healthcare can sometimes be a challenge. That's why Eastern Maine Medical Center created an Ethics Advisory Committee in 2006, and more recently hired Miller as the on-staff clinical ethicist.

"We're not the ethics police. We don't make decisions but rather facilitate decisions made by patients, families and providers," Miller says of the committee.

Instead, the group uses its expertise to come up with possible options for the caregiver, the patient and often the patient's family.

In addition to case consultation, the committee members are responsible for educating themselves and the hospital staff on ethical issues in healthcare, as well as helping to review and draft policies.

"We're an advisory panel only. We're interested in getting the most ethical outcomes in patient care," Miller says. "We're really focused on the patient."

But providing the best options to

doctors and patients can be difficult, particularly when there are circumstances outside what is medically best for a patient that play a role in the final decision making process.

In Maine, one of those concerns is that families many times have to travel long distances just to get to the hospital. If a relative has to go out of state for care, it might be impossible for family members to go with him or her.

Who will run the farm? Who will pay for the gas and hotel room? Who will take care of the children or ailing parents who have to stay behind?

In some cases, the most ethical option and final decision of the patient, caregiver and family might not be the most medically advanced, but in the end is the best outcome.

For example, there is no outpatient care in Maine for someone on a ventilator, requiring patients to go out of state.

Families many times have to travel long distances just to get to a hospital.

A one-way trip from Presque Isle to Bangor is roughly 160 miles. A patient coming from Fort Kent has a one-way trip of nearly 200 miles. With this in mind, it can sometimes be difficult for family members to travel to Bangor to discuss care

options and be with their loved one, let alone travel out of state for more extensive treatment.

"That's a huge issue if all their family and loved ones live in Presque Isle," Miller says.

**For some residents** of Maine, just getting to Eastern Maine Medical Center, which serves two-thirds of the state, can be as challenging and complicated as going out of state for healthcare

"The family is an important resource for staff who want to know what is best for a patient who cannot speak for him or herself, but it can be difficult to have a family meeting when family members live hours away and can't get to the hospital," Miller says. "People aren't just a subway ride away."

Getting family input requires creativity on the part of the whole patient care team, including nurses, social workers, physicians and others, she says.

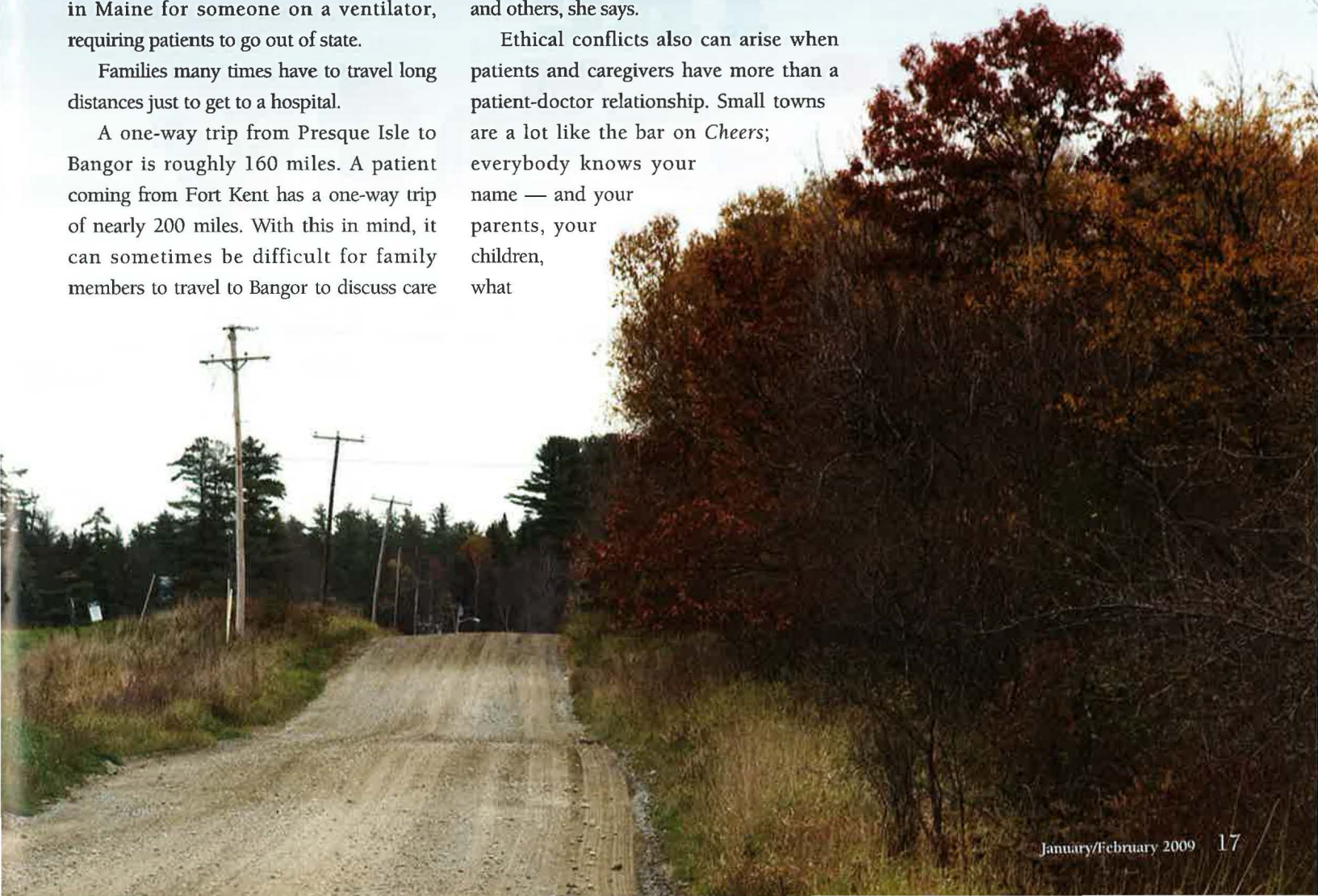
Ethical conflicts also can arise when patients and caregivers have more than a patient-doctor relationship. Small towns are a lot like the bar on *Cheers*; everybody knows your name — and your parents, your children, what

kind of car you drive, where you went to eat last night.

"A lot of times, patients and caregivers are related to each other on more than that level," Miller says. "That's one set of ethical issues that really arises quite a bit."

By providing caregivers with the tools to come up with ethical options for patients and families to consider, Miller says she's hopeful that such discussions become part of the healthcare dialogue.

"Bioethics in a rural setting presents many challenges due to limited economic resources, reduced health status, an aging population, problematic access to care and caregiver stress," Miller says. "There are no easy answers, but a team approach that emphasizes listening, deliberation and core ethical values in crafting a plan of care that best meets the patients' needs goes a long way toward improved health outcomes." ■



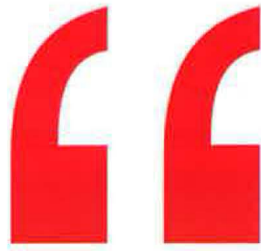


# The Mighty Cranberry

*By Kristen Andresen*

**It can't fly. It doesn't have X-ray vision.  
And it certainly can't leap tall buildings in a single bound.**

But when it comes to food safety, the cranberry is a superhero, according to University of Maine assistant professor and microbiologist Vivian Chi-Hua Wu, whose research is part of the ongoing fight to keep humans safe from the menace of food-borne illness.



We've successfully discovered that cranberries can eliminate or inhibit several important food-borne pathogens." Vivian Chi-Hua Wu

IN MAINE, IT'S NATURAL for researchers in food science and human nutrition to study the health effects of wild blueberries. But Vivian Chi-Hua Wu also is one of only a handful of scientists worldwide studying cranberries from a food-safety standpoint.

Cranberries have long been known for their ability to fight urinary tract infections and combat the bacterium *Helicobacter pylori* that causes certain stomach ulcers. But, as Wu has discovered, cranberries also have the power to fight food poisoning, eliminating or inhibiting several important food-borne pathogens.

Wu recently published several studies that show the preservative and preventative powers of cranberry concentrate. In ground beef and in the petri dish, the compound slowed the growth of — and in some cases, reduced to untraceable levels — listeria, salmonella, staph infection and *E. coli* O157:H7, the form of the microorganism responsible for the 2006 spinach contamination.

Wu, who has ties to both the Maine Wild Blueberry Commission and the national Cranberry Institute, has found that the fruits have similar antimicrobial benefits. The difference lies in the application.

"If you're using cranberry or blueberry as an antimicrobial preservative compound,

in place of a chemical preservative, you have to study how it will influence the final food product," Wu says. "Will it change the appearance or the color of a specialty product? And will that be acceptable? Blueberries have a darker color, and if you don't want to have a color effect, that's significant. It really depends on the product you're going to apply it to."



**On any given day, Vivian Chi-Hua Wu's lab is a hive of activity. She provides extensive research opportunities to undergraduate microbiology students, and works closely with five graduate students. One of her master's students, JingJing Shen, came to the University of Maine from China solely to study with Wu. Shen is working on the color-change nanoparticle research.**

AT HER ALMA MATER, Kansas State University, purple ketchup wouldn't just be acceptable, it would look and taste like team spirit.

Not surprisingly, schoolchildren think a blueberry-laced burger is pretty neat.

In a sensory study at UMaine, Wu found that consumers would accept a burger that included up to 5 percent cranberry or blueberry extract by weight; a mixture of the two berry extracts scored highest. It looks and tastes like a regular hamburger, but it fights pathogenic *E. coli* like a superburger.

Though perhaps best known for her cranberry studies, they are only one aspect of her groundbreaking work in food safety. Her collaboration with Chih-Sheng Lin of National Chiao Tung University in Taiwan caused quite a stir at the 2008 Institute of Food Technologists conference. The two researchers have found a way to detect pathogenic *E. coli* in food with the naked eye, using nanotechnology.

Because the industry has a zero-tolerance policy for *E. coli* O157:H7, meat suppliers routinely examine their products to detect the bacteria using USDA microbiological examination methods. These methods are considered the gold standard, but it takes a long time to get results.

The quick, easy and affordable method developed by Wu and her colleagues could allow consumers and producers to know immediately whether their food is safe to eat, because the presence of pathogenic *E. coli* causes the nanoparticles to change color. The implications for the industry are revolutionary.

"There's potential to develop something very simple, maybe even something a consumer could use — as simple as a strip of paper that you dip into your food. If you see the right color, you know your food is safe," she says.

A BIT LESS SIMPLE but equally impressive are the biosensors Wu and her colleagues developed. One DNA strand, which recognizes a target pathogen, is placed on a tiny chip. If the same pathogen is present in, say, a package of meat, the chip will attract other DNA strands, causing a minute shift in mass. This shift in mass translates into a

change in frequency emitted by the chip, which can be easily read by a computer. In other words, a quick scan of the chip will detect contaminants.

**The quick, easy and affordable pathogen detection method developed by Wu and her colleagues could allow consumers and producers to know in an instant whether their food is safe to eat. The implications for the industry are revolutionary.**

Wu's also keeping an eye on potential food-safety threats hidden in plain view. Common pathogen detection methods will find harmful bacteria. But if a bacterium has been injured — not killed — during processing, it could repair itself.

"If you use the common method to verify whether you have any organisms left after treatment, this will tell you there's nothing left, but it actually missed a group called injured microorganisms," Wu says. "(When food containing injured bacteria is consumed) our human body provides a very, very nutritious environment to let injured microorganisms recover, and once they recover, they start activating harmful bacteria."

Wu has not only identified the threat, she has found a way to keep it under control. The detection methods she developed in 2003 and 2006 are the industry standard, and she still receives phone calls and e-mails about them.

"I think there are a lot of natural things we can look into," says Wu, talking about the potential for cranberries and blueberries to keep food-borne illnesses at bay. "By preventing these pathogens, you can provide safer food products." ■



## Out of the blue

VIVIAN CHI-HUA WU has worked with the Maine Wild Blueberry Commission to develop an affordable, efficient method to combat microorganisms on fresh fruit.

Blueberries from the field typically have at least 1,000 and up to 10,000 microorganisms on them — pathogens that must be eliminated, Wu says.

Traditional disinfectant practices include washing fresh fruit with plain or chlorinated water, but neither is particularly effective at eliminating harmful organisms. And when you add chlorine to the mix, concern over carcinogens arises.

Chlorine dioxide, which eventually turns into water, is a safe but often expensive alternative. Until recently, large, complex, costly equipment was required to create gaseous or aqueous applications of chlorine dioxide, which limited its use to large-scale agricultural operations.

Wu and her students have found a cost-effective way of producing chlorine dioxide by mixing several compounds in a "sachet," which looks like a giant plastic tea bag. Though Wu's research is still in its early stages, it has the potential to

be a viable alternative for Maine farmers.

"We're working with the blueberry industry to see how this can improve decontamination," Wu says.



Meghan McPhee

## Down the garden path

**M**EGHAN MCPHEE of Boothbay, Maine, graduated from high school in 2000 with a plan to study theater in college as preparation for an acting career. But when she moved to Kentucky for a short time and grew rosebushes as a hobby, fond childhood memories of time spent outside with her grandmother came rushing back.

“(Changing majors) was actually probably one of the best moves I’ve ever made in my life,” says McPhee, who will graduate in May with a degree in landscape horticulture from the University of Maine. “UMaine has definitely given me a lot of opportunities and a lot of exposure that I never would have had. (The department) has allowed me to move forward with a dream.”

The 27-year-old, who is president of the UMaine Horticulture Club and the campus chapter of PLANET (the Professional Landcare Network), recently was one of eight student ambassadors from across the country selected to attend this year’s Green Industry Conference in Louisville, Ky.

The three-day conference was hosted by PLANET, an international association of lawn care professionals, landscape management contractors, designers and builders, and interior plantscapers. The organization has about 4,000 member firms.

### **Meghan McPhee’s networking opportunities continue in March when she and eight other UMaine students head to California State Polytechnic University for the PLANET 2009 Student Career Days competition.**

At the conference, McPhee and the other student ambassadors helped with event logistics and participated in a networking session with industry leaders.

“It was like speed dating, but for jobs,” she says. “I met some great companies for some possible jobs down the road.”

After graduation, McPhee hopes to find a job with a landscape design company on the East Coast where she can focus on residential design, which she describes as interior design for the outside.

“You’re extending the inside living space outside,” McPhee says. “You’re not as restricted. It’s more creative and your clients are willing to listen and are usually very flexible.”

While interning last summer with Leahy Landscaping on the north shore of Massachusetts, McPhee had a chance to work on her favorite type of design project — a Cape Cod with a relatively free-flowing landscape design that reminded her of home. The style typically incorporates a lot of tall grasses that move and swish like waves. Plant material features shades of pink, purple and blue.

“The color palette is kind of that muted Impressionist Monet,” McPhee says. “It gives you that hazy, Sunday-morning-coast-in-Maine feeling.”



Marybeth Allen

# Voicing support

**"It's really important to always create that positive self-image. No matter what the disorder is, you need to value the speaker. Listen to my words. That's what counts. It counts what I say, not how I say it."**

Marybeth Allen

**WHAT DO TIGER WOODS,** Johnny Damon, Joe Biden, Julia Roberts, James Earl Jones and Carly Simon have in common?

Yes, they're all famous, but that's not it.

They are among the 1 percent of adults and 5 percent of children who stutter.

"It's a lonely disorder to have, and often, it's hidden, covert," says Marybeth Allen, a speech language pathologist and graduate student supervisor in the University of Maine's Department of Communication Sciences and Disorders.

To help make things a little less lonely for Mainers who stutter, Allen coordinates two monthly support groups in Belfast and on the UMaine campus. At the national level, she serves as the National Stuttering Association (NSA) cochair for family programs. Each week, she spends hours editing NSA's *Family Voices* newsletter, sorting through and responding to e-mails, and vetting and helping people who want to start support groups for youths and their parents.

This outreach is both a personal and professional mission for Allen, who grew up stuttering and also has a son who stutters.

"We all share the common challenge of stuttering and how it affects our lives, how it affects our participation in life," Allen says. "We all have parts of who we are that are challenges, but NSA says, 'Don't let stuttering define who you are.'"

Because of the multifaceted nature of the disorder, Allen says, it's important for people who stutter to get together with others who understand what they're going through. Therapy can work wonders, but therapy is not the same as support. Often, people have days — or even hours — when they're fluent and times when they aren't.

In the past decade, good research has led to the understanding that childhood onset stuttering is a neurophysiological disorder, Allen says. A person who stutters and one who doesn't may say the same words in the same tone of voice, but their mouths and their brains are going through completely different processes. Add a little tension to the mix, and fluency can break down quickly.

"A lot of people experience a fear of public speaking, and with someone who stutters, you get this anticipatory fear," Allen says. "Stuttering is like an iceberg. Observers of stuttering see the tip of the iceberg, they hear the observable speech, but nobody sees what's underneath the water — never knowing when you're going to stutter. I experienced that growing up, not knowing if someone was going to make fun of me."

For children and young adults, support groups can be critical. But they're equally important for adults, which is why Allen and Shaleen Jain, a UMaine professor of civil and environmental engineering, started the on-campus forum. Jain has led similar groups in Utah and Colorado.

For Allen and the participants, the support groups provide an opportunity for sharing. The groups also are a learning environment where graduate students in speech pathology can gain invaluable understanding.



# EXPLOSION

## Traceable Bombs

UMaine researchers explore the use of bacterial endospores as explosives taggants

By Tom Weber

WHEN THE NATIONAL Science Foundation put out a call to researchers last year to develop sensor technologies that could track the origin and movement of explosives used in terrorist bombings, Paul Millard figured that he and his two close collaborators at the University of Maine were positioned ideally to address the problem. Representing three different, yet complementary fields — biological engineering; electrical and computer engineering; and biochemistry, microbiology and molecular biology — Millard, Mauricio Pereira da Cunha and John Singer worked as a team to develop a unique multidisciplinary project proposal.

For the last few years, engineers Millard and Pereira da Cunha have conducted basic



Paul Millard

and applied research in molecular sensors to detect pathogenic bacteria, as well as viruses currently threatening fish raised in Maine's aquaculture industry. With NSF support, they then expanded their research into the human-safety realm, merging DNA-recognition strategies with sensor technology to detect bacterial undesirables, such as salmonella, *Vibrio cholerae* and enteropathogenic *E. coli* O157:H7 in the environment.

To Millard and his colleagues, much of that work seemed to provide a logical lead-up to the NSF's newest challenge: Devise a method that law enforcement officials could use while investigating a terrorist bombing to determine where the explosive materials were manufactured and the route they traveled to the scene of the attack.

# E X P L O

Unique identifying markers incorporated into individual lots of explosives are called taggants. One of the most common explosives taggants in use today consists of tiny multicolored plastic chips bonded to a magnetic material, acting as a bar code of sorts to identify the factory that made the explosive material, and on what date and in what batch, as well as its distributor and the places that sold it.

When a material is detonated, the taggants are released and can be collected from the area with magnets. But the technology has its drawbacks. Someone conceivably could fabricate counterfeit taggants, thereby subverting the identification process.

DNA can also be valuable as a taggant, but it, too, has its limitations. One of the biggest flaws of current DNA taggant systems is that the equipment necessary to read the genetic code is fairly expensive, is not portable and requires skilled technicians to operate. So instead of being able to read the code quickly and easily in the field, officials have to send the genetic taggants to a laboratory for analysis that could take days to complete. Besides that, unprotected exposed DNA is susceptible to degradation caused by environmental conditions.

**M**ILLARD BELIEVES he and his colleagues have hit on a method that will allow them to overcome the limitations of the DNA-recognition method. Instead of using naked, vulnerable DNA, the team plans instead to make use of one of nature's most ingenious little survival mechanisms — bacterial endospores. NSF has provided nearly \$400,000 for the novel three-year explosive tracking project being developed by the UMaine research team, which now includes a multidisciplinary cross section of graduate and undergraduate students.

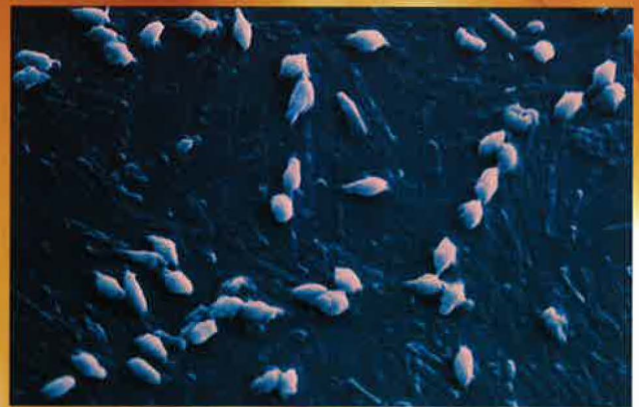
Bacteria such as bacillus and clostridium are able to ensure their own survival during periods of environmental stress by producing endospores, which are dormant, tough, nonreproductive structures in which the bacterial DNA can be safely stored until conditions become favorable again for growth.

"The endospore is a cell reduced to its minimum — more like a seed — that can withstand extreme heat, desiccation, radiation and other harsh environmental conditions, which makes it an ideal container for DNA," says Millard. "Before us, no one had proposed using endospores as nucleic acid taggants."

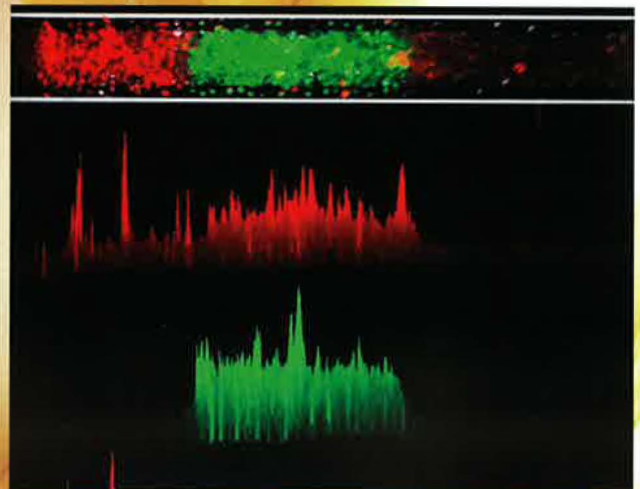
The clever safeguarding mechanism is a bit like backing up criti-

cal system data from a computer onto a flash drive. Provided, of course, that the flash drive is then placed inside a brick, let's say.

But what is most critical to the making of foolproof explosives taggants that can't be stolen, replicated or manipulated by terrorists is the genetic material locked in that endospore. That's where bioengineering comes into play, and where the team will rely on Singer's expertise in bacterial genetics. The team will use *Geobacillus*, a thermophilic bacterium that is widely distributed in soil, hot



Scanning electron micrograph of viable endospores and vegetative cell debris from the bacterium *Geobacillus stearothermophilus*.



Fluorescence micrograph of a microcapillary containing fluorescently labeled DNA. DNA amplified from *G. stearothermophilus* is bound to DNA-modified silica microspheres (+red/-green), but not to spacers (+red/+green). Red and green plots show red and green fluorescence intensity in the microcapillary.

# S I O N

springs and sediments. Though it is known to cause spoilage in food, it is nontoxic to humans and animals.

Millard says the project will involve the generation of a number of genetically modified spores, each with a unique DNA sequence or sequences spliced into its genome. In other words, a code so biologically well disguised that terrorists looking to hide their tracks after a bombing could never crack it without the key. They wouldn't even know where to begin to look.

**I**N A REAL-WORLD application, the DNA-bearing endospores might be mixed in with a batch of explosive material to uniquely differentiate it and its manufacturer. Should terrorists get their hands on some of that batch and detonate it, the taggants — like their plastic-microchip cousins — would be strewn about the attack site. But unlike nonliving taggants, each endospore would have the capacity to give rise to an unlimited number of growing bacteria, greatly enhancing the potential sensitivity of the method.

As the headlines of 2001 made so chillingly clear, *Bacillus anthracis*, the bacterium that causes the anthrax disease, can be weaponized because its endospores germinate at body temperature into toxin-producing pathogens. When enough of them are inhaled or ingested, they can multiply rapidly, eventually sickening or killing their hosts.

Geobacillus endospores, on the other hand, favor temperatures closer to 200 degrees Fahrenheit to trigger the reactivation process; 160 degrees F for the nonpathogenic bacteria to grow.

Pereira da Cunha, who recently developed a UMaine-patented sensor for

health monitoring of Air Force jet engines, is now working on a new surface acoustic wave (SAW) device that will not only detect the endospores on site, but also create the conditions necessary to end their hibernation, producing dividing bacteria from which DNA can be isolated and screened.

The SAW device, which will be developed and manufactured in UMaine's Laboratory for Surface Science and Technology, is intended to be an all-purpose tool for law enforcement. Through the recognition of the coded DNA taggants, it will be able to identify the source and transit routes of seized contraband explosives. The complete microsystem will be able to sample the taggants at a bomb site, and then process them for subsequent DNA analysis.

UMaine's research should give rise to a new class of devices that will serve as a platform for the processing and detection of environmental samples, and provide portability for the sensing microsystem, says Pereira da Cunha.

"That's the beauty of this system," says Millard. "You don't have to send anything back to a lab. You can collect, process and analyze on-site with a single, cheap, handheld device."

While helping to stem terrorist activity is the primary objective of this research, Millard says, the fundamental advances in bioengineering and sensor science expected to emerge could also be of significant benefit in first-responder, healthcare, food safety and antipollution efforts.

"This technology is being developed for a specific niche, but the research should also answer some interesting scientific questions along the way." ■



Surface acoustic wave devices, which will serve as fluid transport and processing components of the endospore detection microsystem, are fabricated through a thin film photolithographic process using a piezoelectric substrate.

experts  
on topic



Economists



IN LIGHT OF recent uncertainty on Wall Street — and Main Street — the economy has been on everyone’s mind. But for students and professors in the University of Maine’s new School of Economics, it’s always a hot topic.

The school ranks among the top 37 in the world in the area of resource and environmental economics. In addition, faculty members are active in state and regional economic development efforts, and are creating a virtual conference on the subject.

The School of Economics provides research to the Maine Department of Agriculture, Food and Rural Resources that is regularly used to set prices for Maine’s dairy industry. This research and state regulatory work help preserve Maine’s dairy industry, associated open space and rural communities.



# NEW potatoes

AN ONGOING PROJECT to produce new varieties of potatoes that can stand up to disease while giving growers in the East new marketing opportunities recently was awarded a \$200,000 U.S. Department of Agriculture grant.

The project to conduct potato breeding and variety selection work is a collaborative effort involving scientists in Maine, New York, Pennsylvania, Ohio, New Jersey, Virginia and North Carolina.

At the University of Maine, the study involves researchers in the Department of Plant, Soil and Environmental Sciences, the Department of Food Science and Human Nutrition, and the School of Biological Sciences.

The UMaine program focuses 50 percent of its effort on developing new russet potato varieties for processing and fresh market use in the East. It also looks at improving fresh market, specialty and chipping varieties.

A new component of the project is designed to develop molecular-based tools to help select varieties with improved disease resistance, says Gregory Porter, coordinator of UMaine’s Potato Breeding and Variety Development Program.

**The project to conduct potato breeding and variety selection work is a collaborative effort involving scientists in Maine, New York, New Jersey, Pennsylvania, Ohio, Virginia and North Carolina.**

## Learning physics

A COLLABORATIVE EFFORT to investigate student learning in physics and to design curricula to make it easier for students to understand the science was recently awarded a three-year, \$337,000 grant from the National Science Foundation.

Researchers from the University of Maine are collaborating with colleagues at Arizona State University Polytechnic and California State University–Fullerton to conduct the three-part study.

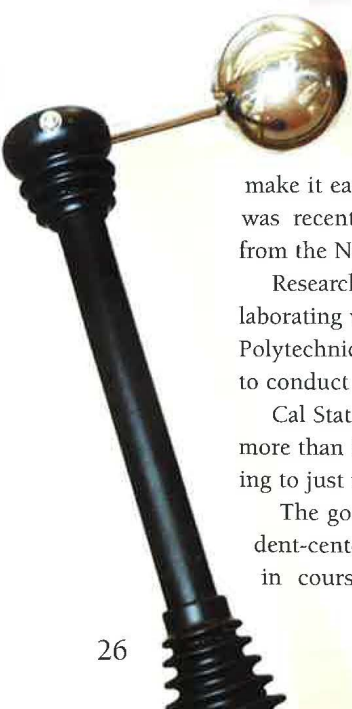
Cal State–Fullerton received an additional grant of more than \$162,000, bringing the project’s total funding to just under \$500,000.

The goal of the project is to produce a set of student-centered curricular materials that can be used in courses to improve learning and conceptual

understanding, and to serve as a model for additional research in the field of physics education.

“Our work could serve as a model for other disciplines to reform teaching in their more advanced courses,” says UMaine Associate Professor of Physics John Thompson.

“The interdisciplinary nature of this work — we have links to chemistry, engineering and math — may lead to more conversations between disciplines on how best to have students learn the concepts and the applications across disciplines.”



**T**HE EFFECTS OF repeated injury to marine worms will be the focus of research funded by a nearly \$382,000 grant from the National Science Foundation.

Assistant Professor of Marine Sciences Sara Lindsay will study worms that live on the ocean bottom — from intertidal mudflats to the deep sea floor.

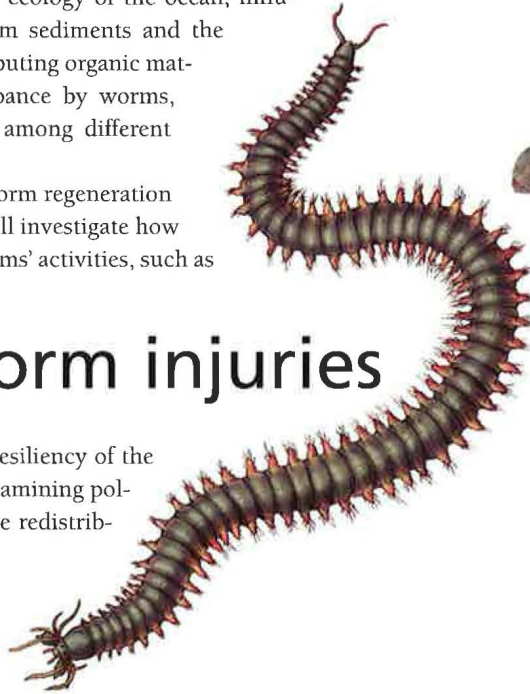
Marine worms play a vital role in the ecology of the ocean, influencing the cycle of nutrients between the bottom sediments and the overlying water column by processing and redistributing organic matter supplied from the column. Sediment disturbance by worms, called bioturbation, also influences competition among different species, and helps determine where larvae settle.

For several years, Lindsay has been studying worm regeneration of body parts following injury. In this study, she will investigate how injury and subsequent regeneration affects the worms' activities, such as reproduction and sediment mixing.

Her work could be particularly helpful to the fishing industry by providing information about the resiliency of the worms dug for bait. It also could aid researchers examining pollutants that end up in sediments that may then be redistributed by the worms that mix that sediment.

Illustration by Carrie Graham

## Marine worm injuries



## #by the Numbers



## Plant a Row

SINCE 1999, University of Maine Cooperative Extension has coordinated the state's Plant a Row for the Hungry project, through which home gardeners and Master Gardeners donate harvest surpluses to help those in need. The 2008 harvest season was bountiful for Maine's Plant a Row for the Hungry:

**80,748**  
pounds of produce

**32,208**  
pounds donated in  
York County — the largest of  
the county contributions

**225**  
volunteers who donated their  
time and/or produce

**70**  
dozen ears of corn donated

**11**  
food pantries, shelters and  
soup kitchens statewide that  
received produce, in addition to  
individual families in need

**1**  
the vegetable donated most —  
potato

## Good business

AN INCREASING NUMBER of businesses don't just want to do well, they want to do good. But wanting to be socially responsible, and actually having a strategy and the management tools in place to implement and track such an endeavor, are two separate things.

Terry Porter, a professor in the Maine Business School, has found that many businesses intend to adopt corporate social responsibility policies; however, they vary in the degree to which these policies are prioritized. Through her research, Porter has created a menu of possible approaches for businesses to achieve CSR and sustainability goals.

"CSR represents the firm's strategic intent with regard to social and environmental initiatives, where such actions exceed what is required by law or regulation," Porter says.

The dominant approach to CSR research compares the effects of such policies on the bottom line. However, Porter goes beyond financial return by assessing the systems by which CSR goals are achieved. The result is a practical approach for managers who wish to implement an effective CSR strategy.

Porter's findings were published in a recent issue of the journal *Systems Research and Behavioral Science*.

## Geometry of cancer

A NEW FORM of image analysis is under development at the University of Maine to improve early detection of breast cancer.

UMaine Assistant Professor of Mathematics Andre Khalil recently received a grant of more than \$73,000 from the Maine Cancer Foundation to build on initial research done by his colleagues in France — Pierre Kestener and Alain Arneodo — concerning use of wavelet-based image analysis to detect tumors.

The Two-Dimensional Wavelet-Transform Modulus Maxima method detects the difference between dense and fatty breast tissue, and reveals microcalcifications. The technology also may be able to discriminate between benign and malignant breast tumors.

Khalil will use the wavelet technology to analyze more than 3,000 images in the online Digital Database for Screening Mammography, maintained by the University of South Florida.

Based on Kestener's research, Khalil hypothesizes that the software can detect a benign tumor based on its geometry. It's believed that benign tumors are fairly typical in shape — a circle or square. It's when the tumor has a more complex fractal or branch-like structure that it is more likely to become more invasive and, thus, malignant.

"The question is, can we detect the cancer with the machine before the radiologist is able to detect it," Khalil says.



ELDERLY MEN with chronic health conditions need more effective patient education and outreach to overcome the stigma of asking for assistance, according to researchers at the University of Maine Center on Aging.

That reluctance, which is often a pattern throughout their adult lives, puts older men at risk, including leading them to disclose symptoms only at later stages of disease. In response, healthcare and social service practitioners

need to address attitudes, behaviors, beliefs and cultural barriers that stand in the way of seeking treatment or assistance.

The leading causes of death among older men — heart disease, cancer and stroke — are preventable in some cases, given timely access to quality healthcare, write Center on Aging researchers Lenard Kaye, Jennifer Crittenden and Jason Charland in the journal *Generations*.

Practitioners need to use targeted questions with older men whenever possible, creating the opportunity for them to disclose questions or symptoms, according to the UMaine

researchers. The providers also must not underestimate the importance of any healthcare visit.

Among the intervention strategies, the researchers recommend setting goals that will allow men to feel more involved in their healthcare and to master any feelings of loss of control or helplessness associated with asking for assistance or with declining health.



## Trust FACTORS

The researchers' findings, published in the journal *Landscape and Urban Planning*, suggest that local community trust factors are complex and critical to understanding the social context of natural resources management.

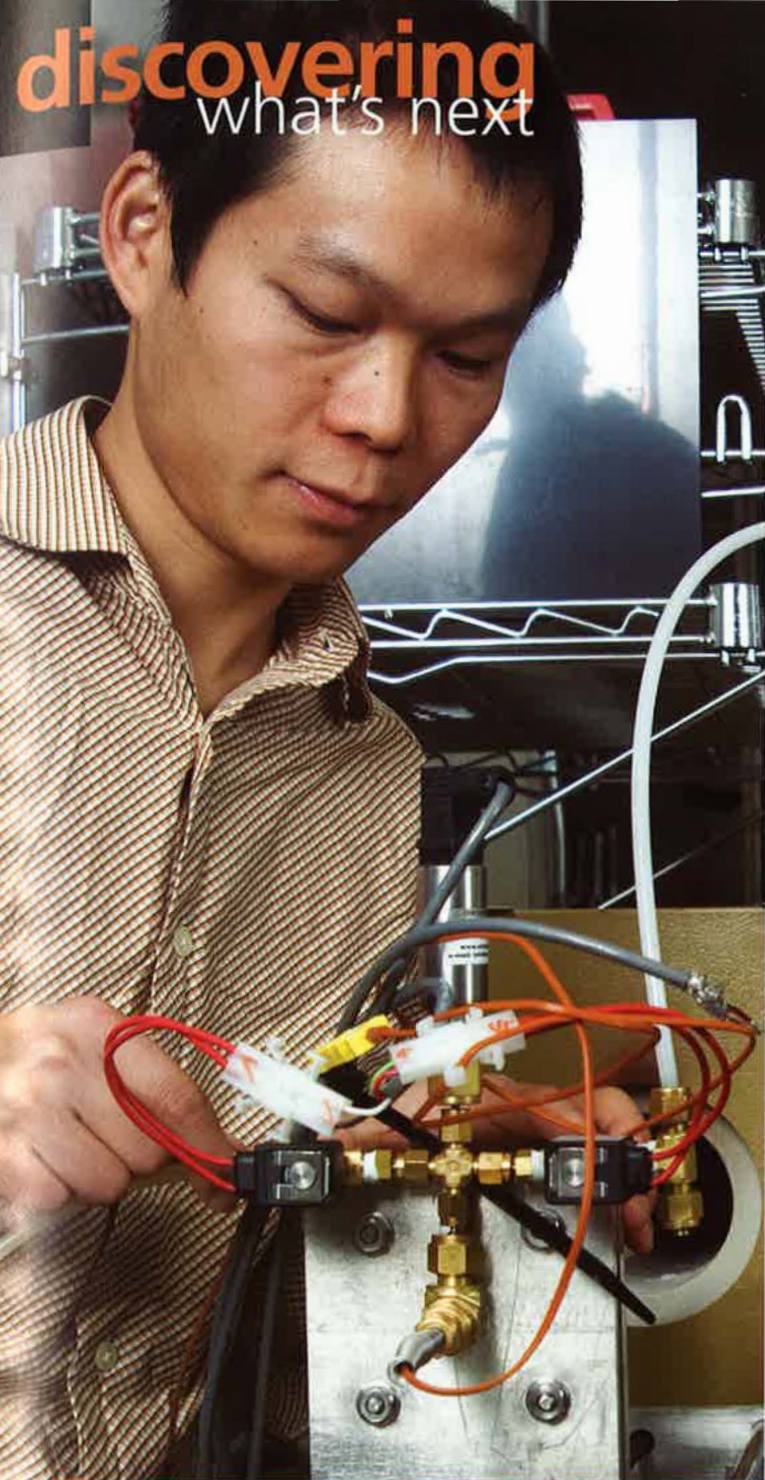
**P**UBLIC TRUST HAS IMPLICATIONS on the quality and durability of natural resources policy and management decisions, including those involving water resources. A new study by two forest resources researchers outlines five factors of trust that planners, managers, engineers, policymakers and community stakeholders involved in natural resources management should consider when seeking better ways of cooperating to produce sustainable agency-community relations.

Jessica Leahy of the University of Maine and Dorothy Anderson of North Carolina State University studied the interaction among the U.S. Army Corps of Engineers and key communities in the Kaskaskia River Watershed in Illinois. In this area, corps managers met with a mix of community support and opposition when managing two reservoirs and one river navigation channel involving flood control, recreation, wildlife conservation and water quality.

The researchers found five factors of trust: general trust in the government, social trust of people, trust in technical competence, trust in shared interests, and trust as a result of procedural justice (fair decision making). For each, the researchers suggested possible planning/management action for improving relationships between communities, agencies and managers.

When government is involved, increasing community familiarity with the local staff and agency can bolster trust. Social trust can be enhanced by events that broadly build a sense of community. Professional development and publicizing efforts to improve technical skills can address questions of technical competence. Education and outreach efforts focused on communicating an array of community benefits provided by management can promote shared interests and values.





No one has done this. It's a new area and we need to move carefully, drawing from other fields as we progress from theory to practical applications.”

Barry Goodell

Professor of Forest Resources



Carbon nanotubes (CNTs) are microscopic — electron microscopic, actually — but they have huge potential for University of Maine wood scientists. Prized for their strength and flexibility, as well as their conductive and insulating properties, CNTs could be used in everything from high-resolution flat-screen TVs to targeted drug delivery. But they're so expensive to produce that currently, there are few practical applications for these materials. University of Maine graduate students Xinfeng Xie and Yuhui Qian, together with visiting student Malte Pries of Georg-August University in Germany, and UMaine Professor Barry Goodell are exploring methods to produce CNTs from wood and plant fibers — one of Maine's richest natural resources — using more energy-efficient, cost-effective processes. The proprietary processes capitalize on cellulose structure, so the resulting nanotubes are already aligned for strength — a key benefit over other methods.

# Critical infrastructure



ALUMNUS THOMAS HOSMER recognizes the University of Maine's leadership role as the state's land grant. As a mechanical engineer, he also knows the importance of infrastructure.

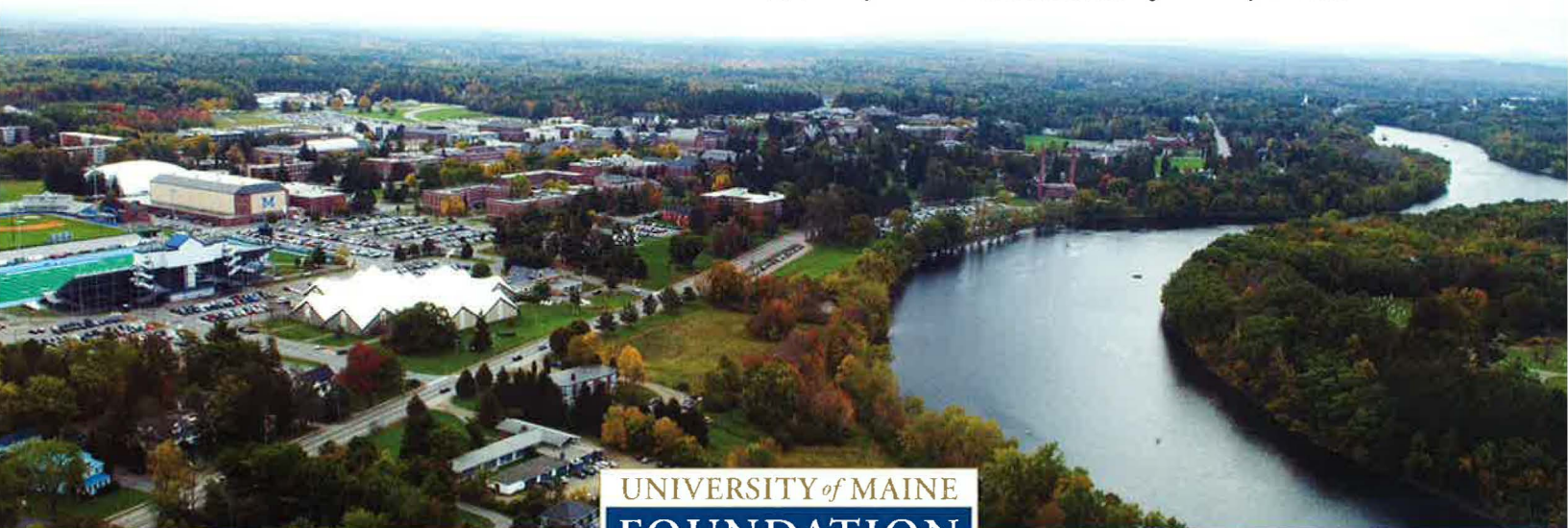
That's why he recently established the **Thomas P. Hosmer Fund** in the **University of Maine Foundation**, where income from this endowed fund supports maintenance projects on the Orono campus.

The fund does not supplant UMaine's annual maintenance budget. Instead, it provides supplemental income for maintenance and repairs that would not be carried out due to budgetary limitations.

"My intent," says Hosmer, who lives in Concord, Mass., "is to convey to students, faculty and alumni that the university is a special place and should look the part."

Hosmer earned a degree in mechanical engineering from UMaine in 1958. A consulting engineer for Arthur D. Little in Cambridge, Mass., from 1965–2000, Hosmer established a Crosby Hall design-engineering center, which he also supports with an endowed fund held in the University of Maine Foundation. The fund enables the Department of Mechanical Engineering to upgrade and maintain the equipment, and purchase supplies to enhance the students' experiences.

The University of Maine has more than 200 buildings on its campus in Orono.



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