

Heat of Battle

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UMaine Today

CREATIVITY AND ACHIEVEMENT AT THE UNIVERSITY OF MAINE

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Could an energy crop
help save Maine farms?

Greener grass

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Grass pellets have the potential to establish a new bioenergy industry in Maine, create a valuable crop for Maine farmers and reduce energy costs for state residents. And from where Andrew Plant sits in Aroostook County, there's no time to waste.

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Laurie Hicks is part of a team of researchers working to make Chinese art forms more accessible to an English-speaking audience. This past summer, she worked as a documentary photographer for ChinaVine.org, a collective that brings Chinese culture to life.

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Satellites collect data that aren't easy to explain, and that's where Annette deCharon comes in. Her job is to help the public understand why monitoring sea surface salinity is critical for NASA and society as a whole.

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As far as shipwrecks go, there was nothing fancy about the vessel found this summer in New York City. Yet when Warren Riess examined the boat, what he found was more remarkable than anything he could have discovered about a warship, ocean liner or pirate vessel.



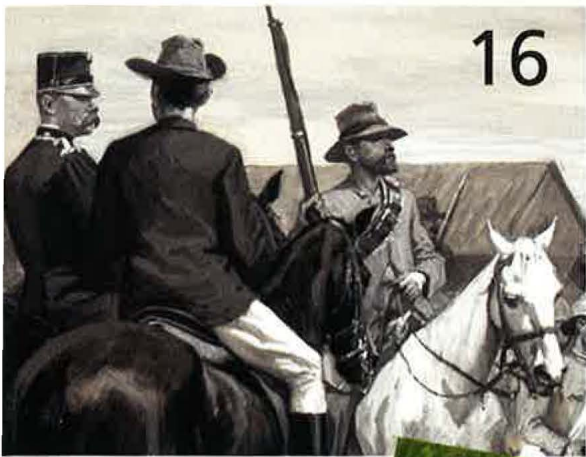
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In *UMaine Today* magazine, +Online indicates the availability of additional content — Web-exclusive stories, video and audio clips, photo galleries, full-length versions of articles, answers to questions posed to our In the Know experts, and a comprehensive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

In the Know

Lenard Kaye on the increasing legal needs of older adults.

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In the heat of battle, the interpretation and perception of proper military conduct can vary greatly, depending on whether you're on the front lines or on the homefront. The dilemmas are timeless, whether talking about the ongoing conflict in Iraq and Afghanistan or a turn-of-the-century war in South Africa, according to British military historian Stephen Miller.



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Mapping Former Glaciers Graduate student Aaron Putnam's recent ice age discoveries in New Zealand.

Medical Mission Pre-med student Jon Pelletier on volunteer work in Peru.

Video gallery

Maine Blueberries A three-part series on UMaine's research-based support of the industry.

President's Message

ANNUALLY SINCE 2008, the Maine Technology Institute has funded 35 research, development and commercialization projects that will lead to significant economic benefits for the state. Sixty percent of those funded projects have been based at the University of Maine.



This fall, in the third round of Maine Technology Asset Fund awards, half of the 10 projects are UMaine-based. One will create a high-performance computing resource for economic development, research and education. Another will aid in the commercialization of new technologies for animal disease surveillance in Maine and worldwide. An advanced biomechanics laboratory will develop high-tech products for injury reduction and rehabilitation. A fourth funded project will establish a fisheries innovation, sustainability and health lab.

The fifth project will construct the first grass pellet demonstration facility in the Northeast. This project has the potential to be an economic development boon to Maine, creating an alternative energy industry, jobs and a lower-cost fuel source, and helping save Maine farms. One of the driving forces behind this project, whose story we're proud to tell in these pages, is Andrew Plant. A Fort Fairfield, Maine, native and UMaine graduate, Andrew is a creative, effective Cooperative Extension professional whose efforts are making a tremendous difference in Maine communities, just like the one where he grew up.

Robert A. Kennedy
Robert A. Kennedy
President



ON THE COVER: Perennial grasses grown as energy crops are the focus of a new alternative fuel project in Maine. Planted in fallow or marginal fields, the grasses could be a much-needed source of green for farms in northern and central Maine. Read about the research on page 2.

Growing Altern

The state's \$1.65

WHEN Andrew Plant sees agricultural fields in Maine sitting idle, he worries that another farm has gone under. He also envisions an alternative that could literally and figuratively fuel farms in the state and give them a future.

That alternative is energy in the form of perennial grasses planted, harvested and sold to make compressed biofuel pellets. Grass pellets, also being studied in Europe and Canada, have the potential to establish a new bioenergy industry in Maine, create a valuable crop for Maine farmers and reduce energy costs for state residents.

And from where Plant sits in Aroostook County — a vast agricultural region in which so many farms have been abandoned in recent decades because of high operating costs — there's no time to waste.

"It's about finding an alternative crop to improve the economic climate for farmers while developing a resource that can be used by the general population —

Pellets made from perennial grasses contain natural lignins that act as gluing agents. For the additional binding needed to improve the energy density, UMaine researchers are exploring the incorporation of recycled, nonchlorinated plastics.



By Margaret Nagle

million investment in grass pellet technology could help save Maine farms

economic development and an environmentally friendly, renewable resource,” says Plant, a University of Maine Cooperative Extension educator based in Houlton. “Aroostook County has gone from producing 150,000 acres of potatoes in the 1950s to 50,000 today. Just driving any of the major traffic routes through the county, you see the old farmlands sitting idle, becoming useless or being developed as house lots.”

For the past two years, Plant has been researching the use of perennial grasses or straw left from small grain rotations as solid fuel crops. The development and commercialization of such sustainable energy crops could give farmers another source of income and lower-cost energy.

Now Plant and Michael Bilodeau, director of UMaine’s Process Development Center, are spearheading a Biomass Engineered Fuel Project, a \$1.65 million initiative recently funded by the Maine Technology Asset Fund linking UMaine research and development with Maine farmers, energy consumers, companies and entrepreneurs to develop and commercialize biomass fuel. In the next four years, the project will focus on the manufacturing efficiencies of converting energy crops to solid biofuel, and testing that biofuel for performance, combustion efficiency and ultimate commercial potential.

The goal is to prototype a commercial-

scale demonstration facility in Aroostook County — the first of its kind in the Northeast. Grass pellets will be beta tested in commercial biomass systems in the state. Several Maine companies have expressed interest in operating biofuel production facilities and licensing the technology.

“This is not just about pellets, but agriculture as a whole. We’re saying what is there — marginal or fallow farmland in central and northern Maine — can be used in a sustainable fashion.”

Andrew Plant

The pellet and boiler technology will be refined to find what works best in homes. With a commercial demonstration mill in Maine, a grass pellet product for household sales could be possible five years later.

Aroostook County farms are signing on to be “biomass growers,” planting energy crops as part of their rotations, or on fallow ground they have around the farm.

UMaine researchers say the annual economic impact of a single commercial pellet mill in northern Maine is expected to be between \$17 million and \$23 million. With potential for 25 pellet mills statewide,

the overall economic impact is projected to be more than \$500 million annually, possibly replacing more than 100 million gallons of home heating oil each year.

“We don’t see much of the dollars spent on imported oil,” Plant says. “But if we consider something locally grown, harvested, processed and utilized, almost every dollar involved stays in Maine.”

MAINE HAS UPWARD of 200,000 acres in which to produce perennial energy crops without displacing current food production, Plant says. If crop waste, such as straw from grain rotations, is included, the number of acres for energy crops doubles.

From a microeconomic perspective, grain production in Aroostook County is a drop in the bucket, Plant says. Most of Maine’s small grains now are going for livestock feed.

“In Aroostook County the question is not food versus fuel, but whether this could mean the difference between a farmer staying in business (and not),” he says.

To determine which perennial grasses will grow best in Maine, Plant began looking at species studied by the U.S. Department of Energy and Oak Ridge National Laboratory in the 1980s and 1990s. Those grasses include the superstar of bioenergy crops — switchgrass — that produces dense pellets shown to have a 14:1 energy

Growing Alternative

balance. In other words, for every unit of energy it takes to produce the pellets, 14 units of energy are gained, through burning. By comparison, the 2008 energy balance for the corn-ethanol industry is 2.3:1, according to the U.S. Department of Agriculture.

There's also reed canarygrass, a native Maine species known for its ability to grow high yields in cool seasons.

Studies in the north central United States and Europe have shown that reed canarygrass can yield 4 tons to 8 tons per acre, depending on fertilization regimes. If replicated in Maine, Plant says, commercial production cost estimates are \$115 to \$130 per ton of pellets — \$5.50 to \$6.25 per million British thermal unit (Btu). Wood pellets average \$9.50 per million Btu.

When home heating oil is \$2.70 a gallon, Mainers pay \$19.50 per million Btu.

Compared with other biofuel crops, perennial grasses conserve soil resources, sequester carbon and nitrogen in their root systems, and can serve as valuable wildlife habitat. The perennial grasses have moderate to high productivity, stand longevity, low nitrogen requirements, and resistance to pests and diseases. They also are well adapted to marginal farmland and can be successfully established in northern climes.

And unlike forage crops harvested a couple times a year, energy grasses are cut annually at the peak of maturity. The baled grass has a moisture content of up to 15 percent, compared to upward of 50 percent moisture content of wood, which mandates extensive drying before pelletizing.



Much of the perennial grass for the Biomass Engineered Fuel Project will be grown in Aroostook County.

A large round bale of grass can produce up to 1,400 pounds of pellets, says Plant. It would take an average of 2 to 3 acres of grass made into pellets to annually heat a typical northern home.

The grasses, like wood, contain natural lignins that act as gluing agents. For the additional binding needed to improve the energy density of grass pellets, UMaine researchers are exploring the use of patented technology that incorporates recycled, nonchlorinated plastics.

Some of these plastics are even found on farms, including greenhouse film and hay bale wire.

The recovered plastics, such as polyethylene and polypropylene, certified by the U.S. Environmental Protection Agency to be used as fuel, are highly refined hydrocarbons with low levels of inorganics and high Btu values. Recent work has shown that bioplastics, such as polylactic acid, which are difficult to process in conventional recycling operations, can also be used in pellets.

Grass pellets may burn faster than wood, Plant says, but with the plastics as binder, they are more energy-dense.

However, when burned, grass pellets tend to be higher in ash content than wood — up to 5 percent versus 1 percent. Grass



Photo by Edwin Remsberg, USDA

also has a higher natural chlorine content, making the pellets more corrosive than those made of wood.

In Europe and elsewhere, research is focusing on new technology for ash management in boilers and stoves, as well as higher-grade metals that better resist corrosion.

“A lot of people think there is one silver bullet to solve everything,” says Plant. “I think we’ll have to be diverse to eliminate fossil fuel use. I relate it to an investment. You don’t put all your money into one account or stock. It will have to be all cards on the table.”

PLANT GREW UP in an agricultural community in Fort Fairfield, working on farms throughout high school and during harvest break.

“While my parents didn’t have a farm, our backyard was 100 feet from a potato field,” he says.

He came to UMaine in 1998 to study biology and pursue a career in osteopathic medicine. He spent his summers working in integrated pest management with UMaine Cooperative Extension crop specialist Jim Dwyer at Aroostook Farm, the potato research facility of the Maine Agricultural and Forest Experiment Station in Presque Isle. By his senior year, when he took a course in plant pathology, Plant knew his career path had done a 180.

“My father always was involved in civic organizations, volunteering and helping people,” he says. “I wanted to do the same in the professional setting.”

Plant received his undergraduate degree from UMaine in 2002 and began work as an integrated pest management professional in Extension’s Presque Isle office. One of his most memorable calls came from a grower concerned about lesions on potato plant leaves. That’s the year late blight was found in the county.

Making one of his first major disease diagnoses and recommendations for management was a bit nerve-racking, he admits, but it solidified his career choice.

“It was so memorable because it showed just how much people’s livelihoods depend on how much we can help,” he says.

In that same potato field, Plant

happened to spy a weed that also had succumbed to late blight. The annual broadleaf, hairy nightshade, is particularly problematic for its ability to harbor diseases and insects, and to resist herbicides. The find, one of the first in Maine, led Plant into research that resulted in his first published papers.

His master’s and now his dissertation research focuses on white mold in potatoes, a little-studied fungus. Plant hopes to better understand the effect of the ubiquitous pathogen on potato yield and how management techniques can control it.

In 2008, when Plant became an Extension educator, his perspective became even broader. He likens it to being a country doctor, only in this case, the questions he fields in the farm pasture or in the grocery store aisle are related to all aspects of agriculture. That includes being ever-vigilant for ways to keep Maine farms healthy.

That year, when oil hit \$150 a barrel, making energy costs another serious problem for farmers, Plant knew he had to look for alternatives. He also was getting calls from people who had bought former farmland and moved to Maine. Their question: What should they do with their 40 acres?

“Knowing a lot of the farmers I work with, I take their success to heart,” he says. “It’s difficult to see them struggling. I don’t want to see anybody fail. A big part of my research now is trying to find or create new and better markets for the nonpotato years during (crop) rotations. Finding profitable crop rotations has been the biggest weak point in the potato crop system.” ■

**HOW THE HISTORY
OF BROADCASTING
CAN INFORM
TOMORROW'S
MEDIA CHOICES**



AIR CHECK

By George Manlove

"IT'S SAD that AM radio is almost dead," Michael Socolow says, partway into a discussion of the evolution of radio broadcasting in the United States.

"Here in Bangor, Maine, you can occasionally still pull in WJR in Detroit, WTOP in Washington," he says. "Just by doing that, you can get a sense of what it was like in the 1920s, the sense of radio transporting you to someplace else."

For more than two decades, until the emergence of television, the radio was a central fixture in almost every American home. Families gathered around vacuum tube radios to hear news covered up to the minute, including the all-important presidential addresses to the nation, and entertainment by such household names as Amos 'n' Andy, Jack Benny and Fred Allen — the Letterman of his day.

Most radios still have AM dials and it's possible to hear the nostalgic hissing and almost musical signal modulation that comes with tuning in stations. However, the original practicality and necessity of broadcasting using amplitude modulation are things of the past.

For Socolow, a leading American radio historian, the loss is not just indicative of technological evolution. The historical perspective of radio puts in context today's discussions about tomorrow's media choices.

"Historical patterns indicate our media choices will be limited by the economy, by technology or by regulation, but it will be sold to you — the consumer — as less quantity and better quality," says Socolow, an associate professor of communication and journalism at the University of Maine, whose research focuses on the development of the nation's radio networks — the competition, the politics and the profitability from the 1920s through the 1940s. Radio's heyday.

"I think when you look at the intersection of technology,

communication regulation and economics, and the trade-offs, you need to have your eyes open in a way I don't think Americans did in the 1920s and 1930s," he says.

SOCOLOW HAS SPENT NEARLY TWO decades reading and writing about broadcast and, to some degree, print media. A former CNN assignment editor covering the news of Southern California, including the O.J. Simpson trial, he also worked for three Olympics broadcasting entities — Radio-Television Olympica, Atlanta Olympic Broadcasting and the Sydney Olympic Broadcasting Organization.

The son of journalist and CBS producer Sanford Socolow, who produced "The CBS Evening News with Walter Cronkite" and later the "Evening News with Dan Rather," and was a producer on "60 Minutes," Socolow studies the why and how behind the evolution of broadcasting and broadcast news in particular.

Radio in America began in earnest around the turn of the century with the modernization of the telegraph, then the telephone. Among the first broadcast networks were the WEAf network, owned by AT&T, and the WJZ network, owned by General Electric, Westinghouse and their subsidiary, Radio Corporation of America (RCA). When AT&T sold its interest in radio and its network to the GE-Westinghouse-RCA group in 1926, a new company, the National Broadcasting Company (NBC) formed, followed by CBS and others.

It is at this point in the history of radio where Socolow begins his industry analysis.

Socolow looks beneath the surface at how technology, politics, regulation, economics, and social and cultural factors blended to influence the current state of broadcasting. His forthcoming book on the development of national network radio in the United States maps the landscape that allowed an oligopoly to structure broad-

Air Check

casting in the United States. His central question concerns why the United States only produced a few broadcast networks when existing technologies might have allowed for far more.

In one of his many published articles on networks, competition and politics, Socolow chronicles an attempt by a multitude of developing networks to persuade government regulators at the Federal Radio Commission to adopt a technical system that would have facilitated coexistence. Instead, Socolow says, network behemoths NBC and CBS managed to delay and ultimately kill consideration of a synchronous radio system.

“In early radio, NBC and CBS lost money,” he says. “The two companies rationalized the business and used the government to help their cause.”

IN HIS RESEARCH, Socolow also has explored advertising’s influence over consumers and the radio industry, the profitability of radio, competition and manipulation of the medium, and broadcast companies’ willingness to acquiesce to government propaganda in the 1940s.

His editorial columns in national newspapers have delved into such topics as the psyche of war correspondents, and the policy and economic implications of net neutrality. He also has examined how networks and media companies present themselves to the public.

Based on history, Socolow predicts some familiar patterns will emerge in the multiplying communications technologies that now encompass the Internet and its proliferation of blogs and social media.

“I’d say we’re in that period before the transition shakes out,” he says. “Traditional journalism jobs are going away. Newspapers are going out of business. I think the sad thing is the media environment we’re in right now can’t sustain itself indefinitely. I see consolidation. I see regulation following corporate demands.”

With the *New York Times* joining hundreds of other online publications and enterprises requiring paid subscriptions, Socolow says he believes free Internet content will become less and less available.

“The wide-open Internet was great while it lasted, but unfortunately it’s not going to last,” he says. “I think there are not enough tollbooths on the Internet to make money. I think we’re going to start seeing more tollbooths. I can’t see the corporations continuing to lose money.”

IN THE MEANTIME, television viewer surveys show fewer young people watching the evening news today, which partly explains the abundance of adult-targeted pharmaceutical advertising that bookends and largely supports network evening news.

And something else has been happening over time with the evening news, Socolow observes: Broadcast organizations go to great length and expense marketing to people they think are their viewers. Decades ago, broadcast news icons such as Chet Huntley, David Brinkley and Walter Cronkite were household names. They brought the nation “news from the mountaintop” in an elite, authoritarian and almost ministerial manner, he says.

“In 1968, people who loved Walter Cronkite and people who hated Walter Cronkite still watched Walter Cronkite. People today won’t watch somebody they believe is biased, but they would in 1968,” says Socolow, who also studies how networks and media companies present themselves to the public.

Michael Socolow

Today, he says, there are dozens of recognizable news personalities and consumers are more subjective than ever about the networks they watch.

With so many emerging ways to receive news and entertainment, Socolow says the trend away from mass broadcasting to personalized, individualized programming by the consumer “will reformat what we actually consider to be ‘radio’ in the future. People will be listening to something resembling radio, but it won’t be ‘broadcasting.’”

But there will be radio in the future, he says, “so long as Americans are stuck in their cars. Radio is now almost completely wrapped around driving and commuting to work.” ■



In 1968, people who loved Walter Cronkite and people who hated Walter Cronkite still watched Walter Cronkite. People today won’t watch somebody they believe is biased, but they would in 1968.”



The CBS newsroom in 1962 with managing editor and anchor Walter Cronkite, seated in the center, and other members of "The CBS Evening News with Walter Cronkite" team, including executive producer Don Hewitt, left foreground, and producer Sanford Socolow, seated center back. "The CBS Evening News with Walter Cronkite" was the first 30-minute nightly news program.

Photo by CBS Photo Archive/Getty Images

Living history

By Michael Socolow

IT PAYS THE RENT.

That's a phrase I well remember from my childhood. Whenever I wanted to change a channel or turn off the television, my father would command me to leave it alone. Why? "Because it pays the rent."

I never understood what such boring, dry fare as "Agronsky & Company" and "Face the Nation" had to do with our rent — in fact, I don't think I even knew the meaning of "rent" — but the phrase was a staple of my childhood. The television was left on because, somehow, the box in the living room paid our rent.

It paid our rent because my father worked for almost four decades as a

broadcast journalist for CBS News. He transitioned from being a wire service reporter into television news in the 1950s, when any serious, ambitious journalist wrote for a major newspaper or wire service, or worked in radio. But as television caught on with the American people — and network journalism transformed from the stale newsreels of the Camel News Caravan to the professionalism of the "CBS Evening News" — his career took off. By the time I was born in the eventful year of 1968, television journalism was changing the world. And my father had been plugging away at it for more than a decade. That year, he was a producer on "The CBS Evening News," helping to

build one of the most dominant and iconic newscasts in American history.

Being the son of a veteran journalist has shaped my career in ways both obvious and unexpected. For instance, we always had newspapers around and television news on. I gained an early appreciation for newspapers, and I loved reading everything from the opinion pages and the comics to the box scores and even the classified ads. Even today, when I travel to a new town or city, one of the first things I do is purchase a newspaper and wade through it to get a sense of place. From my father I also gained an understanding of the link between journalism and history. He subscribed to *American*

ON THE AIR

Heritage for years, and he always loved historical documentaries (in the early 1960s, he had worked on documentary programs for CBS News). Recently, when cleaning out his apartment, he gave me the complete set of the BBC's classic *World at War* series, knowing how much I would treasure them (even if the VHS format dates them a bit).

My father held a variety of high-profile positions, including Washington bureau chief in the early 1970s and executive producer of "CBS Evening News" in the late 1970s. I have distinct memories of his involvement in historical events during these years. For instance, I remember waiting to ascend the Washington Monument one hot early fall morning. Just as my brother, sister, father and I were to start inside, my father's beeper went off (back in 1974, a beeper was an exotic technology). He had to return to the office, for President Ford had just announced his decision to pardon Richard Nixon. My father would be instrumental in producing an instant prime-time special on the pardon that night.

I was tremendously lucky to meet and interact with a variety of famous people via my father's career. I remember meeting Muhammad Ali outside the CBS bureau after he appeared on "Face the Nation," and I remember a picnic at Eric Sevareid's farm in Northern Virginia, where I got to

meet a Washington Redskin. My father was a good friend of Walter Cronkite's, and I remember sailing on Cronkite's yacht and attending his annual Christmas party. Amazingly, I remember having a chat with Walter Cronkite's spry mother at one of the parties — in the 1980s, when she was in her 90s. My father also is good friends with Morley Safer, who lived near us in suburban New York when I was a small child. Years later, when we were invited to a Passover seder at Morley's house, my brother, sister and I had an "only in New York" experience. We traveled together to the seder, and I convinced them they were mistaken about the address. We got off the bus, walked down the block and knocked on the door of a house I was certain belonged to the Safers. The door opened, and the author Tom Wolfe, dressed impeccably in a white suit, stood before us. "Uh, is this Morley Safer's house?" I asked. "Same house, four blocks down," he explained, smiling.

But I also got to see the difficult side of a journalist's life. Journalists can't maintain regular schedules. Like policemen and firemen, they are always on call. My father's job kept him away from home for long hours and days at a time. We moved often, and my parents divorced when I was young. Before I finished high school, my father's job had moved him from New York City to Washington to London,

where he was named bureau chief in the early 1980s. I saw how the changes in television news in the 1980s affected his career, as a more professional version of broadcast journalism gave way to ratings-driven glitz and he was pushed aside by younger executives who knew television but lacked the journalistic background of people like my father. I tried my hand at journalism for a while at CNN, but the shallow depth of the stories and the inability to delve into complexity and nuance sent me back to graduate school for a Ph.D. in history.

As a historian, I chose to examine early network radio. Right after college, I worked as a radio cataloger at the Museum of Television & Radio in New York City (now called the Paley Center for Media). Listening to those old programs — Fred Allen, Jack Benny and the rest — and writing up the summaries captivated me. It made me want to find out how this whole broadcasting process started. Where did networks come from? Why were there only three when I was growing up, and only two in the radio age? My scholarly work has focused on these and other questions about how the radio networks operated, and how they created the template for the television age.

You could say I've always wanted to figure out how that box in our living room paid the rent. ■

Bringing About Change

Maine Extension Homemakers celebrate 60 years

IT USED TO be about preparing a home for electricity or learning how to knead bread. These days, it's more often about managing stress or understanding finances.

But no matter the topic, the Maine Extension Homemakers Council's calling is the same — sharing information and assisting Maine communities while spearheading local, county and statewide fundraisers and charitable projects.

The 850-member council, a branch of University of Maine Cooperative Extension, has been at work in the state for 60 years.

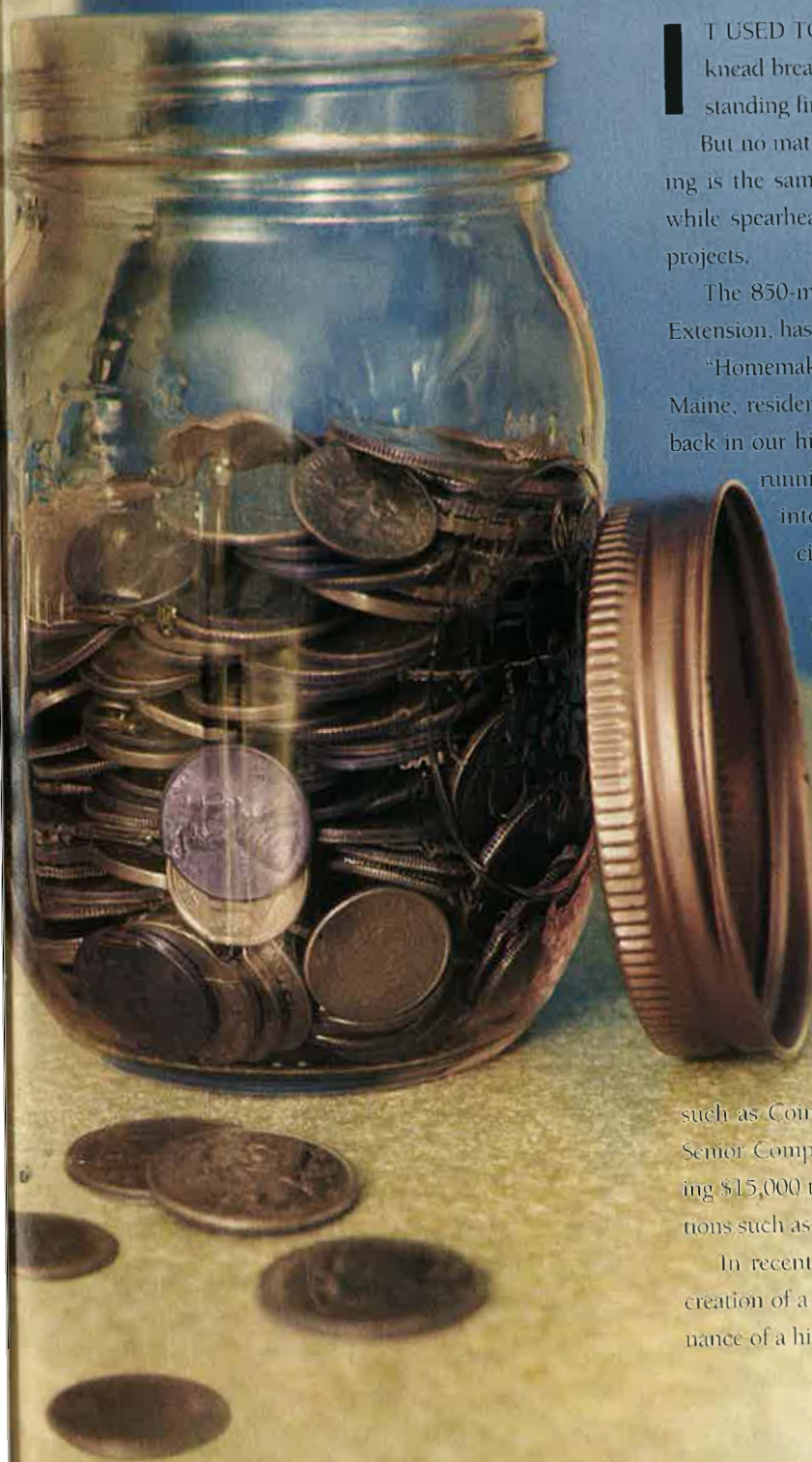
"Homemakers has changed," said Moneda "Bunny" Worster, a Madison, Maine, resident who served as MEHC president in the late 1990s. "We go back in our history and look at brochures of how to prepare your house for running water. We certainly have come a long way. Now we're very into health issues, computers, programs about being self-sufficient."

Although the group has existed in Maine in some form since 1938, MEHC considers 1950 its first official year. That's when the Maine Farm Bureau voted to sponsor a women's division to develop leadership, and to extend home demonstration work among women and youth in Maine. In 1994, after several name changes, along with admission to and then withdrawal from a national affiliate, MEHC signed a memorandum of understanding with UMaine Cooperative Extension.

Homemakers are trained in a variety of research-based subjects, such as nutrition, financial literacy and estate planning, that they share in their communities. Last year, MEHC groups presented 233 educational programs, devoting more than 46,000 hours to community service.

Those volunteer hours also included statewide fundraising, such as Coins for Caring, that benefits organizations such as 4-H and the Senior Companion Program. Last year, Homemakers raised \$68,770, including \$15,000 to purchase an EyeMax System, which allows people with conditions such as ALS or brain injury to communicate.

In recent years the homemakers have focused on projects such as the creation of a rose garden at the Blaine House in Augusta, Maine, and maintenance of a historic balloon-launch site in Aroostook County.



tech styles

London-based fashion company pioneers wearable technology

By Kristen Andresen

WHEN STARS want to make a splash on the red carpet, they usually call in the heavy hitters: Oscar de la Renta, Chanel, Versace.

But for the 2010 Met Costume Institute Gala, pop star Katy Perry wanted to light up the night. Literally.

So her stylist called in Ryan Genz and Francesca Rosella of CuteCircuit, a London-based company that designs high-fashion wearable technology. The result — a floor length confection of pink and white silk, striped with thousands of LED lights — made international headlines.

For Genz, a Caribou, Maine, native who graduated from the University of Maine in 1998 with a double major in studio art and cultural anthropology, it was a watershed moment.

“We didn’t really know what the reaction would be,” Genz says from his London studio. “In a way, it validated our feelings about merging new technologies and fashion. We do think it’s exciting and fun.”

As a result of all the publicity, Genz and Rosella have received several high-profile commissions, including one from the London-based department store Selfridges. The retailer asked CuteCircuit to design a scaled-down version of Perry’s frock for its 2010 holiday offerings. It retails for about \$2,000 U.S.

Genz and Rosella met in 2001 while studying at Interaction Design Institute Ivrea, on the edge of the Italian Alps. The institute offered the world’s first master’s program in interaction

design, and faculty included professors from Stanford, MIT and the Royal College of Art, as well as representatives from industrial design powerhouses such as Microsoft and Whirlpool.

The research-intensive course called on students to quickly develop and prototype new products for clients — and the sky was the limit.

“We were working with types of technology that weren’t in existence yet,” Genz says. “These were ‘Wizard of Oz’ scenarios.”

At the time, one of those scenarios involved computer processors that were small enough to wear, but the only people who were working with this technology were using it for practical purposes, such as using sensors to protect firefighters or others working in hazardous environments.

But Genz and Rosella had other ideas. They immediately connected because of their mutual interest in the intersection of technology and fashion. The couple saw the potential for real innovation in a field that hadn’t changed much since the introduction of synthetic fabrics.

“Film, technology, medicine, all of these have been revolutionized over the last 100 years, but fashion has not, so it’s time,” says Genz.

YES, HEMLINES rise and fall with the seasons, but pants are still just pants. Skirts are still just skirts. And shirts are still just shirts.

But what if a shirt could be more than a shirt?

That’s exactly the question Genz and Rosella set out to answer



This past May, singer Katy Perry wore a CuteCircuit creation to the Metropolitan Museum of Art's Costume Institute Gala Benefit in New York City. The dress made international headlines.

Photo by CHANCE YEHL
PatrickMcMullan.com

Tech Styles

"Film, technology, medicine, all of these have been revolutionized over the last 100 years, but fashion has not, so it's time." Ryan Genz



when they designed the Hug Shirt, which *Time* magazine named one of the top inventions of 2006. Using sensors, Bluetooth technology and mobile phones, the shirt can replicate the feeling of a hug from afar.

The sensors track the strength of the wearer's touch, heart rate and body temperature. The data are transmitted via mobile phone to the recipient (who also needs a Hug Shirt — it takes two to tango), and he or she is, in essence, able to download a long-distance hug.

"It may be silly," Genz says. "Why do you need a hug? But there's that unfulfilled desire when you're away from home. It's not necessary. No technology is necessary. We can still plow fields with horses and avoid zippers and only use buttons, but the role of the designer, the role of the artist is to show what is possible."

By combining the fundamentals of traditional fashion design with cutting-

edge technology, CuteCircuit has redefined what a garment can be. It started with the Kinetic Dress, which Genz and Rosella created for the "How Smart Are You Dressed Tomorrow?" event at the NEMO science museum in Amsterdam in 2004. They embroidered a black Victorian lace dress with electroluminescent wire, which was connected to five motion sensors. When the wearer moved, the wire glowed.

From there, they created the Galaxy Dress, commissioned in 2008 by the Museum of Science and Industry in Chicago for its "Fast Forward: Inventing the Future" exhibit (it is on view alongside the Hug Shirt). The floor-length silk gown is embroidered with 24,000 full-color LED lights, which run off iPod batteries, and 4,000 Swarovski crystals so the dress looks good even when the lights are off. The LEDs are flat and small, and the wires and circuits used are incredibly



fine so as not to weigh down the fabric.

Katy Perry had seen photographs of the Galaxy Dress online, and her stylist, Johnny Wujek, wrote to CuteCircuit asking if she could wear it. Genz explained that the dress is in a museum, but told Wujek to keep CuteCircuit in mind if Perry ever needed a custom light-up dress of her own. Last April, Wujek let Genz and Rosella know that Perry did. In two weeks.

At the same time, they were commissioned to design a dress for Safura, a contestant in the Eurovision Song Contest. Her dress not only lit up, it displayed streaming video.

“We had to work on both of these dresses at the same time,” Genz says. “I’ve never not slept so much in my life. Sometimes, we do stuff just for the adrenaline.”

THOUGH THE technological foundation for CuteCircuit was laid at Ivrea, that up-all-night work ethic and tenacity has its roots at UMaine, Genz says.

He recalls a class when Michael Lewis, a painter and art professor, gave students a tour of his studio. Lewis told them that even when he doesn’t feel like painting, even if he’s feeling uninspired, he finds it important to come to the studio daily. That message resonated with Genz, who adopted that philosophy at CuteCircuit.

Some of the first “wearable art” pieces Genz made were done at UMaine. He drew a series of images on T-shirts for a performance piece in Lewis’ sequential drawing class. For another class, he created a cocoon that could envelop the wearer.

“When I was at UMaine, I remember

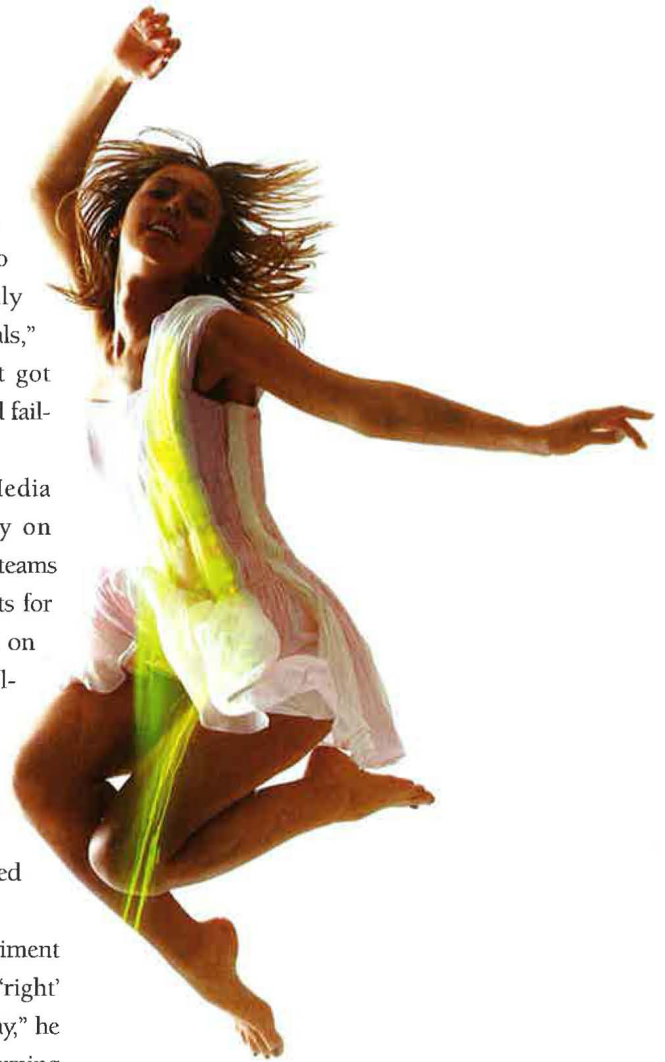
this feeling of intense inspiration and possibility, like we could do absolutely stunning things if only there were enough time and materials,” Genz says. “And in the end, that got channeled into various successes and failures.”

Genz also worked at ASAP Media Services, a new media laboratory on campus. At ASAP, students work in teams to create websites and other products for paying clients. When Genz arrived on campus in the early 1990s, technology was evolving so rapidly that everything was new to the students. The Internet was in its infancy, people still made phone calls on landlines and few people used e-mail.

“I had the opportunity to experiment and fail and to not do things the ‘right’ way, but maybe do things a better way,” he says. “It was a new approach to learning to me and it worked. And today, I encourage people to do that in my studio.”

The spirit of pushing technology, of taking risks and of challenging the status quo still informs everything Genz does. It has led to hoodies that hug and gowns that glow. It has led to T-shirts that twinkle and dresses that double as mobile phones. It has allowed Genz to innovate. To redefine. To shine — whether in the studio, in a gallery or on the red carpet.

“Mentally, I still go back to that state, of being in Maine, or UMaine, and it is still inspiring,” Genz says. “I can’t even put my finger on what it is or where it came from, but it has never failed to make me think in new ways and produce more focused or startling ideas.” ■

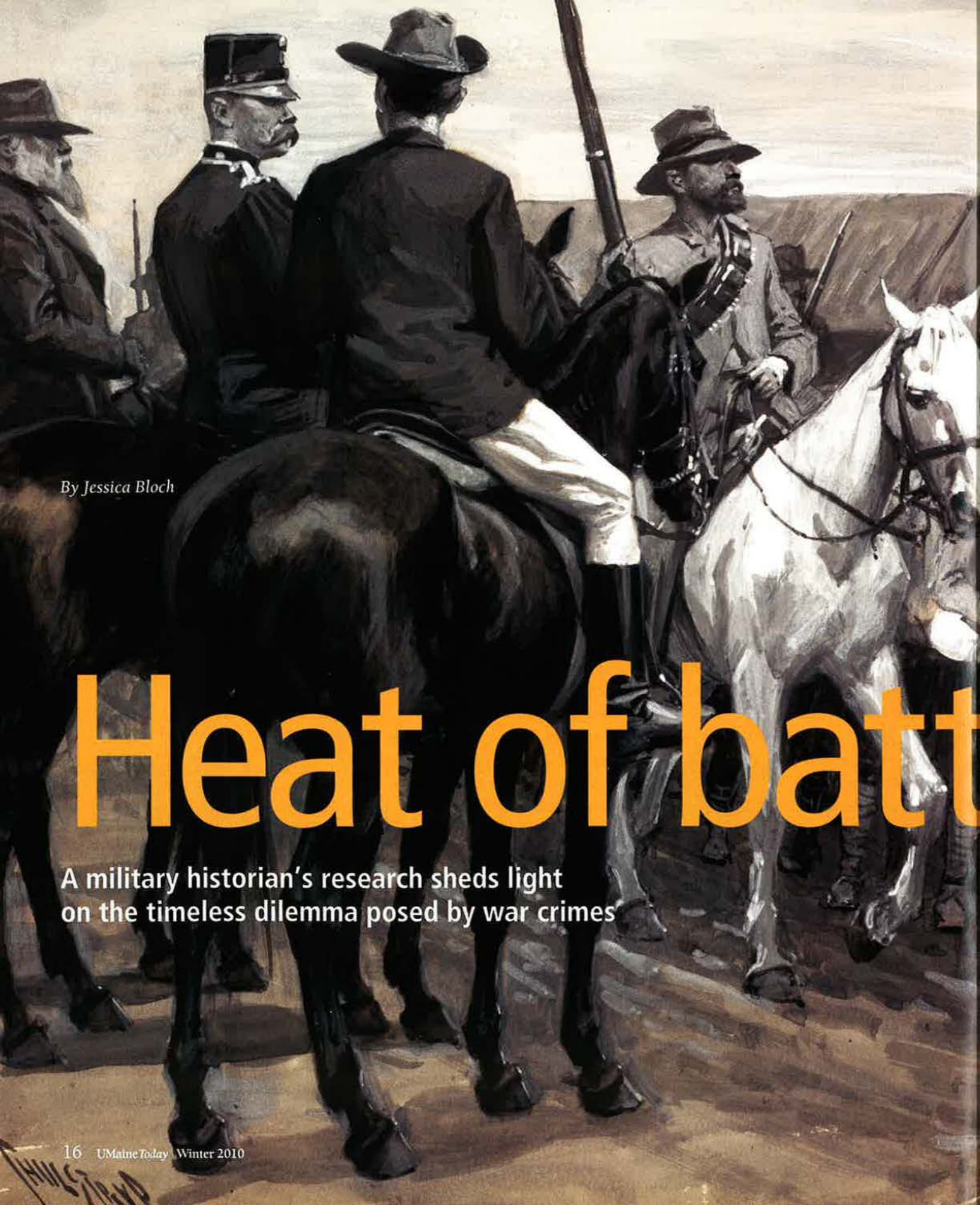


For the holidays, the London department store Selfridges commissioned CuteCircuit to create the K Dress, inspired by Katy Perry’s gown. The silk chiffon frock is decorated with a band of LED lights.

Photos facing page: Ryan Genz wears a Twinkle Shirt, featuring LED technology that makes the design — a stylized eye — glow and twinkle when he moves.

Though it looks like a regular hoodie, the Hug Shirt uses sensors to replicate the sensation of touch, warmth and emotion — sent via Bluetooth technology from a distant loved one. The shirt was named one of *Time* magazine’s 2006 Best Inventions.

Photos courtesy of Ryan Genz



By Jessica Bloch

Heat of batt

A military historian's research sheds light on the timeless dilemma posed by war crimes

In his research, historian Stephen Miller investigates the role of the military in the pursuit, sustenance and development of the British Empire from 1850 to 1902. That includes the manipulation of the British media by the military to shape attitudes about race, class and empire. This image of British prisoners of war in South Africa, published in *Collier's* magazine, would have stirred patriotic sentiments on the homefront.

Prisoners of War — Arrival in Pretoria of the Royal Irish Fusiliers Captured Near Ladysmith, c. 1900, by Thure Thulstrup
Wash drawing courtesy of the Anne S.K. Brown Military Collection, Brown University Library

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Heat of Battle

THE TROOP BATTALION that went into battle this morning has been ravaged by losses. The surviving soldiers are hungry and tired. War weary. And there are no reinforcements in sight. After walking miles, the battalion comes upon a farmhouse recently vacated by enemy sympathizers. Here for the first time in days is the promise of fresh water and food. A search of the house also turns up a cache of jewelry, to which the soldiers help themselves.

In the heat of battle, the black-and-white rules of engagement can blur. And the interpretation and perception of proper military conduct can vary greatly, depending on whether you're on the front lines or on the homefront.

The dilemmas are timeless, whether talking about the ongoing conflict in Iraq and Afghanistan, or a turn-of-the-century war in South Africa, according to British military historian Stephen Miller. And the answers are no clearer.

"How much has changed in 100 years?" asks Miller, a University of Maine professor of history. "Do we want to hear about atrocities in Iraq? Do we want to see images of dead Iraqis or dead American soldiers? I think there is a large segment of society now, just as there was then, that does not want to hear the details."

In his research, Miller focuses on the British army and the South African War known as the Boer War of 1899 to 1902. It was a conflict in which the British were ultimately successful, but the cost was high. The British lost many men in battle and to disease, and morally it weighed heavily on both combatants and civilians.

British soldiers regularly violated the rules of warfare and committed a number of atrocities, Miller says. Among them were murder, rape, forceful removal of civilians to concentration camps and unlawful destruction of property.

Many transgressions were not hidden. Stories circulated throughout South Africa and some made their way home to Great Britain. But few soldiers were prosecuted and, for the most part, the British public overlooked whatever crimes were committed in pursuit of empire.

"How much has changed in 100 years? I think there is a large segment of society now, just as there was then, that does not want to hear the details." Stephen Miller

MILLER IS INTERESTED in the nature and practice of discipline and punishment in the late-Victorian army. That includes exploration of what the British military defined as a criminal act, and how charges were investigated and punishment meted out. Using court martial records, personal letters, diaries and memoirs, he is looking at how British soldiers in South Africa viewed their actions and those of their comrades.

How society defines crime on and off the battlefield was an important question in the late 19th century as more and more countries developed professional armies that were often supplemented by civilians in times of war. The relationship of the

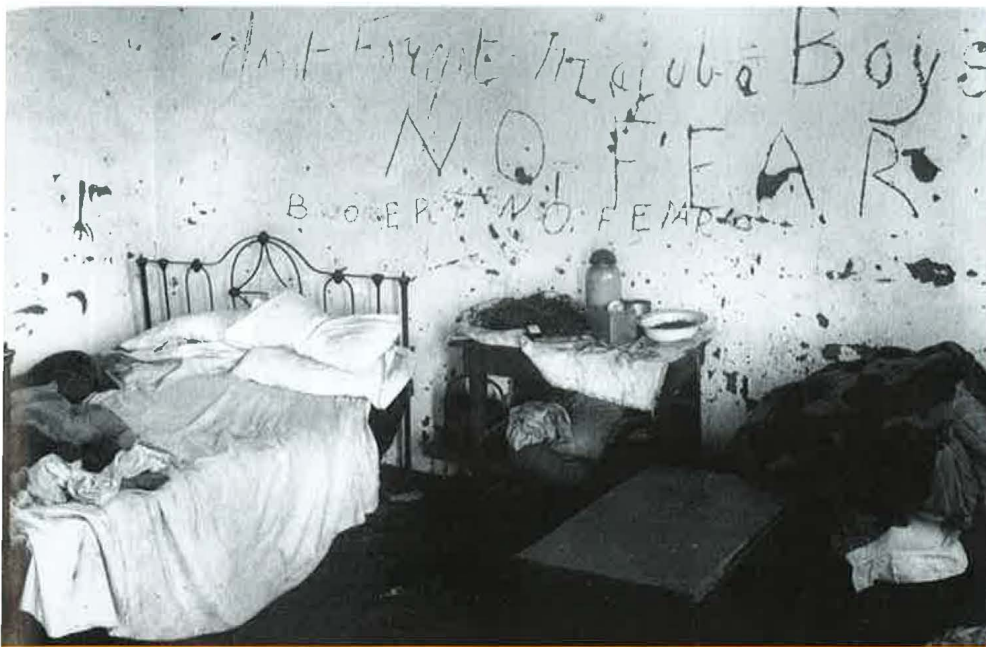
individual to the state was in great flux.

"Traditionally it was argued that soldiers are different, and the reason why you need strict discipline in the service and separate laws, such as those which regulate military courts, is because soldiers have to act differently in battlefield situations, and they're asked to do things that civilians would never have to do," says Miller, whose newest book, *Volunteers on the Veld: Britain's Citizen-Soldiers and the South African War, 1899-1902*, focuses on British citizen-soldiers and the depictions of the military in the South African War.

"Theorists argued that a soldier must be trained to act without question when given an order by a commanding officer," Miller says. "But this unquestioning belief in blind obedience was challenged by those who argued that soldiers needed education, not just training. They needed to take responsibility for their actions on the battlefield and not just follow commands. And as the battlefield grew larger, the individual soldier gained more independence and decision making devolved down the chain of command."

Rank-and-file professional soldiers were supplemented by civilian-soldiers — volunteers, yeomanry and militia — on the battlefield and as an occupation force, Miller adds. These soldiers did not see themselves as members of an elite military cast, but just regular men from London or Liverpool or Edinburgh.

"As such, these men were not just soldiers, but they were in some ways cultural ambassadors," Miller says. "Their actions were a reflection of their culture's morals and values."



An 1899 photograph of graffiti scratched on the wall of a Boer home in South Africa reads, "Don't Forget Majuba Boys," recalling a famous Boer victory over the British, followed by an apparent reply, "No Fear, Boers, No Fear." "Remember Majuba" was a rallying cry for the British army during the war. Photo by Reinhold Thiele/Getty Images

DURING THE SOUTH African War, Miller says, the governments of the Boer republics continuously complained about the treatment of their civilians and prisoners of war. Many captured Boers eventually disappeared or were found dead, yet during the war only four British soldiers were found guilty of murder.

In addition, the number of reported rapes was too low to be accurate, says Miller. In nearly three years of conflict, with a force of around half a million men who routinely came into contact with the enemy, only 14 soldiers were charged with rape, attempted rape or aiding and abetting rape. Of these, nine were acquitted.

"In my research, I show that soldiers often shared their experiences with family and friends, and discussed their willingness to execute a prisoner if necessary, though none personally admitted to doing

it," Miller says. "According to the rules of law and conduct codes developed at the Hague Convention, which concluded only a few months before hostilities erupted, the execution of prisoners was clearly murder. There's no other way around it. So then why were there so few British soldiers found guilty of murder? Britain was trying to preserve an image of itself."

On the homefront, some scope of the atrocities was known, but the spin was clearly pro-British. The media of the day perpetrated that in a number of ways.

"Race is a term that was very fluid at the end of the 19th century and often refers to nationality," he says. "But certain newspapers projected the Boers as sort of these backward farmers, hillbillies, hicks. And so racially they're seen as different and not like 'us,' so who are you going to believe in that situation?"

And it's important to remember, Miller says, that the British soldiers fighting in the South African War came from a range of societal classes — workers, members of the middle class, elites. British society was deeply connected to its military in that sense — in a way we don't see in contemporary society.

The combination of disdain for the "other," the importance of the British reputation, and a strong, often personal investment in military success may have set the stage for public sympathy for the military and a willingness to overlook the atrocities it committed.

There was a kernel of opposition in the form of small but very vocal groups that traveled to South Africa to document the situation. Miller says one of the most well-known members was a woman named Emily Hobhouse, who documented appalling conditions in concentration camps filled with Boer women and children.

"She made a big difference, because the government responded to public pressure generated around this issue," he says. "But she was just one person from one small group, and there were many people in the public who called her a pro-Boer just for exploring the truth. That truth reflected poorly on the flag, so she was somehow anti-patriotic."

Not much has changed since the South African War, Miller says. Today, news programs still catch heat for reminding people of the war dead. Many atrocities still go unpunished.

In times of war, the public "wants the job done," but doesn't always want to hear how it would be done, Miller says. ■



Ma



de in China

UMaine art professor works to make the country's cultural life accessible to a Western audience

By Kristen Andresen

Photos by Laurie E. Hicks

ON THE PAGES of art history textbooks, traditional and contemporary Chinese work can seem worlds apart from the American experience. Sometimes, the culture's essence and vitality get lost in translation.

But Laurie Hicks, a professor of art at the University of Maine, is part of a team of researchers working to make these art forms more accessible to an English-speaking audience. This past summer, Hicks worked as a documentary photographer for ChinaVine.org, a collective that aims to bring Chinese culture to life through narrative, video and photography. During her travels to Beijing and Shanghai, Hicks documented a range of art forms — from traditional gourd engraving and puppet theater to contemporary sound art and zines.

“We’re trying to present this from the perspective of the artists, using their narratives as the basis for understanding their work,” says Hicks, who became involved with the project as a result of previous collaborations with principal investigators Kristin Congdon of the University of Central Florida and Doug Blandy of the University of Oregon. “We want this to represent as closely as possible the experience of the artists and the people who engage with these art forms.”

On these pages, Hicks presents a selection of her photographs from Beijing and Shanghai.

Beijing gourd carver Wang Xiaoqi and her niece

Following in her father's footsteps, Wang Xiaoqi works in a small bedroom/studio in the apartment she shares with her parents, cutting shallow lines onto the surfaces of gourds to create delicate images of traditional Chinese stories.

Made in China





Clockwise from upper left:

Ou Ning, Beijing zines artist and director of the Shao Foundation

In a conference room located in the offices of the Shao Foundation, Ou Ning speaks about the socially focused zines he has created. As his copies were confiscated by the police, Ou Ning borrowed many of the zines he showed us from friends.

Xiuwen Cao, Jinshan Farmers Painting Inheritor, Zhonghong Village

Living in the Zhonghong Village with others who work in the same tradition, Xiuwen Cao paints images that speak of the experiences and traditions of rural life.

Graffiti near island6 Arts Center, Shanghai

Artists mark walls near the island6 Arts Center with images of popular Chinese and Western icons. The center is a collection of artists' studios, galleries and performance spaces in Shanghai.

Embroidered shoe inserts, Beijing

Women embroider shoe inserts using geometric designs, flower motifs and traditional imagery. According to one artist, the inserts ensure that you will "always walk on beauty."

Puppet master, Qibao shadow play in the Qibao Water Village

We watch backstage as one of Qibao's puppet masters demonstrates the traditional techniques of shadow play.

Detail-oriented

WHILE LAURIE HICKS visited China, she wasn't just documenting artists at work — she was an artist at work. Hicks' own photography and research centers on memory and the tourist experience. For instance, a recent project includes 2,500 pictures of tourists taking pictures.

"I'm really interested in the relationship between imagery and memory," Hicks says. "What is it that we remember and how do we remember it? Our memories of places are often constructed by the stories we tell and the pictures we bring home rather than by the actual experiences we had in the place itself."

For Hicks, the story is in the details. She's less interested in the grand panoramic view than in the small details: a window latch, a piece of graffiti or an unusual building façade.

"These types of things are, to me, what make a place a place," Hicks says.

A Gift to the Chinese People — The Façade of the British Pavilion at Expo 2010 — Shanghai
Photo by Laurie E. Hicks





Why is it important to know about sea surface **salinity**? **How** do the oceans affect the **water cycle**? **How** much of the ocean's **surface** has been tested?

Fathoming ocean science

UMaine marine educator brings data and concepts to life

CURRENTLY, HUNDREDS of satellites orbit the Earth, many with instruments that improve our lives and define our lifestyles. Satellite-based technology makes it possible to watch our favorite television shows, navigate unfamiliar roads and plan weather-dependent activities a week ahead.

Satellites also collect data that aren't as easy to explain, such as the NASA instrument to be launched this spring to measure sea surface salinity over the globe.

Annette deCharon's job is to explain exactly what that instrument, dubbed Aquarius, will do once it's launched in 2011 and why its mission — to collect data on salt concentrations at the ocean surface — is critical for NASA and for society as a whole.

From her mission control-style desk in an office at the University of Maine Darling Marine Center in Walpole, Maine, deCharon's job as senior marine education scientist is to make ocean sciences more accessible for various audiences. Her work with NASA/Aquarius Education & Public Outreach targets the public, students from elementary school to college, and science communicators from classroom teachers to ocean researchers.

"Many people don't really interact with the ocean at all, so they don't think about how it affects them, but it's basically the key driver of climate," says deCharon, who teaches a UMaine

Semester by the Sea class and directs one of the national Centers for Ocean Sciences Education Excellence (COSEE). "In all of our education and outreach programs, we really try to emphasize that point. One approach is through visualization of ocean data and concepts. This is important because the ocean is so remote that people can't readily identify with it. But if you give them visuals that help them see the big picture and how things interact, they are more likely to believe its relevance."

The educational materials deCharon and her team produce help demonstrate why monitoring sea surface salinity is key to understanding what's happening in the oceans.

"Most people know the oceans are salty, but they don't know that patterns of salinity change geographically and over time," she says. "If there's a lot of rain or if ice melts in a region, the sea surface will be less salty. If you get higher evaporation, seawater will be saltier. Sea surface salinity changes can tell us how the water cycle is changing over the ocean. That's important because 86 percent of global evaporation and 74 percent of global precipitation happens over the oceans."

Over its three-year mission, Aquarius data will be used to produce monthly maps of global sea surface salinity. Within a few months, Aquarius will collect as many sea surface salinity measurements as the entire 125-year historical record from ships

What do hurricanes have to do with the salinity of the oceans? How does sea surface salinity affect the climate? What effect does ocean salinity have on El Niño and La Niña? How does melting sea ice affect salinity levels?

By Jessica Bloch

and buoys. The newest findings also will be used in climate prediction and El Niño forecasts.

To increase awareness and understanding of salinity, deCharon and her team have developed a website with a wealth of information, including trivia (bet you didn't know, for example, the word "salary" may derive from the money paid to Roman soldiers to buy salt), online data tools and suggested activities for students from elementary (a potato float helps children understand the concept of relative density) to high school (an experiment that splits saltwater into its constituent ions).

The activities are aligned with National Science Education Standards and Ocean Literacy principles, and are evaluated to ensure their efficacy.

As ensconced as deCharon is now in the world of science education, she didn't start out that way.

A University of California – Davis graduate in geology, deCharon earned a master's degree in oceanography at Oregon State University. She worked at Brown University as a research assistant in the Department of Planetary Geology before being hired as a mission planner for the NASA Jet Propulsion Laboratory in Pasadena, Calif.

"I discovered that I am pretty good at taking lots of input and coming up with plans that satisfied the needs of various types

of people, including NASA engineers and scientists," she says. "That's something you usually don't get during your scientific training."

After several years, deCharon went from mission planning to public outreach on NASA's TOPEX/Poseidon mission, the pioneering satellite that measured sea surface height during the 1997–98 El Niño event. DeCharon assisted in media campaigns, produced outreach materials and created some of NASA's early educational websites.

It was an exciting experience merging science, technology and education, deCharon says, and a springboard for her role as director of COSEE-Ocean Systems.

The UMaine-based COSEE center brings together scientists and educators in peer-to-peer interactions, both in person and online. Educators contribute their understanding of how people learn, thus helping scientists better communicate their research. Scientists contribute their content knowledge and expertise in connecting complex ideas.

"By developing web-based tools that support scientist-educator collaborations, we are pushing the boundaries of ocean sciences education," says deCharon, who recently received another three years of COSEE funding. "We look forward to making significant impacts in Maine, New England and beyond." ■

Shell Hatcheries

Undergrad part of innovative lobster research

YOU'VE SEEN PLENTY of bumper stickers urging people to save the whales. But what about the lobsters?

In the ocean, lobster larvae have a survival rate of less than 0.1 percent in the first three months. It's a wonder any full-grown lobsters make it to the trap, let alone the dinner table. Aquaculturists have tried to raise crustaceans in captivity, but there's a bit of a problem with that: lobsters are cannibalistic. And to keep the babies separated is cost-prohibitive.

Bob Bayer, director of the Lobster Institute at the University of Maine, figured there needed to be a better solution, so in early 2009, he turned to biological engineering professor David Neivandt and undergraduate researcher Ryan Dawes.

Neivandt — whose primary research focuses on the transport of certain proteins linked to cancer and other diseases across cell membranes — has a reputation on campus for working on unusual problems. Dawes, a senior biology major and honors student who has worked in Neivandt's lab since his freshman year, has a reputation on campus as a conscientious, curious researcher.

With the help of the Downeast Institute for Applied Marine Research and Education, working with Brian Beal in Beals, Maine, and a Maine Technology Institute seed grant, they're testing a simple, innovative procedure. They're using discarded clamshells as small-scale

hatcheries, sealing them with a biodegradable polymer and etching them with notches to allow the flow of food — algae.

Though their early trials have had mixed success, the process has been a tremendous learning experience for Dawes. The logistics alone — perfecting the shell notches and transporting shells seeded with living larvae to a field station several hours away from campus — have been an eye-opener.

"I've learned how to plan an experiment, how to collaborate with others, and how to keep an ultimate goal in mind without getting bogged down in the research," Dawes says.

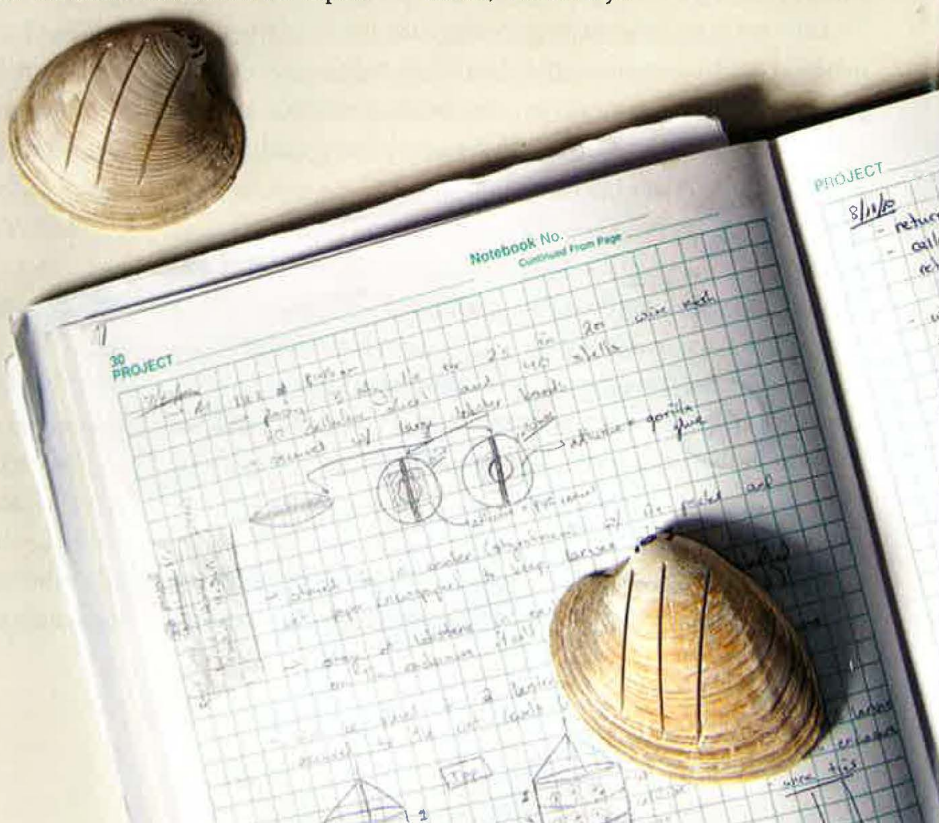
Since his high school days in Belgrade, Maine, Dawes wanted to participate in research. He knew that hands-on experi-

ence would bolster his graduate school applications, and he found that it improved his work ethic, as well.

"I always thought of myself as a hard worker before coming to college, but the demands of the actual coursework and being employed in a lab were quite a shock," Dawes says. "Because of how busy I was, and because I had graduate students and Dave (Neivandt) to look up to, I became a much better student."

Over the years, Neivandt has become a trusted mentor and friend, and on the drive to and from Beals, Dawes was able to use him and Bayer as a sounding board for his career choice.

"I want to pursue a Ph.D. and become a professor partly because of that conversation," Dawes says.



A Buried Treasure

Centuries-old ship
just one of three
ever discovered

By Jessica Bloch

AS FAR AS SHIPWRECKS go, there was nothing fancy about the vessel found this summer at the construction site of the World Trade Center in New York City.

It wasn't an old military ship with heavy artillery. It wasn't a great cargo vessel laden with exotic riches from another continent. And it wasn't a ship that might have been used by pirates.

Yet what University of Maine marine archaeologist Warren Riess discovered several months ago when he examined the boat was, in a sense, more remarkable than anything he could have discovered about a warship, ocean liner or pirate vessel.

Riess, a national expert in marine archaeology of the New England and mid-



Marine archaeologist Warren Riess at the World Trade Center site in New York City, where the remains of a light coaster ship from the late 18th or early 19th centuries were unearthed this past summer.

A Buried Treasure

Atlantic regions, believes the remains, found about 200 yards from where the World Trade Center's South Tower stood before the terrorist events of Sept. 11, 2001, is a light coaster from the late 18th or early 19th centuries that likely carried goods up and down the East Coast to a growing populace of the post-Revolutionary War era.

Analysis of the ship's remains is ongoing, but Riess thinks it could be just the third vessel of its kind and age to have been discovered. The other two were found elsewhere on the East Coast.

In its time, the ship wouldn't have been considered a significant vessel, which is the reason why no drawings or models have survived. Today, however, that insignificance is exactly why the find is so exciting for the nautical archaeological community.

For an archaeologist, it's the difference

between finding a buried treasure of gold and a buried trove of broken pottery.

One find tells a fantastic tale. The other simply tells a tale of daily life.

"The most interesting thing is we don't know much about these ships," says Riess, a research associate professor in UMaine's School of Marine Sciences whose work in marine archaeology includes several shipwrecks and the Penobscot Expedition of 1779.

"The warships, the government ships, there are all kinds of drawings and models of those. But the everyday coasters of this time period, we've only found three of them, and we don't have drawings in any detail. So to be able to study this is very important, because it tells us about everyday life at that time. It tells us about the 99.5 percent of the people who weren't recorded, and it tells us about the level of technology at the time."

THE WORLD TRADE Center vessel is now also one of three ships of this vintage found in Manhattan. Unlike this coaster ship, the other two were transatlantic vessels.

The first was discovered in the early 1980s in an area now beneath the South Street Seaport Museum near the East River, a location almost directly across the city from the World Trade Center site. The second was found about two blocks south from the first.

The World Trade Center ship was removed from the site in five days so as to not hold up construction of the complex. The remains were taken to the Maryland Archaeological Conservation Laboratory, which serves as a clearinghouse for archaeological collections recovered from land and underwater projects.

The vessel was found about 25 feet below street level in an area that would

Although the other two ships discovered in Manhattan were from the same era, the World Trade Center ship stands apart in several ways. It's an exciting find for marine archaeologist Warren Riess and others in his field, because it brings new data to their understanding of ships of this particular era. The vessel is smaller, lighter and about 50 years younger than the other two. Its builders used wrought iron nails rather than wood to fasten it together. The construction of the other two ships was closer to government vessels. Photos by Kathleen Riess



have been beachfront to the Hudson River. Based on evidence at the site, Riess believes the vessel had been brought in for repairs or replacement. Whatever the reason, its beaching was intentional.

Researchers excavated conifer logs found perpendicular to the ship's keel, which indicates it had been rolled onto the shore. Riess also found that an outer sheathing had been scraped off the planks of the ship, which could mean it was being readied for repairs.

Riess can only guess what happened next, but if his estimations are correct, the ship played yet another role in the expansion of a growing New York City.

"A shipwright probably took a look at it and said, you know, it's just not worth repairing," he says. "It looked like they took off the upper parts of the ship, probably to reuse the wood for buildings, houses, commercial buildings or barns,

and they just left the bottom there and filled over it. I don't think it was purposely brought in for the fill, but just happened to be there."

The researchers found about 32 feet of the vessel from stern to midship, which Riess estimates is about half of its original length. The seaworthy vessel was lightly constructed, unlike a government ship built to exacting specifications, including a carefully crafted finish.

"With a government ship, they would have wasted wood to get it to look right," he says. "This ship was made in an everyday shipyard for merchants. It was carefully put together with material that was available or at hand, rather than material sought out as perfect to use."

Where those materials came from remains a mystery, as does the ship's identity. Clues to the vessel's travels may be found in the shells of tiny mollusks

known as shipworms present in the ship's wood skeleton. Even hundreds of years later, identifying what kind of shipworm left its shell behind can help determine where the ship might have picked up the mollusks.

One of the world's specialists in the identification of shipworms, Kevin Eckbarger, director of UMaine's Darling Marine Center, examined some of the shells in the wood and found evidence that the ship may have traded in the Caribbean at least once.

"Here's this vessel that helped create that important time period, right after America becomes a country," Riess says. "This was the time when George Washington, Thomas Jefferson, John Adams and Alexander Hamilton were trying to figure out how to get the economy going. This ship was one of those tools used to build New York and the country." ■



Giving voice to fishing families

A TWO-YEAR socioeconomic study of Down East Maine fishing families and communities is under way to inform policies being developed by the National Oceanic and Atmospheric Administration in an effort to restore depleted fish stocks in the Gulf of Maine.

The project is led by University of Maine School of Marine Sciences researcher Teresa Johnson and includes collaborators from several partnering institutions. Through surveys, recorded oral history interviews, focus groups and an assessment of economic and socioeconomic data, researchers will for the first time define the needs, requirements and capacity of eastern Maine fishing communities to survive as federal fisheries managers develop "catch-share" policies.

The research will influence how future fishing policies in New England can be designed to protect fishing communities as fisheries managers try to reverse the 80 percent stock decline in the Gulf of Maine in the last 15 years.



Saving scallops

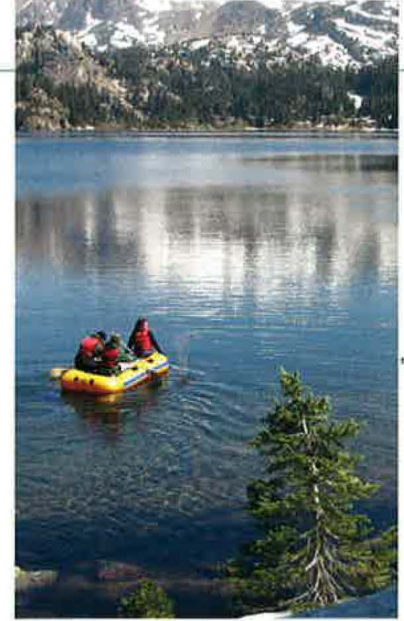
AS PART OF the Sea Scallop Research Set-Aside Program of the National Oceanic and Atmospheric Administration, researchers at the University of Maine's Darling Marine Center are studying the ways the mollusks spawn in hopes of helping revive the industry in the state.

Rick Wahle, a UMaine research associate professor, is leading a team of graduate students working in the Damariscotta River and the laboratory to better understand and model the fertilization process of scallops. Wahle has done extensive research on reproduction in the sea urchin, another broadcast spawner that has been severely depleted in the Gulf of Maine. If scallops are like sea urchins, fertilization rates drop dramatically over a distance of a meter or two.

If the scallop fertilization process can be better understood, the findings can be extended to other species, such as oysters, mussels and clams.



It is critical to assess the degree to which small-scale, fishery-dependent communities can participate successfully in a catch-share program, and what conditions and resources are needed to facilitate the success." Teresa Johnson



Glacial nitrogen

MELTING GLACIERS in the American West are releasing chemicals that cause ecosystem changes in alpine lakes, including large quantities of nitrogen that reduce biodiversity, according to an international research team led by University of Maine paleoecologist Jasmine Saros.

The study, funded by a \$509,000 grant from the National Science Foundation, determined that glaciers in alpine watersheds are the largest geomorphic and biogeographic influences of nitrate concentrations in high-elevation lake ecosystems.

Nitrogen is a key limiting nutrient in alpine lakes that can dramatically affect ecosystem productivity and species diversity.

The researchers from UMaine, Miami University, the U.S. Geological Survey, University of Nebraska – Lincoln and the University of Alberta studied the ecosystems of 26 high-elevation lakes in the northern and central U.S. Rocky Mountains, where atmospheric nitrogen deposition is low and where alpine glaciers have receded substantially in the 20th century.

Those lakes fed by melting glaciers and snow had up to 100 times higher nitrate concentrations and lower algal biomass than those fed solely by snowpack. In those lakes affected by glacial melt, sediment diatoms were less diverse than at any other time in the past century.



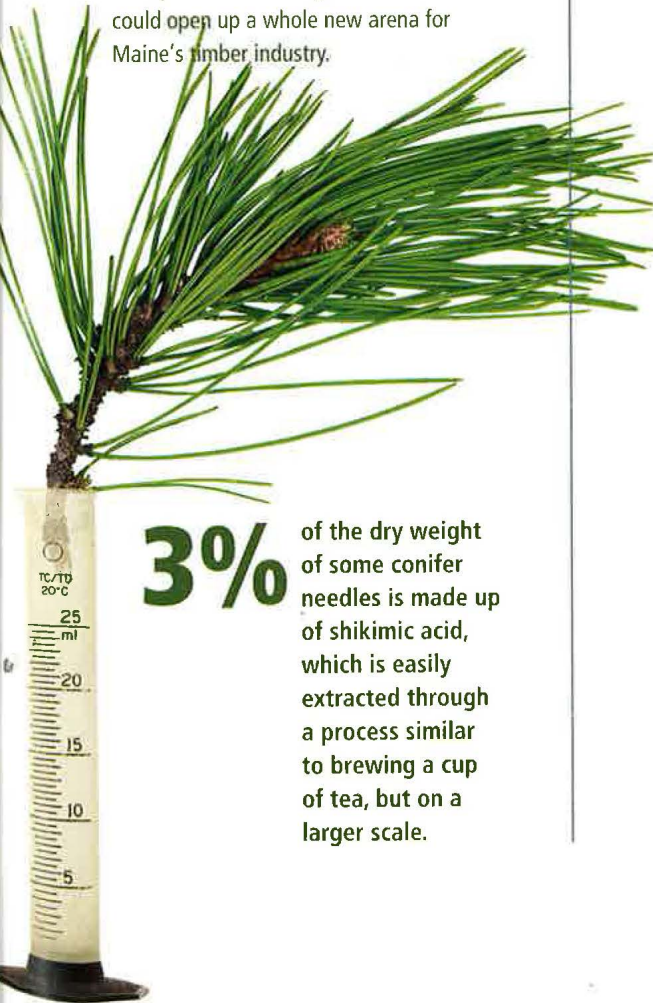
Flu-fighting needles

COULD MAINE forests help address shortages of flu-fighting drugs?

University of Maine researchers have found that the needles of several conifers, including Maine's state tree — the white pine — have the ability to store the starter molecule for the drug Tamiflu.

All plants and bacteria produce shikimic acid, which is a key compound in the synthesis of drugs such as Tamiflu. However, the researchers, led by UMaine Ph.D. candidate Nilmini Gedivinne and chemistry professors Raymond Fort and Barbara Cole, discovered several species of Maine trees store shikimic acid in higher concentrations — and for longer periods of time.

The scientists' next challenge is refining the extraction technique to garner large amounts of shikimic acid from pine needles. Progress on that front could open up a whole new arena for Maine's timber industry.



3%

of the dry weight of some conifer needles is made up of shikimic acid, which is easily extracted through a process similar to brewing a cup of tea, but on a larger scale.



Partnering to power the physical sciences

ALMOST 50 Maine middle and high schools will have a chance to redesign their physical science curricula with the help of a \$12.3 million grant from the National Science Foundation to the University of Maine's Maine Center for Research in STEM Education.

The grant will be used to form the Maine Physical Sciences Partnership, creating 12 jobs and generating curricula that will be used in 12 high schools and 36 middle schools. It also will fund professional development programs for schoolteachers and UMaine faculty and students, as well as the purchase of supplies for local schools.

The curricula will be tailored for students in grades 6-9, which are crucial years. The course of study would be organized so that students who reach ninth grade have a common background.

"A lot of students close the door on science and math in grades 6-9," says Susan McKay, director of the Maine Center for Research in STEM Education and a professor of physics who is overseeing the new partnership. "I think we can really set up students for success if we can take some of the research about how to sequence ideas and implement a curriculum using that research, so the seventh-grade teacher knows what the students have done in sixth grade."

Migration monitoring

A NEW NORTHEAST Regional Migration Monitoring Network will take a groundbreaking, comprehensive approach to studying the major migration route for many species of birds heading south for the winter and north for the summer along Gulf of Maine islands and coast.

Researchers participating in the network include University of Maine biologist Rebecca Holberton and other UMaine scientists who have spent the last two years trying to determine where and when migrating species fly over the gulf.

Also taking part are biologists from the U.S. Fish and Wildlife Service, Maine Coastal Islands National Wildlife Refuge, the National Park Service and Acadia University.

"There has never been such a combination of techniques and technology applied to bird migration in this region before, and we are beginning to make some exciting discoveries," says Holberton.

Last fall, a banding program led by UMaine doctoral student Adrienne Leppold, along with USFWS and the National Audubon Society, revealed that as many as a half-million or more songbirds fly over Maine's island and coastal areas in the midcoast region alone. Leppold's spring migration studies at Metinic Island this year showed that migrating songbirds also use these same areas as they return north.



Juvenile red-eyed vireo Photo by Glori Berry



Tufts-bound

ANIMAL AND veterinary sciences major Warren Varney of Turner, Maine; biochemistry major Bradie Manion of Old Town, Maine; and biological engineering major Daniel Gerges of Yarmouth, Maine, are the latest University of Maine students to receive early acceptance to Tufts University School of Medicine through the Maine Track Early Assurance program. Born of a partnership between Tufts and Maine Medical Center, the program reserves a limited number of seats per year for sophomores from University of Maine System institutions, and Bowdoin, Bates and Colby colleges. Last year, the first for Early Assurance, two UMaine students were accepted — Jonathan Pelletier and Aaron Perreault.



Aaron Putnam collects moraine samples in New Zealand.
Photo by alumna Alice Doughty, now a Ph.D. student at the University of Victoria, New Zealand

Antarctica's ice age influence

IMPROVED METHODS for dating mounds of dirt and rocks left behind by glaciers confirm that New Zealand glaciers responded to climatic events in Antarctica, rather than events that originated at the Arctic, according to an international team of researchers led by University of Maine scientists Aaron Putnam and George Denton.

The findings by the 10-member research team, published in the journal *Nature Geoscience*, resolve a long-standing debate about the end of the last ice age in New Zealand. The research was led by Putnam, a Chapman, Maine, native who is a Ph.D. student in UMaine's Climate Change Institute.

"Applying a precise and accurate dating method to glacier landforms has confirmed that the effects of Antarctic Cold Reversal extended to New Zealand," said Putnam in a press release issued by the Institute of Geological and Nuclear Sciences based in New Zealand. "It brings us closer to understanding the intricacies of the global climate system."

Scientists have debated whether conditions at the Antarctic or Arctic had more important influence worldwide. Studies of core samples from Arctic and Antarctic ice sheets have revealed warming in the north matched cooling in the south, and vice versa, at the end of the last ice age.

The researchers found that the Southern Alps glacier movements matched Antarctic temperature patterns, an indication that Antarctica and New Zealand began warming up 13,000 years ago at the same time Europe sank back into a 1,300-year-long ice age — the Younger Dryas.

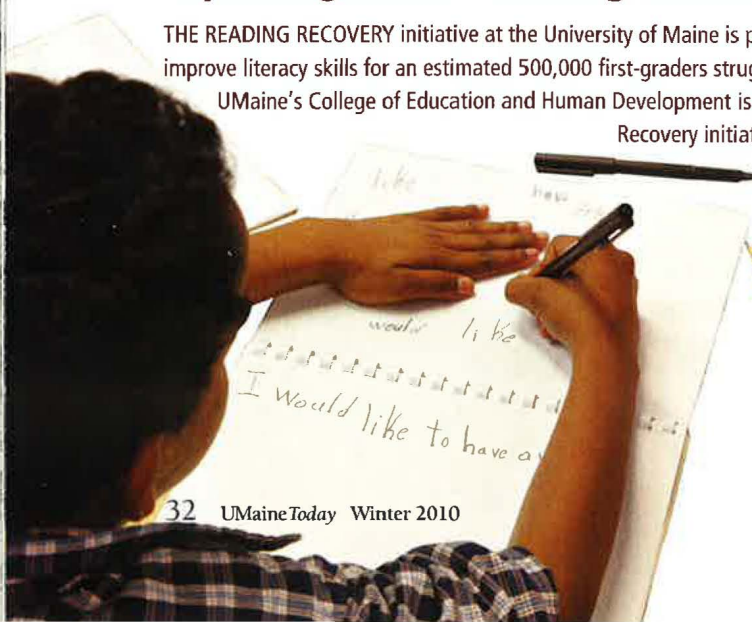
Expanding Maine's Reading Recovery

THE READING RECOVERY initiative at the University of Maine is part of a national network of 16 colleges and universities receiving \$45.6 million to help improve literacy skills for an estimated 500,000 first-graders struggling with reading and writing.

UMaine's College of Education and Human Development is receiving \$2.9 million in federal funds to substantially expand its statewide Reading Recovery initiative, a scientifically based short-term early literacy intervention model that already has helped thousands of Maine first-graders improve literacy skills.

The five-year grant will enable the Reading Recovery training network to add 50 trained Reading Recovery teachers each year. That will increase their ranks exponentially to more than 250 throughout the state by the end of the five-year period, according to Mary Rosser, UMaine's coordinator of literacy professional development programs and director for Reading Recovery.

Expanding the training program "will make a huge difference for education communities in Maine," says Rosser, the grant's principal investigator and an internationally recognized researcher in early literacy education.



UMaine's ADVANCE

A FIVE-YEAR, \$3.3 million National Science Foundation ADVANCE grant will fund a new University of Maine initiative to improve institutional conditions disproportionately affecting female faculty in the sciences, technology, engineering, mathematics and the social-behavioral sciences.

The grant will establish the Rising Tide Center, which will support the initiative at UMaine and in the University of Maine System. The goal of the center is to increase the number of female faculty members in the STEM disciplines (science, technology, engineering and mathematics) and social-behavioral sciences by defining the practices that attract and support the retention of female faculty, facilitate promotion through the academic ranks and to administrative positions, and provide professional satisfaction.

UMaine has a combined 114 female faculty members teaching in STEM and social-behavioral fields, compared with 284 male faculty members in those areas. UMaine is below the national average in a number of STEM and social-behavioral fields.

"From Edith Patch to Doris Twitchell Allen to the women who help lead our faculty today, UMaine has a proud history upon which we can build to become a model institution for supporting female faculty members across the university," says Susan Hunter, UMaine's senior vice president for academic affairs and provost. She also is a biology professor who will serve as principal investigator on the project. "This initiative will promote opportunity, enhance diversity and provide more of the role models who will help show our female students the pathways to success in STEM and social-behavioral science fields."

Four other faculty members co-authored the ADVANCE grant: Amy Fried, associate professor of political science; Susan Gardner, associate professor of higher education; Karen Horton, associate professor of mechanical engineering technology; and Jody Jellison, professor of molecular plant pathology and director of the School of Biology and Ecology.

The goal of NSF's ADVANCE program is to encourage the representation and advancement of women in academic science and engineering careers, thereby contributing to the development of a more diverse and sustainable U.S. science and engineering workforce.



A Member of the University of Maine System

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Losing the ocean's trees

DECADES OF WHALING and fishing for the largest species have altered the ability of oceans to store and sequester carbon, according to a team of marine researchers from the University of Maine, the University of British Columbia and the Gulf of Maine Research Institute (GMRI).

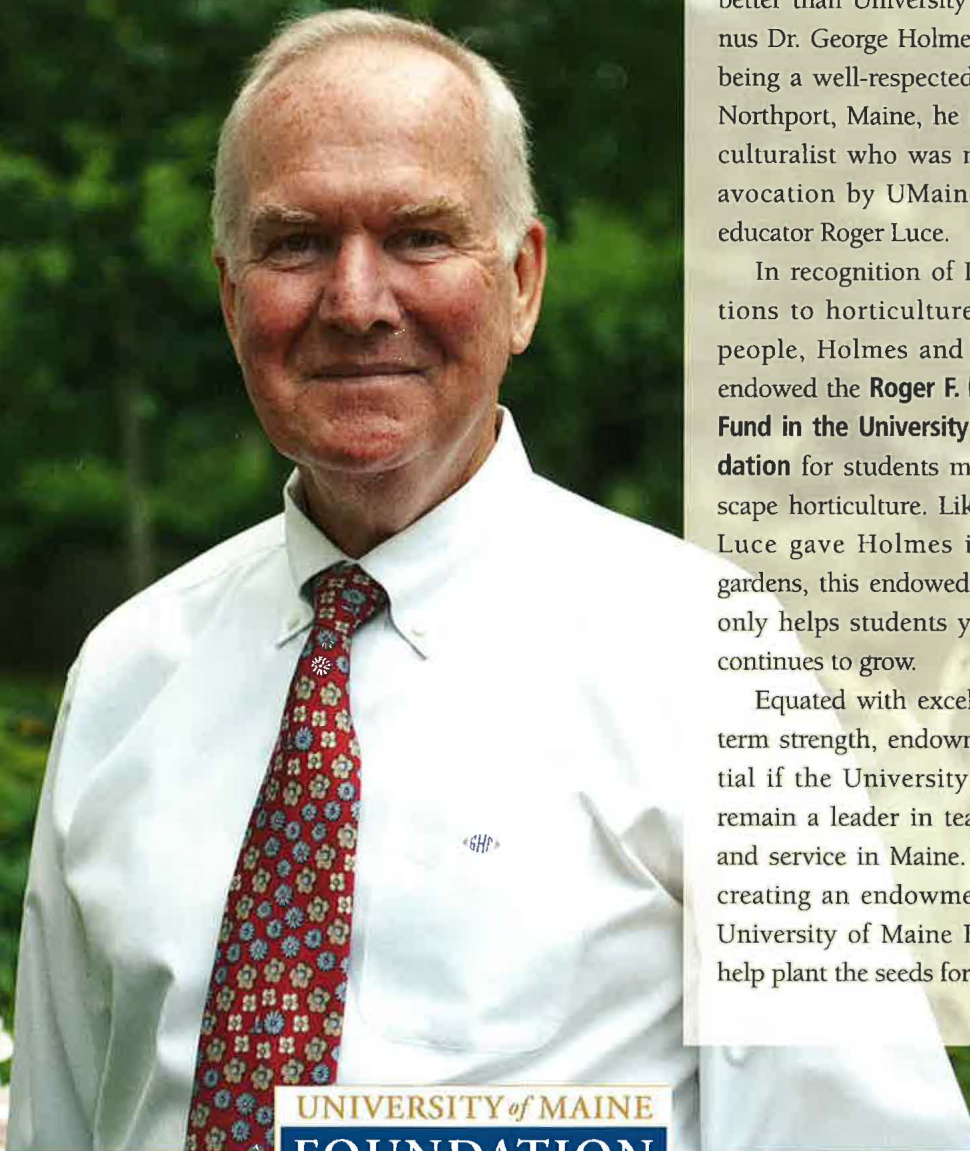
An individual whale contains a huge amount of carbon, an amount only exceeded by the largest trees, says Andrew Pershing, a research scientist with a joint appointment at UMaine and GMRI who led the team. A century of whaling equates to burning more than 70 million acres of temperate forest or 28,000 SUVs driving for 100 years, he says.

"We tend to think of carbon storage in peat bogs, trees and grasslands, not in animals," Pershing says. "By removing whales, sharks and large fish, we've reduced the amount of carbon stored in these populations."

Larger marine vertebrate species and the largest individuals in the species should be a top conservation priority, according to the researchers, whose findings on the impact of whaling on the ocean carbon cycle were published by the international Public Library of Science (PLoS).



Planting Seeds



CULTIVATING AND MAINTAINING a garden can be rewarding and satisfying. But it all starts with the first step — planting the seeds.

No one understands that concept better than University of Maine alumnus Dr. George Holmes. In addition to being a well-respected veterinarian in Northport, Maine, he is an avid horticulturalist who was mentored in his avocation by UMaine alumnus and educator Roger Luce.

In recognition of Luce's contributions to horticulture and to Maine people, Holmes and several friends endowed the **Roger F. Luce Scholarship Fund in the University of Maine Foundation** for students majoring in landscape horticulture. Like the assistance Luce gave Holmes in creating his gardens, this endowed scholarship not only helps students year to year, but continues to grow.

Equated with excellence and long-term strength, endowments are essential if the University of Maine is to remain a leader in teaching, research and service in Maine. Please consider creating an endowment through the University of Maine Foundation and help plant the seeds for excellence.

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