

President's Message



MAINE CITIZENS ARE FACING significant challenges as we move into the winter months. While concerns related to high energy costs and a flagging national economy are not unique to Maine, some of the characteristics that make our state a wonderful place to live — our four-season environment, rugged landscape and rural nature of vast areas — make these concerns particularly difficult.

As you will see in this issue of *UMaine Today*, the University of Maine is applying its expertise and resources in significant ways to help citizens across Maine prepare to effectively deal with the challenges ahead. This response to state needs reflects our commitment to the land-grant university ideals that make public universities such vital contributors to the communities we serve.

The cover story that describes the work of University of Maine Cooperative Extension in providing practical advice, available to all Maine citizens, is a wonderful example. That service is having a real impact in homes across Maine, and Extension is uniquely positioned to provide it. The Extension collaboration with state agencies to provide information about home heating and energy conservation, and the School of Economics Financial Education Initiative are two more examples of great programs, based on good ideas that come from our commitment to making life better for Maine's people.

Throughout this issue, you will find stories about other initiatives, such as the interdisciplinary, collaborative Biobank of Maine cancer database project — in a state that has the highest cancer rate in the U.S. — where *UMaine* is working in ways that only a land-grant university can to help deal with some of our most serious concerns. We are proud to serve the state of Maine in this unique way, and the depth of the current challenges makes us more committed than ever to providing unique assistance to the people of this wonderful state.

Robert A. Kennedy
President



ON THE COVER: The squeeze is on. With the sagging economy causing food prices to skyrocket, consumers are feeling the pinch. University of Maine Cooperative Extension educators have some expert advice for belt tightening to combat high food prices and sticker shock. See related story on page 14.

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University of Maine profile

Located in Orono, Maine, the University of Maine is the state's land-grant and sea-grant institution. *UMaine* serves its home state through its explicit statewide teaching, research, and public service outreach mission. Offering 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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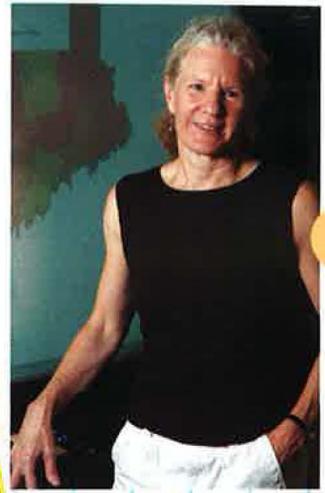
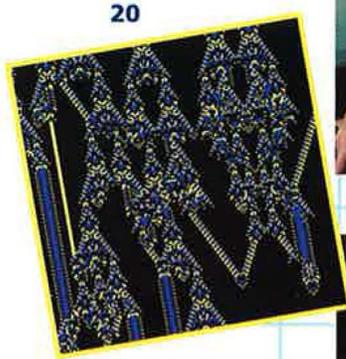
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Look for +Online throughout *UMaine Today* magazine. It indicates the availability of a wealth of additional content — Web-exclusive stories, video and audio clips, photo galleries, full-length versions of articles and a comprehensive editorial archive.



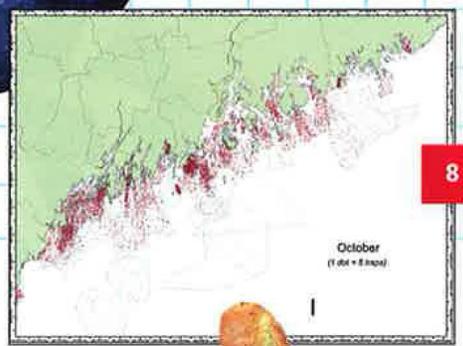
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Degenerate musik

UMaine music scholar searches history to recover the voices of composers silenced by the Third Reich

By Margaret Nagle

ARTURO TOSCANINI KNEW OF LEONE SINIGAGLIA'S BRILLIANCE. The legendary conductor featured a work by the Italian composer in a 1938 performance of the Israel Philharmonic Orchestra.

Nearly seven decades later, when music scholar Phillip Silver was in Tel-Aviv researching the history of the orchestra, which by World War II included many refugees from Germany and Poland, he saw Sinigaglia's name for the first time. That mention in a concert program was all it took to prompt Silver to search for works by the Jewish composer whose voice had been silenced by the Nazis.

The hunt through history, one of many Silver has done in the past decade, is part of his effort to recover what he calls "thwarted voices."

"At first, all I could find was his book on mountain climbing, published in 1896, that had been translated into half a dozen languages," says Silver, talking about Sinigaglia, who proved to be his most challenging Holocaust-era composer to research. "I then found out he had studied with Dvorak and was a friend of Brahms, and Mahler knew him. That's when I got even more curious about what his music sounded like."

Silver found that the British Library in London had copies of some of Sinigaglia's compositions, which had been published by major houses: Breitkopf & Härtel in Germany, Hansen in Denmark and Casa Ricordi in Italy. Silver also found that many of Sinigaglia's manuscripts, including those unpublished, are in the Giuseppe Verdi Conservatory in Turin, Italy. However, the collection remains uncatalogued.

"It was two years before I saw any of his music. Only one piece by him, an oboe piece, had been recorded to that point and to be honest, it isn't a very good work."

That didn't deter Silver, a pianist and associate professor of music at the University of Maine, who describes his research as a musical and humanitarian quest.

"I go out of my way to try and locate pieces of music I think are of interest," says Silver, the newly named coordinator of Judaic studies at UMaine. "That often means the works have no performing tradition. What I want to do is basically allow certain voices to be heard and give them an opportunity to be judged by modern audiences."

Catalog cover of the Third Reich's exhibition of degenerate music, *Entartete Musik*, 1938, Düsseldorf, Germany. The image defames the popular 1927 opera about a jazz violinist, *Jonny spielt auf*, by Austrian composer Ernst Krenek. Adolf Hitler banned jazz, which the Nazis associated with African-American culture, and music composed by Jewish artists.

Image courtesy of the Hindemith-Institut, Frankfurt, Germany



The development of 20th-century musical language was derailed by the absence of composers banned by the Nazis, argues Phillip Silver. In addition, countries like Germany stopped being major musical influences. The question is: What would have happened if these composers had continued to perform? Whom would they have influenced?

Photos by Michael Mardosa

Degenerate musik

“Being unable to hear music for political reasons must not be allowed to stand. As time progresses, people forget about the works; they lose any audience they could have had.”

WHEN HE CAME to power in 1933, Adolf Hitler launched an all-out cultural purge. Under his anti-Semitic laws, many Jewish workers were fired, including well-known conductors Bruno Walter and Otto Klemperer. In addition, the newly established Reich Music Chamber made it impossible for musicians of Jewish heritage to work in Germany.

A 1937 exhibit in Munich of “degenerate” art banned by the Nazis was followed the next year by the *Entartete Musik* exhibition in Düsseldorf. Works by Felix Mendelssohn, Franz Schreker, Kurt Weill and Gustav Mahler, as well as jazz, were defamed; recordings of Jewish musicians and composers banned.

Those artists of Jewish heritage not forced into exile in other countries were summarily rounded up and sent to concentration camps.

Silver’s research into the composers of this era began with artists who died in the Holocaust, such as Viktor Ullmann, Gideon Klein and Alma Rosé, the niece of Gustav Mahler. He found himself drawn to the extraordinary testament to the human spirit that would allow such artists to continue to compose despite the madness all around them. Silver was determined that their voices would continue to be heard through their music.

“I lost many members of my family in the Holocaust,” he says. “In some small way, I’m helping remind people of what happened. I’m not allowing the deniers to have a say. I’m reminding people that, if it happened once, it could happen again.”

Through the years, Silver and other international performers and scholars have helped reintroduce the music of composers who were silenced by the Nazis. The

cultural cleansing involved not only those composers who lost their lives, but also those forced into exile.

Those efforts have resulted in modern audiences’ rediscovery not just of composers such as Ullmann, but also others like Franz Schreker, an influential Austrian opera composer whose works today are recognized as some of the finest of the 20th century, Silver says.

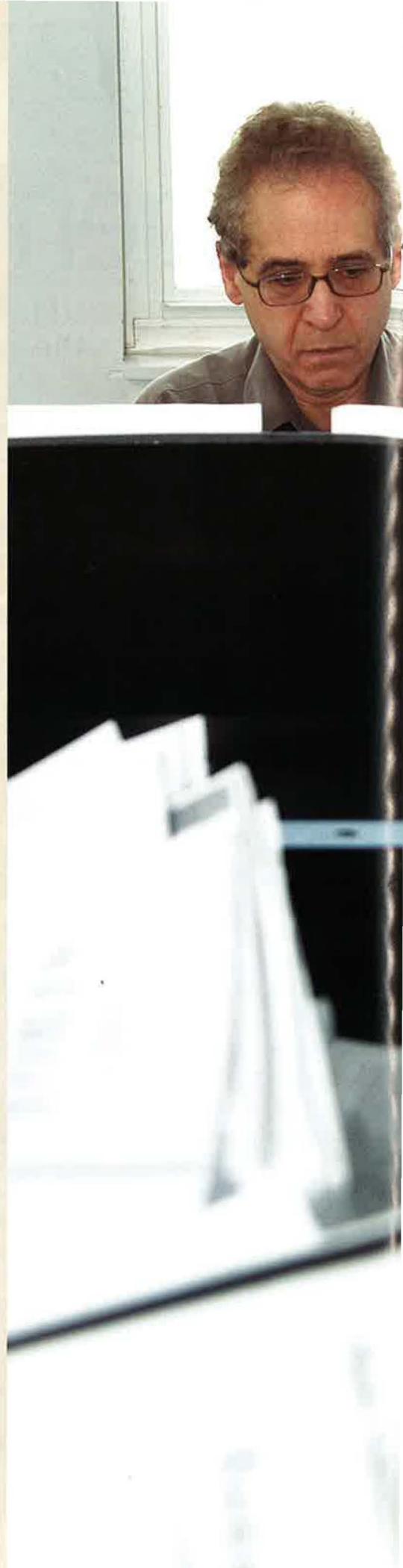
The same is true for Alexander von Zemlinsky. Paul Ben-Haim. Ernst Toch.

WITHIN THE LAST five years, Silver’s research emphasis has evolved to look at the larger body of musical voices silenced by the Third Reich, those artists — a lost musical generation — who produced what Hitler called “degenerate music.”

“It’s what the Nazis called the music of Jews and jazz,” says Silver. “It was the music of composers who died in the camps and those driven into exile who tried to reestablish their base but failed. There also are composers who stayed in Europe and disappeared in history. Many of these composers had their audiences, but then found themselves out of favor for sociological reasons. What happens when such music is unnaturally stopped and prevented from being heard? I want to allow it to be heard, given its chance.”

The development of 20th-century musical language was derailed by the absence of these composers, argues Silver. Countries like Germany stopped being major musical influences. The question is: What would have happened if the composers had continued to perform? Whom would they have influenced?

“Ignorance is bliss if you don’t know that these pieces exist,” says Silver, who has written about his research in the online journal of the Jewish Music Institute’s International Centre for Suppressed Music. “But once people come in contact with these works, they are exposed to the fresh melodic ideas, the levels of enjoyment and



sadness, and their lives are touched. That's what great music does."

Not all the Holocaust-era composers strike a chord with Silver. One of the most dissident is Karl Amadeus Hartmann, whose music Silver describes as "difficult to listen to." Hartmann was a German who protested the Nazi regime by not allowing his music to be performed. His second piano sonata, composed after he witnessed a death march of Nazi prisoners, is "technically difficult and not appealing to audiences," but it has a place in music history.

"The biggest misconception is, because of the Nazi experience, people think the composers' works are tragic and ominous, but often they are the exact opposite," Silver says. "Often when people are undergoing a traumatic experience, they want to escape and look for a means to create a musical sanctuary to temporarily alleviate the pain. There are tragic elements in some of the works, but they are not constant."

IN THE PAST DECADE, interest in entartete or degenerate music has grown. Today, there are organizations devoted to reviving these composers. Increasingly, recognized labels are recording the once obscure compositions and major houses are staging the works.

"Major performers are now looking into this music, not just a small handful of devotees," says Silver. "They are entering the mainstream again."

Those mainstream names will one day include Sinigaglia, Silver hopes. The Turin native stayed in Italy during World War II. In 1944, when he was 75, Sinigaglia and his sister sought sanctuary in a hospital in their hometown during a Nazi roundup of Jews. Both died there of heart attacks.

"Sinigaglia's music is traditional, roman-

tic and tonal," Silver says. "He was writing music that was at home in the 19th century."

The result, Silver says, is the music's immediate appeal in "its lyricism, the atmosphere being evoked, the hauntingly bittersweet profundity."

Two years ago, Silver and his wife, cellist Noreen Silver, gave the first modern performance of a Sinigaglia sonata for cello and piano in a live broadcast in Israel. Last month, Silver's annual concert on campus highlighting music by victims of both Nazi

and Soviet anti-Semitism included works by Sinigaglia, as well as Schreker and von Zemlinsky. In February, a sonata for violin and piano will be performed in Minsky Hall with guest artist Ferdinand Liva, a violinist with the DaPonte String Quartet.

This spring, Silver will release a CD of four of Sinigaglia's works on the Toccata label.

Silver says his hope is that audiences take away

such a love of this music that they want to hear it again. "If that happens," he says, "I've succeeded in my other desire to revive these composers and undo the Nazi pursuit to wipe them out of history. I've succeeded in bringing to people's attention that because people were Jewish or labeled degenerate and unfit, 6 million people were massacred."

It's that potential for justice that keeps Silver ever-searching for other thwarted voices of the Holocaust.

"When will I stop looking? Ask me in 20 years," he says. "We will probably reach a point down the line when the great works will be uncovered. But I tend to believe that there is value even in those composers of lesser renown who have five-minute compositions worth reviving. As a result, we keep looking." ■ **Online**

"Being unable to hear music for political reasons must not be allowed to stand. As time progresses, people forget about the works; they lose any audience they could have had."

Phillip Silver

BETTER UNDERSTANDING of the interaction between cancer genes and the environment is the goal of a research project launched by the Maine Institute for Human Genetics and Health and two of the leading research institutions in the state — the University of Maine and Jackson Laboratory. At the heart of the initiative is what researchers hope is a new cancer-fighting tool, the Biobank of Maine, to explore the relationship between the disease and its geographic, demographic, health and environmental variables.

“We will ask questions such as why breast cancer rates are low in Aroostook County while all rates of cancers are highest in Washington County,” says Janet Hock, director of the Maine Institute for Human Genetics and Health, headquartered in Brewer. “It’s not simply that you live in an area with high radon or lead in the water. It’s far more complex. It’s the interplay between genes and the environment. We’re going beyond asking whether variations of the genes make people more susceptible, to asking what is their interaction with the environment.”

In 2007, the Maine Institute for Human Genetics and Health launched the Biobank of Maine with a \$1.8 million award from the Department of Defense. The goal is to investigate the effects of rural environments on human genetics and health to find solutions to reducing the high rates of cancer in Maine.

According to the National Cancer Institute, Maine had the highest annual incidence rate for all cancer cases — 526.1 per 100,000 per year for 2004, the latest year for which statistics are tabulated. Washington County has the highest incidence; Oxford, the lowest.



The researchers spearheading the Biobank of Maine project are, left to right, Margaret Chavaree, tissue repository coordinator with the Maine Institute of Human Genetics and Health; Carol Bult, Jackson Lab bioinformatics scientist; Kate Beard-Tisdale, UMaine professor of spatial information science and engineering; and Janet Hock, director of the Maine Institute of Human Genetics and Health.

In Maine, lung, breast, prostate and colorectal cancers predominate, and melanoma rates are rising.

The biobank has two core components — a cancer tissue repository managed by the Maine Institute for Human Genetics and Health, and a complex geographic information system (GIS) database developed by the University of Maine and Jackson Laboratory.

Both adhere to the strictest of confidentiality guidelines as set by the National Cancer Institute and the International Society for Biological and Environmental Repositories.

Nov. 1, the first of the tissue samples will be deposited in the biobank. Patients consenting to have their postsurgical blood and tissue samples archived in the repository will complete a confidential

geospatial questionnaire. On it they will be asked to provide information about their behavioral, occupational, residential and health-care histories.

The demographic information will be entered in the secure database known as the Maine Cancer Geographic Information System or MeCancerGIS. The database will integrate four basic types of data: geographic, demographic, health and environmental. Publicly available databases on geography, environment and occupational exposures will be included, as will geospatial and temporal information on environmental exposures in Maine, such as radon and arsenic in water and bedrock, and herbicide and pesticide applications.

The goal is to provide a spatiotemporal perspective on the state’s incidence of cancer. Such detection and monitoring of cancer incidence and mortality in space and time in Maine could help identify

The time

A spatiotemporal database of risk

By Margaret Nagle

“The hope is that by building a baseline that is perpetuated, we can create a model to tease apart the complexity of the different potential risk factors to make a diagnosis about cancers. We hope the database helps us address some of the questions we have about whether risk factors are working in isolation or in combinations of ways we don’t yet understand.” Kate Beard-Tisdale

regions where there are higher-than-expected cancer rates and could aid investigations of the connections between specific environmental variables and cancer.

The spatiotemporal database of risk factors for cancer also has the potential to be a model for mapping patterns in other diseases.

“Maine Cancer GIS will map incidences of cancer and provide tools to investigate interactions with environmental, socioeconomic and demographic factors,” says University of Maine Professor of Spatial Information Science and Engineering Kate Beard-Tisdale, who is collaborating with Jackson Laboratory bioinformatics scientist Carol Bult to develop the database. “Through representation of the data, we can generate many different ways to look at patterns and subsets. Does where people live or have lived make any difference? Are there spatial structures that can help diagnose how disease evolves?”

The incorporation of GIS as an analytical tool for the Biobank of Maine is “a unique marriage,” says Hock. Other biobanks across the country record some geocode information like the patient’s last known address, but Maine will be the first to comprehensively compile the gene-environment interactions that change the risk of cancer.

The research initiative is being watched closely by other states. Already, Hock is discussing partnerships to share resources with other biobanks, including one in New Brunswick, the province with the highest cancer rate in Canada.

The hope is to find out how the environment influences the genes, ultimately informing the development of treatments to target the risk factors. Physicians could one day treat cancer patients by looking at both their medical and environmental histories. Clinics could be established in areas with populations at higher risk, helping overcome socioeconomic boundaries in rural states like Maine.

Such a multifactor inquiry could shed light on questions like why some breast cancer patients go into remission and others do not, or why the incidence of lung cancer in nonsmoking women is rising.

“There’s potential richness in combining genetics with socioeconomic, environmental and geographic factors,” says Beard-Tisdale, who directs the National Center for Geographic Information and Analysis at UMaine. “This data gives us the possibility of isolating which factors pose greatest risk.” ■ **Online**



and place of cancer

factors will explore connections between the environment and the disease

Taking stock

UMaine marine scientist's models of fisheries population dynamics aid resource management

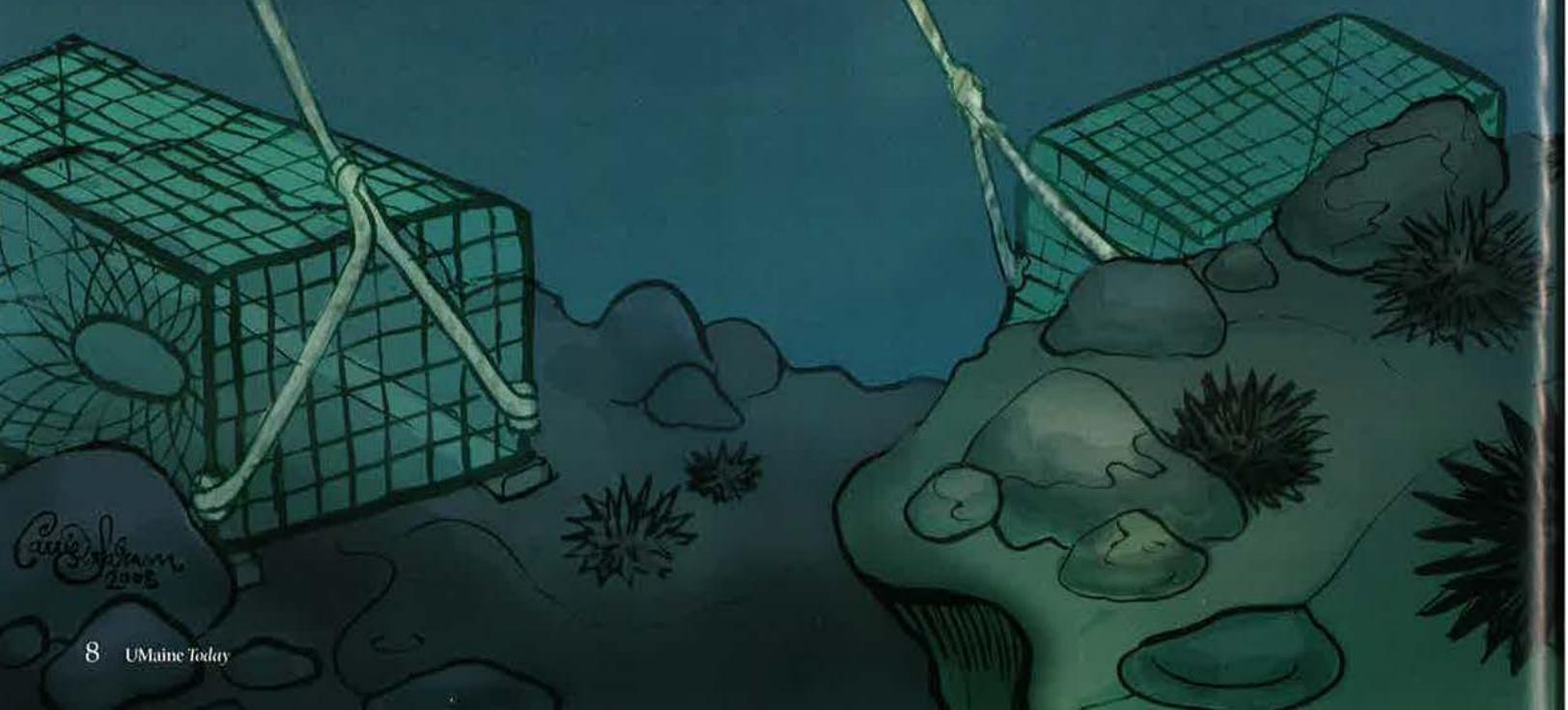
By Catherine Schmitt

FIFTEEN YEARS AGO, a lobsterman who agreed with a government scientist was a rare if not impossible find. Number crunching by regulatory agencies showed that lobsters were overfished, while the men and women hauling traps in the Gulf of Maine were harvesting record numbers of crustaceans. Everyone was using a different source of information and nothing made sense. Disagreement led to mistrust, some bitter words and overall discontent in the world of lobsters.

Was the lobster population healthy or not?

For answers, the University of Maine and Maine Department of Marine Resources (DMR) turned to Yong Chen.

"My work is like being an ecological detective," says Chen, a fisheries population dynamics researcher who came to UMaine in 2000 from Memorial University of Newfoundland. "You collect data from wherever you can and try to create a story about why species numbers are changing. From there, you can estimate what kind of impact fishing would have on a population."



K

Chen has analyzed fish populations in Canada, Australia and China, but the stock assessment needs in the northeastern U.S. are different, he says.

"In many ways, they were behind the times," he says. "On the West Coast, in Australia, they were using newer technology and methods. And there was this history of problems because the assessment of lobster kept predicting overfishing. So I came at the right time, because people were ready for something new."

Counting lobsters is no trivial matter. Lobster is one of the most

valuable fisheries in the U.S., generating \$350 million each year, and Maine's 7,000 license holders bring in about 75 percent of all the lobsters landed in this country.

Chen's first task was to identify potential problems with the existing stock assessment. One concern was that the model used only one source of survey data, which didn't include the range of lobster sizes and ages.

Many marine stock assessments are age-based, taking into account the proportion of older and younger fish in a given popula-



The computer screen displays a lobster trap distribution map of the Maine coast, developed in Yong Chen's lab.

Illustration by Carrie Graham

Taking stock

tion. But lobsters, like most invertebrates, do not have the ear bones and scales that record growth over the years.

Chen developed a new computer model based on lobster size that accounted for many factors, including seasonal patterns and lobster biology. Different management scenarios can be plugged into the model to predict results of different fishing activities, such as v-notching.

Before, v-notching (the practice of fishermen marking reproductive female lobsters with a v-shaped notch in their tails and not keeping any such marked lobsters in their catch) was undocumented and unsupported by the government and fisheries scientists. Chen's models have helped confirm that v-notching has made a difference in the lobster fishery by protecting reproductive stocks, says Carl Wilson, a DMR lobster biologist.

FISHERIES POPULATION dynamics is a complex and sophisticated field. In the Northeast, only two or three people are familiar with these models and use them on a routine basis, says Larry Jacobson, a biologist with the National Marine Fisheries Service.

Whether modeling population dynamics of lobsters, Jonah crabs, sea urchins, sea cucumbers, groundfish or marine worms, Chen must work with limited surveys conducted by the state and federal governments, and the catch reported by harvesters. The more information Chen has about a species and its environment, the better he can build his computer model, but there is always some negative space. To fill in the gaps, he uses various statistics that let him assume certain situations.

The lobster stock assessment model developed by Chen, Wilson, Jacobson and postdoctoral researcher Minoru Kanaiwa endured rigorous review for years before the

Atlantic States Marine Fisheries Commission adopted it for the 2008 lobster assessment. Chen's tool will be used to assess all the lobster stocks in the United States.

Because the model is so complicated, Chen is developing a user-friendly version for biologists and fishermen. Ph.D. student Michael Errigo is doing further testing, funded by a three-year fellowship from the National Marine Fisheries Service, the National Sea Grant College Program and UMaine.

The rigors of Chen's field and his work require that people trust him. "What Yong and his lab have been able to do, in a remarkably unconflictual way, is to introduce new methods and ways to evaluate how we assess lobster stocks. He is cutting edge in his field," says Wilson.

For Chen, the key is in working closely with managers and biologists, and attending government meetings to get input. He also maintains a global perspective as an adjunct professor at both Central China Agricultural University and Shanghai Fisheries University, and a visiting professor at National Taiwan University. He served as a consultant to the United Nations, studying the impacts of the Gulf War on the fisheries of the Middle East.

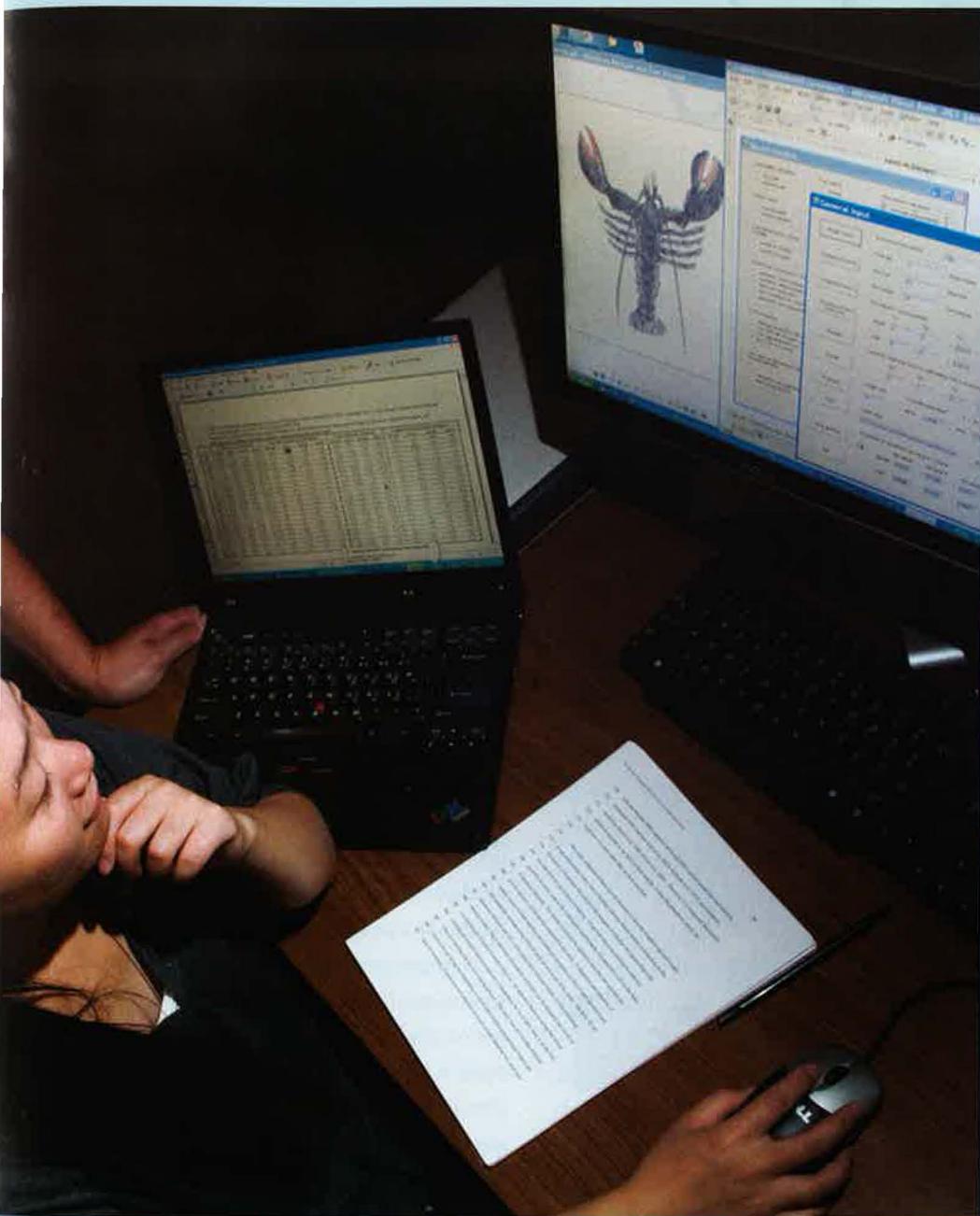
"Trust-building is a long process, but it works," he says.

MORE MODELS ARE needed for more fisheries, which will require more experts like Chen. But with a shortage of well-trained people with technical fisheries expertise, one of Chen's critical responsibilities is in preparing the next generation of marine scientists in fisheries dynamics, says Jacobson.

Students tend to prefer marine biology or even economics to population dynamics, which requires knowledge of biology (How long do lobsters live? How often do they



mate?), ecology (How do lobsters interact with other species? What are the migration patterns?), statistics (What is the probability of a given population in a given time frame?), math (What is the formula for exponential population increases?), computer science (Can I write a computer program that will calculate all of the above?), and policy (What do the outcomes need to look like so the government can



"My work is like being an ecological detective. You collect data from wherever you can and try to create a story about why species numbers are changing. From there, you can estimate what kind of impact fishing would have on a population."

Yong Chen

Yong Chen with third-year Ph.D. student Yuying Zhang.

decide on their regulations and fishermen can keep their jobs?).

TODAY, CHEN HAS nine graduate students in his lab, many who are working with DMR and fishermen while pursuing their research. Chen also regularly meets with DMR staff and many DMR employees take his course in fisheries population dynamics.

In turn, DMR provides Chen with data

collected in its trawl surveys and landings reports from fishermen, which he uses to develop models and assessments that he hands back to the agency.

"He's really interested in the nuts and bolts of fisheries science, and he understands that fishermen need good models and assessments," says Linda Mercer, resource management director with DMR. "He's enthusiastic about new methods. He

seems pretty undaunted by the needs we've thrown his way, species after species."

Chen designed the first-ever stock assessment for Maine's sea urchins, and he was the first to study the population of sea cucumbers — a species that has the potential to become a new fishery without much knowledge of the animal's biology. A sea cucumber model to estimate population and biomass will allow DMR to determine if the fishery can be expanded, and get more people fishing, says Mercer.

Sheril Kirshenbaum worked on the sea cucumber project as a graduate student pursuing dual degrees in marine policy and marine biology.

"The emerging fishery provided invaluable experience," says Kirshenbaum, who graduated in 2005 and is now an ocean and coastal policy research associate at the Nicholas Institute for Environmental Policy Solutions at Duke University.

"I was involved in understanding the population dynamics of a fascinating species, while exploring real-world socioeconomic and political implications. Science informs policy, and this was the ideal setting to learn to communicate between worlds." ■

Culture club



Clinical laboratory sciences major Stephanie Bouchard, left, in class with Anne Hanson, who coordinates microbiology laboratory instruction. In the Pathogenic Microbiology and Serology Laboratory, students study the clinical diagnostic procedures used to identify agents of human infectious diseases. The Atlas-Protocol Collection of the MicrobelLibrary of the American Society for Microbiology (ASM) is one way to check their results. The atlas includes a series of images that support the learning and use of a standard microbiology protocol. The protocol includes information pertinent to teaching undergraduate microbiology. Hanson has helped develop the collection, and now serves as one of its overseers. ASM aims to have 20 atlas-protocol results online by the end of this year.

ANNE HANSON HANGS OUT with a rough crowd: *Staphylococcus aureus*. *Streptococcus pneumoniae*. *Haemophilus influenzae*.

The company she keeps is enough to make anyone sick. But that's the whole point.

In her microbiology lab at the University of Maine, Hanson tests pathogens and documents the results so students and colleagues — on campus and worldwide — can benefit. Her work is part of the Atlas-Protocol Collection on the American Society for Microbiology's Web site (microbelibrary.org).

The Atlas-Protocol Collection was developed in 2004 as a training tool for microbiology students and faculty. It is part of the society's Microbelibrary — online, peer-reviewed teaching resources for undergraduate microbiology education, supported by the American Society for Microbiology.

The protocol collection includes images, historical background and step-by-step instructions to help educators replicate the tests in their own labs. Collection contributors must conduct the lab work and have the accompanying written materials peer reviewed, a process that takes about a year from start to finish.

Hanson, who has contributed two protocols, recently joined the committee

Hanson's work benefit

that oversees the Atlas-Protocol Collection.

"It's a very little piece of a big thing," says Hanson, who has worked as an instructor in the UMaine Department of Biochemistry, Microbiology and Molecular Biology for more than a decade. "We have members all over the world and we cover all kinds of concepts."

For undergraduate microbiology instructors, the Atlas-Protocol Collection is an invaluable tool. Working with pathogens can be risky, and many smaller schools or organizations don't have the proper safeguards. The trend is to conduct dry labs or include images of expected results in a slideshow.

Pathogens must be tested in a sterile environment. They require specific conditions for growth and must be disposed of properly. For schools that don't have a comprehensive microbiology curriculum, those demands can be cost-prohibitive.

"At the University of Maine, that isn't an issue. We have a microbiology department and it's essential (for students to have hands-on experience to identify pathogens)," Hanson says. "We're training people to work in clinical labs."

Though UMaine students are able to conduct the tests with live pathogens, they still turn to the online Microbe Library

when they need to see how a test result should look. The students who plan to work in a clinical setting say they'll continue to use it as a reference.

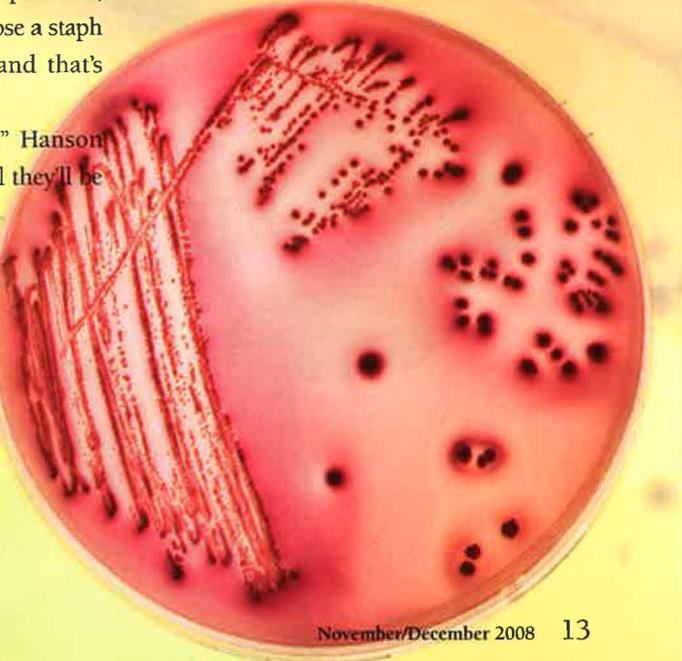
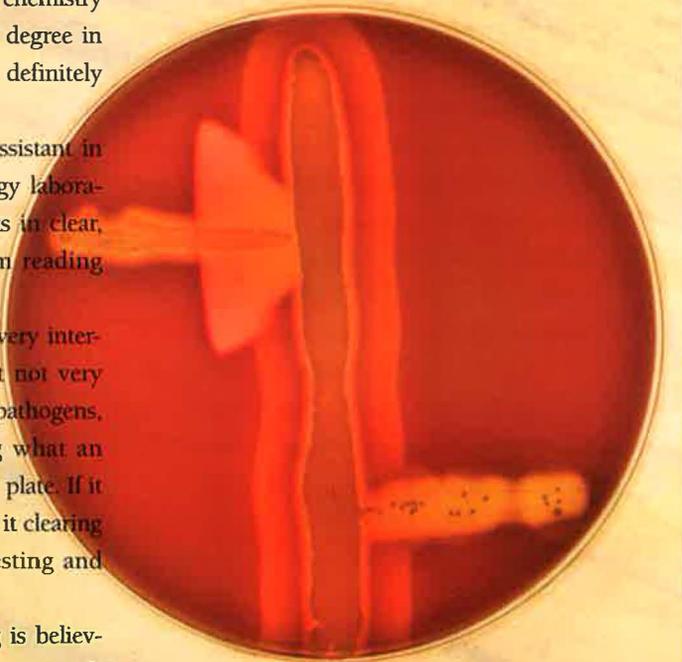
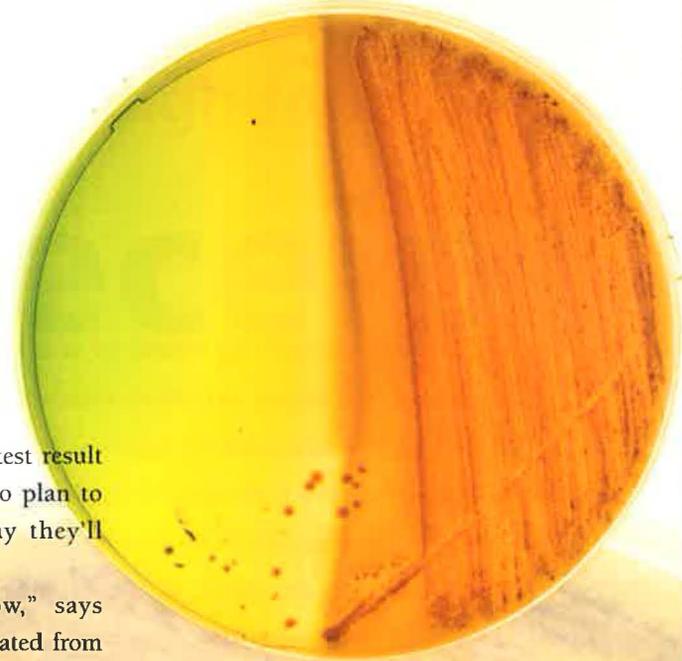
"It's a good resource now," says Stephanie Bouchard, who graduated from UMaine in 2006 with a degree in chemistry and is working toward a second degree in clinical laboratory sciences. "We definitely could use that (in the field)."

Lee Hutchinson, a teaching assistant in Hanson's pathogenic microbiology laboratory, says experiencing the results in clear, living color is far different from reading about them in a textbook.

"A lot of science tends to be very interesting, very groundbreaking, but not very visual," says Hutchinson. "With pathogens, you're plating it, you're seeing what an organism is doing on a blood agar plate. If it hemolyzes it, you can actually see it clearing the blood, which is both interesting and disturbing at the same time."

For Hanson's students, seeing is believing. Once they learn the proper protocol, they'll be able to accurately diagnose a staph infection or a strep throat — and that's enough to make anyone well.

"The students really like it," Hanson says. "It really teaches them a skill they'll be able to go out and use."



microbiology students, educators worldwide

The a

“I encourage people to think of the cost-per-nutrient value and eat more nutrient-dense foods. If people looked at the amount of money they spend on beverages and foods that contain a lot of calories — things that contribute to the obesity epidemic — they would be shocked. A lot of these are impulse items and it all adds up.”

Alan Majka

IN A NORMAL YEAR, people call Kathy Savoie because they're up to their ears in corn. Or because they crave pickles. Or because nothing else compares to grandma's strawberry jam.

But this isn't a normal year, and Savoie, a University of Maine Cooperative Extension educator, isn't getting the normal calls for the canning and food preservation classes she teaches.

“We're hearing from a wider variety of community groups,” says Savoie, who is based in the UMaine Extension Cumberland County office. “A church group requested a class. Their concern was not to just learn the skill. They were specifically interested in food preservation in the event they couldn't afford to pay their electric bill.”

In the face of soaring energy prices and a long winter ahead, people in Maine and beyond are turning to UMaine Extension experts for tips on how to cut costs — specifically food costs — in tough times. And their

advice goes beyond canning.

Just ask Jane Conroy, a budgeting maven and UMaine Extension educator who writes the *Money Sense* newsletter. She works with the directors of Piscataquis County food cupboards, who anticipate falling donations and rising demand as the temperature drops.



Angony of receipt

By Kristen Andresen

But she also helps people who are looking for ways to stretch their food dollar.

"The energy crisis is on their mind," Conroy says. "Folks are preparing for the increase in their grocery bill — high bread costs, milk obviously went up. But then it's other staples too, like laundry detergent. What \$100 used to buy a family is now less."

MAKING THAT \$100 — or \$25 or \$50 — go further is Conroy's mission these days. She urges families to create a weekly meal plan, working in leftovers to save money. The plan can then form the basis for a grocery list, which helps keep shoppers on task.

Staying on task can be difficult when "buy one, get one free" offers, promotional displays and coupons abound, but a little homework can go a long way. Conroy's advice: Look at your trash. Seriously. By knowing what you throw away, you'll gain a better understanding of where you can cut back.

Scan supermarket sale flyers to comparison shop for best prices. Don't bother with coupons worth less than \$1 unless the store doubles or triples the savings; you may end up spending more than you budgeted. And avoid Internet coupons altogether, unless they come from an established Web site.

In shopping, as in life, timing is everything. Don't hit the supermarket when you're hungry. Factor in enough time to compare

prices and try to leave the children at home — the fewer distractions, the better. If that's impossible, turn it into a learning experience for the youngsters.

For those on a really tight budget, Conroy recommends bringing a calculator to the grocery store.

"If you know you only have \$125 to spend, a calculator is going to tell you if a little less is going to have to go into your shopping basket," she says.

WHEN MONEY IS TIGHT, and especially if you have children, it's essential to get the most nutritional bang for your buck. That's where Eat Well comes in. Since the 1960s, UMaine Cooperative Extension has sent nutrition associates into homes and schools.

To be eligible, individuals must qualify for food stamps, while schools need to have at least 50 percent of their students receiving free or reduced-cost lunches. However, Eat Well's hands-on, practical, easy-to-understand curriculum can benefit people of any income.

"The biggest thing I hear people say is, 'It costs too much to eat healthy,'" says Alan Majka, a UMaine Extension Kennebec County educator who serves on the Maine Nutrition Council's Board of Directors. "I would say there's some truth to that, but it isn't necessarily so."

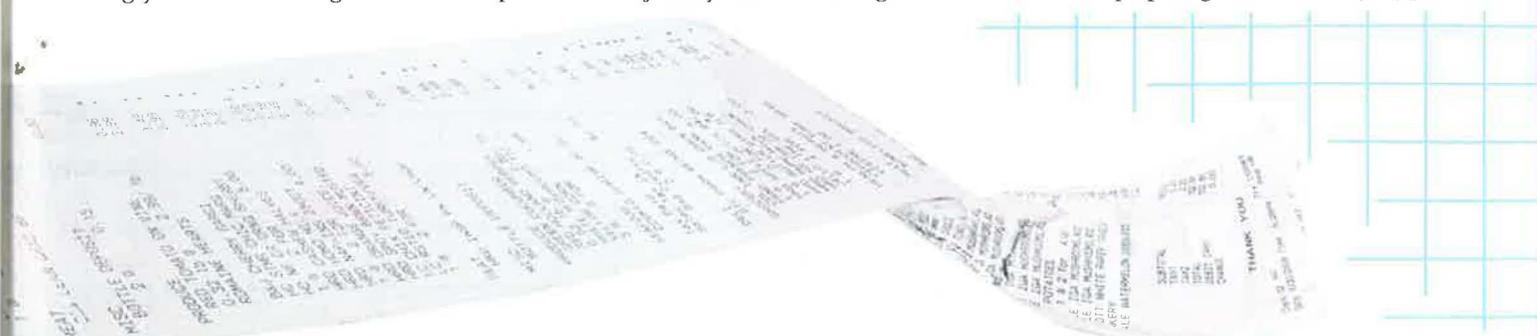
Majka says fruits and vegetables, which

some Eat Well clients consider a luxury, don't need to be fresh in order to be healthy. Flash-frozen options can be less expensive, and they may retain more nutrients than their "fresh" counterparts, many of which have been shipped thousands of miles to get to the grocery store. Canned fruits and vegetables are another option that could cost less.

When it comes to meat, less expensive cuts that require moist, slow cooking for tenderness are often healthier because of their low-fat content. But Majka also urges people to "eat lower on the food chain" by using meat as a small addition to a meal rather than the main component. Nutrient-rich legumes and whole grains, such as beans and oatmeal, are a relative bargain.

"I encourage people to think of the cost-per-nutrient value and eat more nutrient-dense foods," Majka says. "If people looked at the amount of money they spend on beverages and foods that contain a lot of calories — things that contribute to the obesity epidemic — they would be shocked. A lot of these are impulse items and it all adds up."

Eat Well associate Karen Toohey says many of the young parents she advises grew up eating fast food; they know it's a quick, cheap way to put a hot meal on the table. She shows them how to stretch their food dollar even further by cooking with pantry staples and preparing meals with staying power.



buy one
get one
free

Grocery list

Jane Conroy's money-saving shopping tips:

- Use a weekly menu plan.
- Shop with your food list.
- Stick to your budgeted dollar amount.
- Avoid multiple trips to the store.
- Use unit pricing and think generic brands.
- Compare your prices.



Can do

Beth Calder offers the following safety tips for home canners:

- Use a recipe from UMaine Cooperative Extension's recommended resource list with tested recipes, which is online (extensionpubs.umext.maine.edu).
- Use the proper canning method for your food product.
- Use the proper canning supplies (lids and jars).



Food for thought

Alan Majka says consumers should ask themselves the following questions:

- Am I paying too much for convenience?
- Am I buying empty calories?
- Am I spending too much by eating meals away from home?

Take advantage

"If you cook a chicken dinner, then you could have chicken sandwiches, then you could have chicken soup," says Toohey, who is based in Oxford County. "It's kind of a surprise to them that they can do all these things because they never saw anyone do it."

BARBARA MURPHY, who coordinates UMaine Cooperative Extension's statewide Plant a Row for the Hungry outreach, has seen a surge in demand for the program. With the assistance of UMaine Extension Master Gardener volunteers, Plant a Row provides upward of 100,000 pounds of fresh produce annually to needy individuals and organizations, including soup kitchens and food pantries.

"They have more demand than they can meet and it's been that way for more than a year," says Murphy, who is based in Oxford County.

But that's not the only demand Murphy sees. Many Mainers reacted to rising fuel and grocery bills this year by tilling up a plot and growing their own vegetables. This summer, UMaine Extension educators fielded an unprecedented number of garden-related questions. In an average summer, one in four calls to the Oxford County office is garden-related; this summer, three in four calls were rooted in growing your own.

Murphy anticipates that the number of home gardeners will only grow in 2009, and she's planning classes to help them get more

of UMaine Extension's top tips

from their gardens. A two-part workshop will cover planning a garden with nutrition and economics in mind, seed starting, succession planting, season extension and how to harvest to keep the crops coming in. In addition, the annual UMaine Extension Master Gardener course will also teach participants how to maximize the return from gardening dollars.

"The reason why more people are gardening is they can't afford food," Murphy says. "Prices are through the roof."

SO ARE FUEL PRICES, which have caused many home gardeners to consider — or reconsider — canning and other means of extending the harvest to save money. For Savoie and her colleague Louise Kirkland, an educator with UMaine Extension Penobscot County who also teaches food preservation classes, late summer is always a busy time of year. But 2008 proved busier than ever. By mid-July, 100 people had already taken Savoie's preserving class; she anticipated another 250 students by season's end. Seasonally, she usually teaches a few dozen canning enthusiasts.

"The demand is much larger," Savoie says. "The real danger is that someone will can using improper equipment or using improper methods for the type of food they're preserving."

Techniques have evolved through the years, so even people who have been putting up pickles and green beans for decades should brush up on their knowledge. Manuals such as the *Ball Blue Book of Preserving* include up-to-date information. For all would-be canners, a visit to the National Center for Home Food Preservation online (uga.edu/nchfp/) is a great place to start.

While it is easy to preserve, a lot can go wrong — spoilage, discoloration or, worse, botulism. Which is why Beth Calder, a UMaine Extension professor and food science specialist at the University of Maine, and her colleague Al Bushway, a professor of food science and human nutrition, provide guidance to amateur and small-scale commercial canners. They urge canners to embrace modern techniques and be sure they're using the right method for the type of foods they want to preserve. Calder, Kirkland, Majka, Conroy and their colleagues Nadine Reimer of UMaine Extension Knox-Lincoln County and Kate Yerxa, Extension's statewide nutrition and physical activity educator, also are part of a statewide call team answering specific questions.

"I think people are just looking for resources," Calder says. ■

EXTEND the growing season

By extending the growing season, home gardeners can get higher crop yields. Plastic mulches and row covers require an initial investment, but with proper cleaning and storage, they will last several seasons.

- **Use plastic mulches** in the spring to help warm the soil, aid moisture retention and speed growing.
- **Use row covers** in the spring and fall. In the spring, row covers can prevent insect infestations and warm the soil quicker. In the fall, they can help prevent crop loss from early frost by retaining heat from the soil. Spunbonded or woven row covers are widely available at gardening centers. UMaine Cooperative Extension educator Barbara Murphy says old blankets or sheets are a cost-saving alternative, but unlike store-bought row covers, they'll need to be removed in the daytime.
- **Build a cold frame.** A cold frame is a bottomless box placed over plants, complete with a plastic or glass top that opens to allow ventilation. Think miniature greenhouse.

For step-by-step instructions on extending the growing season and other practical tips, visit UMaine Cooperative Extension's online publications.

Cents *and* sensibility

THERE'S NO DENYING that the three R's — reading, writing and arithmetic — are skills every student needs to learn. But a University of Maine program aims to educate Mainers about the three B's — budgeting, banking and buying within one's means.

UMaine economics professor George Criner, along with master's students Hugh Stevens and Sharon Hageman, launched the Household Financial Education Initiative in September. The effort aims to help individuals and businesses evaluate their finances; discuss household budgeting and winterizing; and provide residents with an extensive list of organizations and programs that can provide assistance.

"We're interested in helping people realize what their situation is before it reaches a crisis level," says Criner. "We're providing information to help them make intelligent decisions."

UMaine's School of Economics will collaborate with University of Maine Cooperative Extension, UMaine's Business School, Maine Centers for Women, Work, and Community, and several municipalities in eastern and central Maine. Over time, they hope to reach out to towns in Franklin, Aroostook, Penobscot, Piscataquis, Washington and Hancock Counties.

This feet-on-the-street approach is critical, according to Stevens.

"If they can't afford to pay \$5 a gallon for fuel oil, they can't afford \$4 a gallon for gas to drive to a state agency," he says. "We're going to them, to each and every community our budget allows, to every community center and church. If we can get two people who are interested, we'll meet with them."

Just as their geographic reach is broad, so is

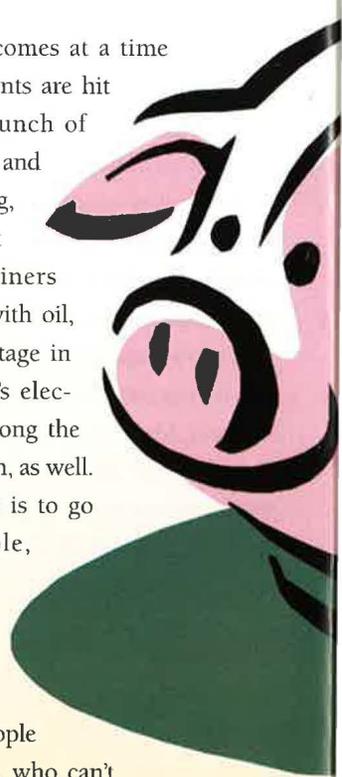
the range of assistance they can offer. When people apply for general assistance, the town often will require recipients to have a budget in place to show how they plan to get back on track. These students can make a budget with their eyes closed. But they can also let people know how much money they'll need to heat their house this winter, how to open a bank account and how to get out of debt.

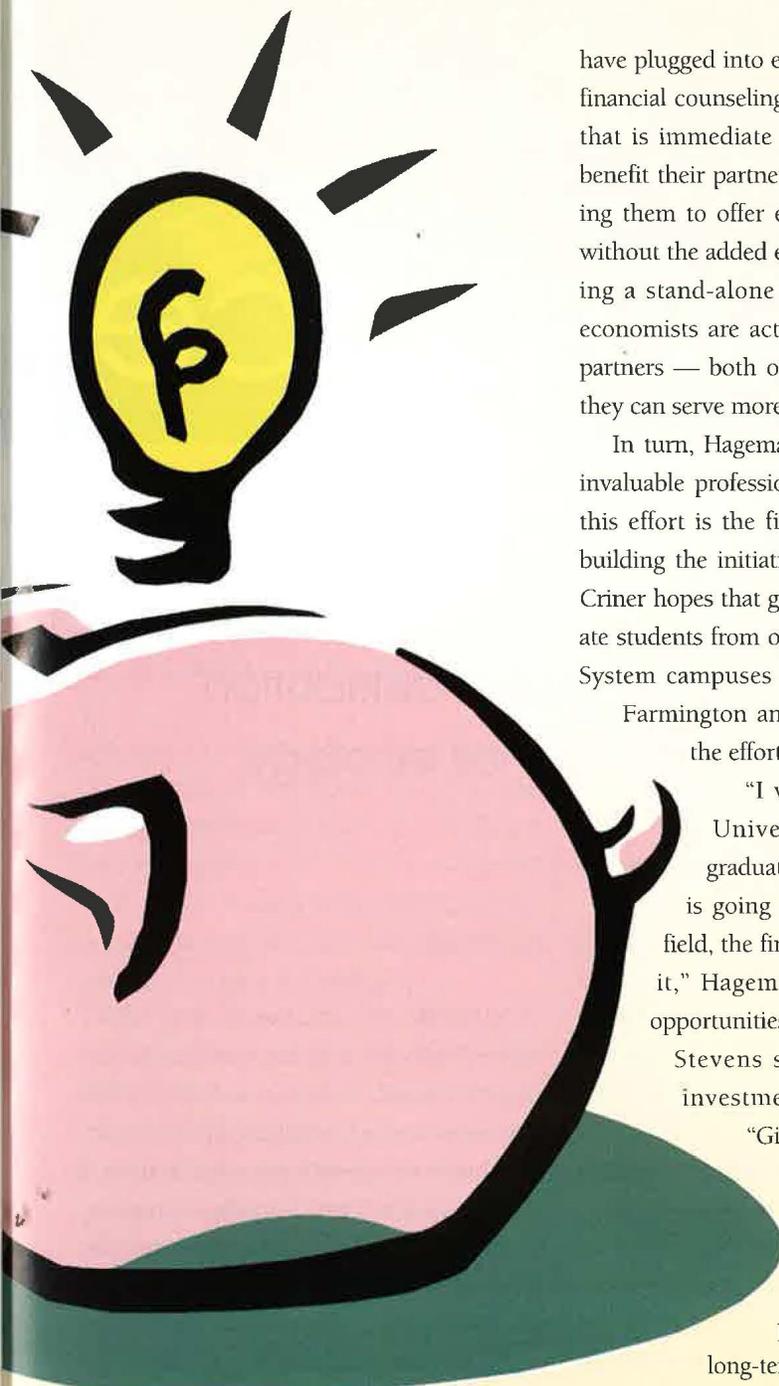
Financial education is a good idea in the best of times. As Hageman says, all high school students should learn these skills. But in tough economic times like these, it is essential.

This outreach comes at a time when Maine residents are hit with a one-two punch of rising energy prices and predictions of a long, cold winter. About 80 percent of Mainers heat their homes with oil, the highest percentage in the nation. Maine's electricity rates are among the highest in the nation, as well.

"Our main goal is to go out to help people, especially with the energy crisis going on right now," Hageman says. "There are people who are unbanked, who can't save. We want to go out and help them."

To help, Criner, Stevens and Hageman





have plugged into existing programs to offer financial counseling and education in a way that is immediate and effective. This will benefit their partner organizations by allowing them to offer extended contract hours without the added expense or effort of creating a stand-alone program. The UMaine economists are actively seeking additional partners — both on and off campus — so they can serve more people.

In turn, Hageman and Stevens will gain invaluable professional experience. Because this effort is the first of its kind, they are building the initiative from the ground up. Criner hopes that graduate and undergraduate students from other University of Maine System campuses in Fort Kent, Machias, Farmington and Presque Isle will join the effort.

“I went straight from (the University of Cleveland) to graduate school, so for me, this is going to help me get into my field, the financial economics end of it,” Hageman says. “I see a lot of opportunities.”

Stevens sees the lessons as an investment in Mainer’s future.

“Giving somebody money is a one-time action,” he says. “We hope increased financial education would provide people with a long-term financial coping skill.

Not only are we long-term in our outlook, the skill is long-term, as well.”

The Financial Education Initiative has received a \$27,000 University of Maine System grant, which will allow UMaine’s School of Economics to collaborate with students and faculty from four other University of Maine System campuses in Farmington, Machias, Presque Isle and Fort Kent.



Frontiers of space

UMaine mathematician studies the spatial distribution of populations to better understand their ecology

By Kristen Andresen

SPACE AND TIME. Most people wish they had more of both.

While David Hiebeler can't help in that regard — he's a mathematician, not a magician — his research could be the next best thing. Using computational and mathematical models, Hiebeler describes how certain populations behave over time and under a variety of simulated environmental conditions.

Working at the intersection of math, computation and biology, Hiebeler, a mathe-

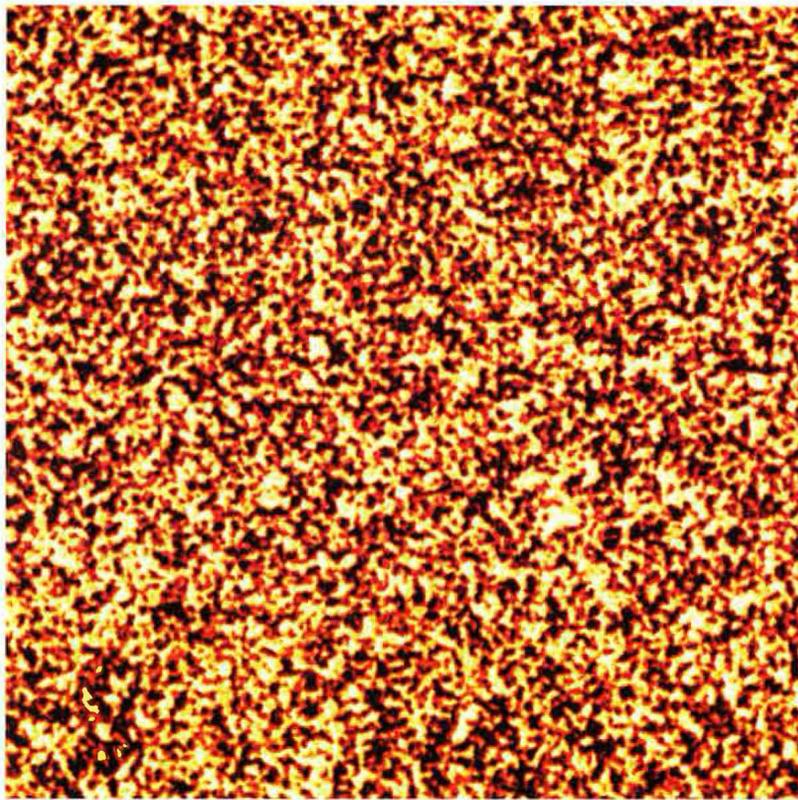
matics professor at the University of Maine, uses his research to help people — and industry — use space and time to their advantage.

Hiebeler likes to call it “the science fiction of biology.”

“Space wars are being fought here on Earth, but not with soldiers or advanced technology,” Hiebeler says. “Natural organisms fight for a space to call their own as they live, reproduce and interact with other organisms.”

To predict the outcome of these “space wars,” Hiebeler and his students create computer-based, mathematics-driven models with a number of variables. For example, one simulation shows what would happen if a plant in a forest with a patchy distribution of suitable living conditions — sunlight, good soil — produced big, heavy seeds that fall close to the parent plant or small, tufted seeds that float on the breeze.

“The main question is how does the spatial distribution of a population affect the



Ben Wasserman, an undergraduate majoring in wildlife ecology and mathematics, and Assistant Professor of Mathematics David Hiebeler, pictured left, are studying how the variability and spatial distribution of habitat affect population dynamics. This image represents a map of a landscape with smoothly varying habitat quality. The darker sites have lower habitat quality, the lighter sites have higher quality.

dynamics and, ultimately, the outcome or success of a population,” Hiebeler says. “The answer is what the landscape looks like.”

ON THE COMPUTER SCREEN, the distribution of black and white dots looks like static on a television or spots on a Dalmatian. And at first glance, it’s hard to understand what, if any, connection this “landscape” has to the pine trees, ferns and lady slippers that make up Maine’s forest ecosystem.

But when Hiebeler starts to describe the way climate change could affect the distribution of plants over time — Banana trees in Maine? Kudzu in the tundra? — the dots start to make sense. Though his work deals primarily with theoretical models, it has practical significance.

In May, Hiebeler received the National Science Foundation’s most prestigious honor for promising young scholar-researchers: the Faculty Early Career Development (CAREER) grant. The \$400,000 award,

which Hiebeler will receive over five years, recognizes faculty who “most effectively integrate research and education within the context of the mission of their organization,” according to NSF.

This marks the first such award for a professor in the UMaine College of Liberal Arts and Sciences.

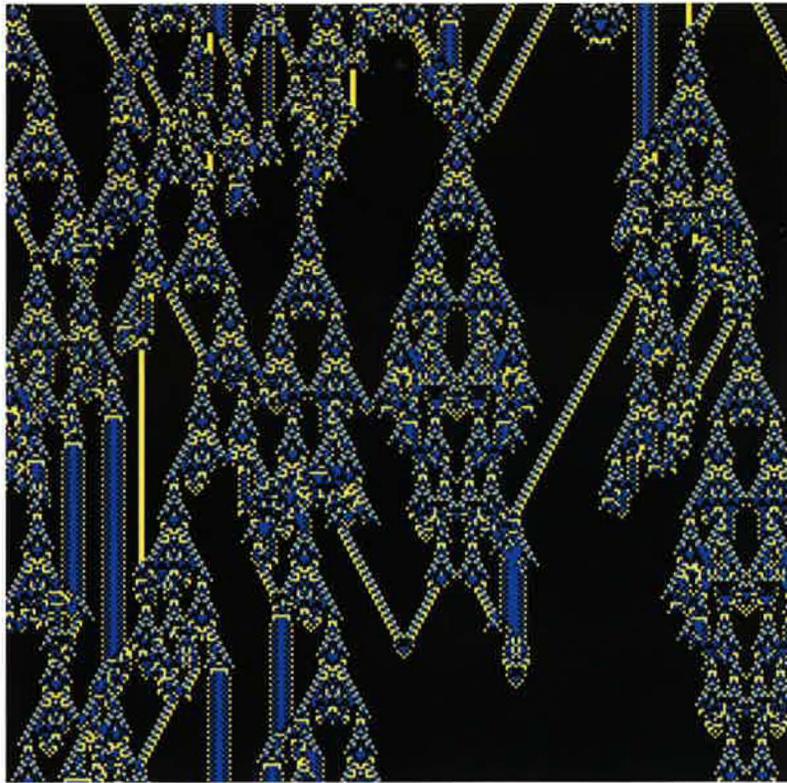
Hiebeler’s research centers on mathematical population ecology and epidemiology. Real-world applications for the research include understanding more effective pesticide application in Maine blueberry fields, studying how infectious diseases spread, and predicting and perhaps combating the worldwide spread of malicious software, such as viruses and worms, through computer networks.

“The importance of the work is that it may suggest new strategies for monitoring populations for outbreaks of infectious diseases, invasive species or malicious software to enable earlier detection,” he says.

TO HELP INCORPORATE undergraduate and graduate students into his research, Hiebeler established the SPEED (Spatial Population Ecological and Epidemiological Dynamics) Lab. One of those undergrads, Isaac Michaud, plans to use Hiebeler’s epidemiological models to determine when, where and how much pesticide should be applied to combat maggot flies, the chief pest in Maine’s blueberry farms. Michaud will collaborate with Frank Drummond, a professor of insect ecology and insect pest management in UMaine’s School of Biology and Ecology.

For Michaud, a UMaine senior who was valedictorian of his high school, the collaboration has been invaluable.

“In most of the mathematics programs here and in the rest of the country, you need a Ph.D. to even understand what’s going on,” Michaud says as he sits in the narrow, bright room that houses the SPEED Lab. “To be able to contribute to this research as an



An image of a cellular automaton, used to model many different types of phenomena in computer science, physics, biology, chemistry and even social dynamics (such as the spread of rumors or ideas through a population).

undergrad is an amazing experience. It makes me want to excel in my other classes.”

It also has influenced his decision to pursue a Ph.D. in mathematics.

“Doing research with David has pushed me a little bit further down that path,” Michaud says. “He makes you realize that mathematicians are human beings — not every mathematician is Einstein.”

Michaud’s classmate and fellow SPEED Lab researcher Sarah Krause agrees.

“David makes you realize it’s more attainable,” she says.

Krause is a senior math and secondary education major, and she says her classes with Hiebeler have taught her how to present conceptual mathematics to students in a way that won’t overwhelm them.

“I could see the potential for students to realize what they can do with their math skills beyond just, ‘I can do calculus; what does that mean to me?’” she says. “When they get these results, they’ll be able to see

mathematics can be used in ... a lot of ways in the real world.”

IN ADDITION TO HIS work with Drummond, Hiebeler plans to establish similar collaboration with entomologists at Zhejiang University in Hangzhou, China, to address planthoppers, a pest in rice fields in Asia.

An earlier \$180,000 NSF award made it possible for Hiebeler to hire more UMaine students and expand the lab’s outreach to area high school students. In the future, high school students will meet weekly on campus to begin training with Hiebeler and his undergraduate students. They will later become directly involved in SPEED Lab research projects.

For Hiebeler, the benefit is threefold. Through his work with UMaine education majors, he plans to seed Maine high schools with teachers who are familiar with his approach to mathematical biology. By working directly with high school students, he

hopes to cultivate an early interest in mathematics. And if some of the SPEED Lab proteges decide to come to UMaine to study, they’ll be ready to hit the ground running.

In time, Hiebeler would like to set up an intensive summer program for undergraduate researchers modeled on the Mathematical and Theoretical Biology Institute at Arizona State University. In addition to his work at UMaine, he has served as research adviser and lecturer at the institute for the past three summers, and he recently was appointed an adjunct faculty member in ASU’s Mathematical, Computational and Modeling Sciences Center.

Through all of his outreach, he wants to provide students at the University of Maine with the same opportunities that enriched his own academic experience.

“One research project opened the door to another research project,” Hiebeler says. “It can only snowball. At least that’s my hope.” ■ [Online](#)

Undergraduate research



Nancy Hall

Title: Associate professor of communication sciences and disorders, and director of the Center for Undergraduate Research

Research focus: The interaction between language development and stuttering

Years with UMaine: 15

Milestones: Served on the National Joint Coordinating Committee on Evidence-Based Practice of the American Speech-Language-Hearing Association in 2004–05; named Distinguished Alumna in the Department of Communication at College of Wooster in 2003; and holds a national certificate in clinical competence in speech-language pathology from the American Speech-Language-Hearing Association.

Question: What is the mission of the new Center for Undergraduate Research?

Answer: CUGR's primary mission is to facilitate and enhance research and research opportunities for undergraduates. Specifically, that translates into developing a database of research and creative projects at UMaine that are open to undergraduates, matching faculty and students by projects and interests, and getting the word out to students and academic advisers that the center is a resource.

Question: Why are undergraduate research and scholarship growing priorities at universities nationwide?

Answer: Institutions and employers recognize that the kinds of skills developed through research and endeavors of scholarship help make an individual more competitive. There's a clear push in the U.S. that if we want to compete globally, we need to start with our undergraduates. Large funding agencies and government agencies emphasize that students with early research experience develop better critical thinking and problem-solving skills, and stronger content knowledge.

Question: What can undergraduates get out of research and creative activity?

Answer: In research and scholarship, undergraduates hone their abilities to communicate and put ideas together, to organize and write, to investigate and ask questions. They learn to problem solve, using a variety of methods to find answers. For many students, research provides an opportunity for a mentor-mentee

relationship different from that of teacher-student. In that context, the learning is invaluable. It's something I wish for all students.

Question: What's in it for faculty researchers?

Answer: Undergraduates often have a broader perspective, enthusiasm and energy that are ripe for explorations and learning. For me as a faculty member, the most incredible process to see is the evolution of learning by a student involved in research or creative experience. We're looking at tomorrow's scholars. The more we invest today, the better off we'll be.

Question: How will CUGR help grow undergraduate research at UMaine?

Answer: In the University of Maine Strategic Plan, advancing undergraduate research with CUGR's leadership is one of 12 objectives for the institution. CUGR builds on UMaine's strengths as the state's leading research university, taking advantage of the hundreds of faculty and graduate students involved in research and creative projects who can teach and mentor undergraduate researchers. It also looks at curriculum work, exploring how to include research-based activities in coursework, and campuswide events highlighting undergraduate research and scholarship. Already, there's a lot of undergraduate research going on across campus. CUGR is raising the visibility of undergraduate research and creative activity.

Question: How do you reach CUGR?

Answer: Contact CUGR director Nancy Hall and graduate assistant Anya Rose, or stop by the CUGR office, 124 Alumni Hall.

Fly me to the

moon

By Tom Weber

IN MANY OF THE EARLIEST science-fiction imaginings, gleaming structures of glass and steel rise from the surface of the moon and into the surrounding darkness as intrepid colonists zip about them in jet packs and flying cars.

While those nifty space-age modes of transportation have yet to materialize in the real world, the long-envisioned idea of establishing a colony on the moon might actually become a reality in the near future. That's the grand scheme, at least, as outlined in President George W. Bush's "Moon, Mars and Beyond" space-exploration initiative.

The idea is to return to the moon by 2020 and create a self-sustaining research outpost somewhere on its surface. At first, a few astronauts will make several weeklong visits until their power systems, rovers and living quarters are functional. NASA then plans to extend the missions to two weeks, then two months and eventually to 180 days.

Within a decade or so, the theory goes, lunar explorers should have enough extraterrestrial experience and skill to make the next giant leap to Mars and perhaps planets beyond.

Of all the many challenges NASA faces in this ambitious endeavor, one of the most critical is providing habitats that will allow humans to live and work safely in the lunar or other harsh space environments. Not only will the structures have to be comfortable enough for long stays, they will have to

UMaine engineers take sensor research to new heights

shield their inhabitants from cosmic rays and radiation while withstanding micrometeorites, moonquakes and surface temperatures that fluctuate day to night from about 224 degrees to minus 243 degrees Fahrenheit. Thus, it will be critical to continuously monitor the dynamic shape of deployable space structures, such as lunar habitat and microwave antennas.

Designing such deployable space structures will require engineers to rethink what constitutes a structure, and the methods and materials necessary to build them. That's where University of Maine researchers are hoping to play an important role.

Initial funding by the Maine Space Grant Consortium led to a \$1.5 million grant from

the NASA Experimental Program to Stimulate Competitive Research (EPSCoR) and UMaine. UMaine electrical and computer engineers Ali Abedi and Mauricio Pereira da Cunha have teamed up with mechanical engineers Vince Caccese and Mohsen Shahinpoor, as well as University of Southern Maine computer engineer Mariusz Jankowski to develop a first-of-its-kind wireless sensor network system to monitor the structural integrity of inflatable space structures after they've been deployed in space.

Easy-to-assemble inflatable structures are considered to be one of the most promising of the habitation concepts now on NASA's drawing board. They're ultralight when compared with building materials used in



A sliver of the setting moon photographed by an Expedition 7 crew member onboard the International Space Station, with the Earth at the bottom transitioning into the orange-colored troposphere. Photo courtesy of NASA

to facilitate lunar habitation

large earthbound structures, and that's a big plus when launch costs are running about \$10,000 a pound and getting one pound of supplies from the Earth to the moon requires 125 pounds of hardware and fuel.

One UMaine graduate student is now working with Caccese to build computer models of how certain flexible materials work, while another is researching a new way to make them rigid once the inflatable structure is deployed.

"NASA is extremely concerned about human safety," Caccese says. "I picture myself being up there, too, and I ask myself what would I like to live in and what would make me feel safe."

It was work by Abedi and Pereira da

Cunha on wireless sensing, and Caccese's and Shahinpoor's past experience with smart structures, that convinced NASA to make the UMaine project one of 13 in a nationwide competition to receive funding.

Abedi says this system would also allow NASA to reduce the miles of bundled sensor wires and connectors that now add so much unwanted weight, expense and potential for failure to every space flight.

As innovative and valuable as that battery-free wireless system may prove to be, Abedi says, the UMaine team's latest efforts in the advancement of space exploration will require technology that goes a step beyond anything that currently exists.

"Today, what we have for sensors, wireless systems and algorithms, none of them can address this new system," says Abedi, who is leading the UMaine team. Once the new sensors are developed, the challenge will

be to find a way to embed them into a multi-layer fabric that a leading aerospace contractor in Delaware will use to build a prototype inflatable structure for UMaine researchers.

By sensing the coordinate positions of an array of key points on the inflatable's surface, the wireless system will allow the researchers to visualize the shape of the structure after it is deployed. That final shape data, when compared with computer modeling data, can be used to assess how successfully the structure was inflated and eventually to help in correcting any troubling deformations.

"If there is damage to the deployed space structure from a micrometeorite, for example, we have to be able to determine where that impact occurred, and what kind of damage it caused," Pereira da Cunha says.

"That's the first step in this investigation, but once we enable this system, we will be able to expand our research to include other relevant NASA monitoring needs, such as

gas, temperature, changes in pressure, etc."

As important as shape constraints are for lunar habitats, they are even more critical to the proper functioning of inflatable antennae. If an antenna is not shaped exactly as its designers intended, its microwave transmission signals are distorted and attenuated, and, ultimately communication may be interrupted.

"The beauty of this project is that wireless technology gives us a powerful mechanism to determine how an inflatable structure has been deployed, and what

dimples or wrinkles need to be corrected," says Shahinpoor, chair of the Mechanical Engineering Department, who will use his expertise in smart materials for the rigidization work. "Right now, NASA can't detect or correct these deficiencies."

Although NASA has long been interested in inflatable structures, the educational opportunities

such research could provide for students, as well as its economical development potential, have so far gone largely unexplored at most universities. This project, according to Caccese, could change that quickly for UMaine, USM and the state.

The researchers plan to involve 15 undergraduate and four graduate students in the three-year project. They will be trained in campus laboratories, as well as at NASA's Johnson Space Center in Houston, Texas, and Glenn Research Center, Cleveland, Ohio, which are collaborating on the UMaine research and development work.

The UMaine team also intends to create new course materials pertaining to the research and to hold seminars for the public at high schools in the state.

"It helps the university and the whole state to get students excited about this," Abedi says. "I think this will put UMaine on NASA's map." ■

The UMaine team's latest efforts in the advancement of space exploration will require technology that goes a step beyond anything that currently exists.

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Although NASA has long been interested in inflatable structures, the educational opportunities

such research could provide for students, as well as its economical development potential, have so far gone largely unexplored at most universities. This project, according to Caccese, could change that quickly for UMaine, USM and the state.

The researchers plan to involve 15 undergraduate and four graduate students in the three-year project. They will be trained in campus laboratories, as well as at NASA's Johnson Space Center in Houston, Texas, and Glenn Research Center, Cleveland, Ohio, which are collaborating on the UMaine research and development work.

The UMaine team also intends to create new course materials pertaining to the research and to hold seminars for the public at high schools in the state.

"It helps the university and the whole state to get students excited about this," Abedi says. "I think this will put UMaine on NASA's map." ■

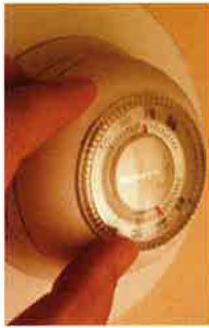
focusing on climate change

experts on topic



UMaine Cooperative Extension

WITH MANY MAINE residents struggling to meet their needs for heating, transportation and food due to rising fuel prices, University of Maine Cooperative Extension has established a Web site to distribute research-based information on saving money through energy conservation and alternative energy sources. For homeowners, the site has heating source comparisons, and information on how to conserve energy through insulation and appliance use. For the traveler, there is information on efficient vehicles and public transportation, as well as cost calculators for hybrid vehicle options. The site also includes energy-saving tips for small businesses and farms, current research in Maine on producing energy on the farm with biodiesel, and links to information on tax incentives and energy audits.



extension.umaine.edu/energy

Based in Los Angeles, the W.M. Keck Foundation was established in 1954 by the late William Keck, founder of the Superior Oil Co. The foundation's grant making is focused primarily on pioneering efforts in the areas of medical research, science and engineering. It also maintains a program to support undergraduate science and humanities education, and a Southern California Grant Program that provides support in the areas of healthcare, civic and community services, education and the arts, with a special emphasis on children and youth.



A \$1.6 MILLION GRANT from the William M. Keck Foundation will fund continued groundbreaking scientific research in the University of Maine's Climate Change Institute.

The project, led by Climate Change Institute Director Paul Mayewski, will build on UMaine's ongoing research aimed at developing a global array of ice cores to study historical climate change. The goal is to better understand the Earth's environment and create sound hypotheses about the climate's future.

For decades, UMaine scientists have been extracting ice from polar regions around the world with funding by the National Science Foundation, NASA and the National Oceanic and Atmospheric Administration. By examining the chemical composition at intervals along the ice core, scientists can reconstruct climate history over centuries and monitor current climate conditions in critical regions.

Keck Foundation funding will allow the UMaine scientists to expand their research with the purchase of a laser ablation inductively coupled plasma spectrometer for rapid, continuous, high-resolution sampling. In addition, UMaine scientists in the Laboratory for Surface Science and Technology will lead an interdisciplinary team to develop new ice core measuring capabilities with chemical sensors embedded in an ice core drill, along with a GPS system for onsite sampling in hazardous environments and for monitoring changes in glaciers.



Unlocking disease-fighting secrets

IN BIOMEDICAL RESEARCH, the zebrafish is used as a model organism because it has many biological traits that mimic those of humans. However, a greater understanding of the differences in their immunity systems could one day lead to therapies to better fight human disease.

With a five-year, \$1.4 million grant from the National Institutes of Health, University of Maine microbiologist Carol Kim will conduct a comparative immunology study to shed light on the distinctions that evolved in the innate immunity systems of zebrafish and mammals, such as mice and humans.

Her prediction is that identifying those unique disease-fighting molecular processes in the

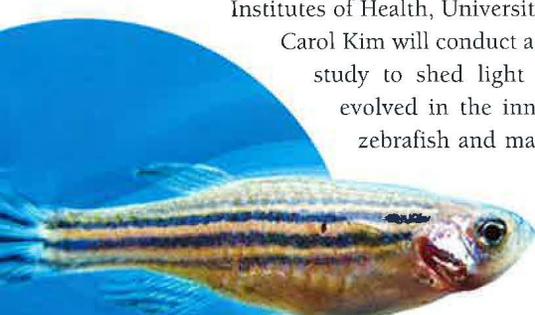
zebrafish will provide researchers with clues to finding similar defense mechanisms as yet unidentified in humans.

Unidentified components may be masked or maintain minor roles in the complex structure of mammals' innate immunity. But if their contributions to the body's immunity system were boosted, the result could be a complementary approach to fighting infectious disease.

The research could open the possibilities for new vaccines.

"Unlocking the secrets of the innate immune response is so promising, companies are now trying to use Toll-like receptor (TLR) signal pathways (proteins found on the surface of certain cells) and receptors as adjuvants for vaccines, all in an effort to achieve a more robust immune response," says Kim, the new director of UMaine's Graduate School of Biomedical Sciences.

While adaptive immunity remains essential to the existence of many species, researchers now know that the stronger the innate immune response, the more vigorous the adapted immune response.





Berry good for you

CRANBERRIES are an autumn staple, whether baked into a quick bread or served as a sauce at the holiday table. But Vivian Wu, an assistant professor of food science and human nutrition at the University of Maine, knows there's more to cranberries than their sweet-tart flavor. Here are her top five cranberry facts from her research:

- Cranberries contains antioxidant compounds that reduce free-radical, or oxidative, damage.
- Cranberries are known for their unique "anti-adhesion" activity, which protects the body from certain harmful bacteria that cause urinary tract infections, stomach ulcers and gum disease.
- New research led by Wu shows cranberries may offer a strong line of defense against food poisoning with their unique ability to reduce the growth of salmonella and other types of harmful bacteria in food.
- Wu's research group also found that food testers accepted the flavor of a hamburger that includes up to 5 percent cranberry extract.
- One day, incorporating cranberries into food preparation may be a natural way to minimize food contamination.

IN JULY, U.S. IMMIGRATION and Customs Enforcement (ICE) announced the return to the Colombian government of more than 60 Precolumbian artifacts that were seized in Florida in 2005. The recovered artifacts that had been smuggled into the United States included more than a dozen emerald pieces that were studied by University of Maine physicists March 18 after they were brought to campus by ICE officers to determine the gems' trace elements.

Earlier this year, Professor of Physics C.T. Hess was contacted by the State Department after a federal official found reference to a research paper published in 1998 in the journal *Archaeology*. In the paper, Hess and two coauthors — then Hudson Museum director Stephen Whittington and gemologist James Vose of Lincoln — detailed the use of X-ray fluorescence spectroscopy to determine the trace elements in another Precolumbian artifact known as "the emerald man," a carved figurine that is part of the Palmer Collection in the Hudson Museum.

After a day of testing in his lab this spring, Hess and his students — Joshua Wright, Douglas Cahl and Anna Schliep — determined that the trace elements in the confiscated emeralds revealed that they were mined from one source.

X-ray fluorescence spectroscopy helps researchers determine the chemical components in samples, providing clues to geological origins.

The research results on the now repatriated emeralds — 14 stones with drilled holes for what was probably a necklace, and a tiny carved frog figurine — were reported in a senior thesis in April by Joshua Wright.

the case of the stolen Emeralds



UMaine professor C.T. Hess is a theoretical nuclear physicist who has conducted pioneering research on radon in water and air.

Emerald photo by Stephen Bicknell

A NEW INITIATIVE at the University of Maine aims to give women a bigger slice of the political pie. Beginning next year, up to 40 college-age women from Maine will have the opportunity to participate in MaineNEW Leadership, a weeklong intensive residential training program targeting the next generation of leaders.

The program began in 1991 at the Center for American Women in Politics at Rutgers University. UMaine is the latest partner in NEW Leadership's 17-member national network.

"The idea behind the program is for college women to understand the importance of serving in office and of civic engagement, particularly in your community and your state," says Mary Cathcart, a former Maine legislator who now is a senior policy associate at UMaine's Margaret Chase Smith Policy Center.



Ageism in the workplace

A TWO-YEAR STUDY of older employees in Maine is focusing on how they perceive and handle harassment in the workplace.

With a \$125,000 grant from the National Science Foundation, University of Maine sociologist Amy Blackstone is surveying as many as 800 Maine workers age 62 and older. Blackstone says she hopes to find out how stature at work affects harassment experiences, and how stature at work, home and in the community may affect responses to those experiences.

By bringing together several areas of sociological inquiry, including age, power, victimization and mobilization, the study is expected to inform policymaking and employment laws by raising awareness about situations that may create opportunities for employee harassment or discrimination.

The study's findings will be used to develop a larger comparative investigation of workplace harassment over worker life cycles.

Ice age pests

CHIRONOMIDS, or midge flies, begin their lives as larvae in lake sediment. As they grow, they shed their skin four times, then pupate. When they emerge as a swarm of adults, they mate, lay eggs and die.

The extent of their adult lives occurs within a few days, but the lessons they can teach us about climate change endure, according to University of Maine researcher Ann Dieffenbacher-Krall.

Dieffenbacher-Krall has spent the last several years extracting and classifying chironomid head capsules — the only part of the insect that preserves — from cores of lake sediment in New Zealand.

“We’re using them as a thermometer, basically,”



University of Waikato graduate student Jeremy Cole-Baker and UMaine Associate Research Scientist Ann Dieffenbacher-Krall drill cores at Lake Quagmire, New Zealand. Photo by Marcus Vandergoes

Dieffenbacher-Krall says, to help determine what was going on in the Southern Hemisphere at the end of the last ice age.

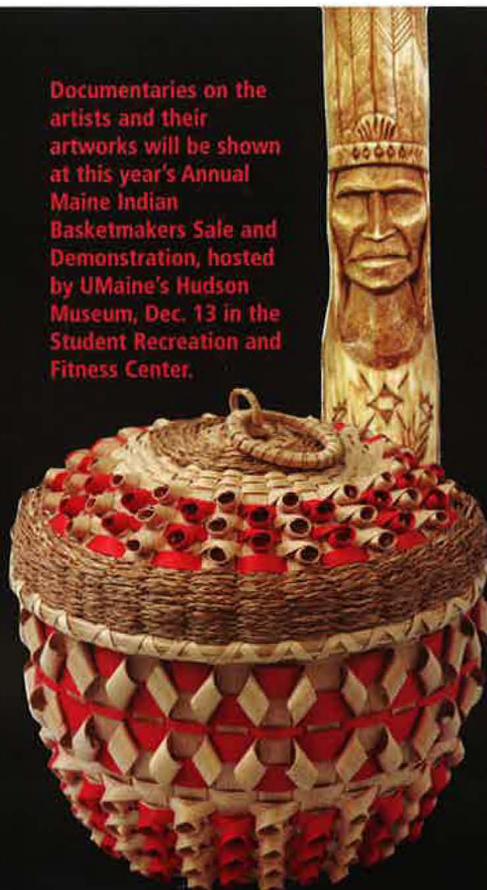
Different types of chi-

ronomids exist in different ecological conditions, but the dominant variable is a lake’s mean summer temperature.

Comparing chironomid research data with pollen-based studies of temperature change, Dieffenbacher-Krall and her Climate Change Institute colleagues George Denton and Marcus Vandergoes have painted a more complete picture of climate change in the late glacial period.

The findings from their research, published recently in *Quaternary Science Reviews*, indicate stronger seasonality, which could have broader implications for understanding the differences between proxy records for abrupt climate change.

Documentaries on the artists and their artworks will be shown at this year’s Annual Maine Indian Basketmakers Sale and Demonstration, hosted by UMaine’s Hudson Museum, Dec. 13 in the Student Recreation and Fitness Center.



Documenting culture

AT THE UNIVERSITY OF MAINE, the Hudson Museum’s Maine Native American collection includes more than 500 examples of culture — from birch bark canoes and root clubs to beadwork and baskets of brown ash splints and sweetgrass dating from the 1850s. Also in the collection are traditional tools used by Maine Indian basketmakers to transform the natural materials into functional works of art.

Now a documentary series by the Hudson Museum and the Maine Indian Basketmakers Alliance, filmed and produced by students at ASAP, UMaine’s new media and Internet technology production lab, illustrates just how those tools are used in the artistic tradition by contemporary artists as a means of sustaining cultural heritage. Eleven Passamaquoddy, Penobscot, Maliseet and Micmac artists from Bethel to Limestone, as well as tribal elders, were interviewed.

The two-year project to document Maine Indian material culture, made possible by a \$96,000 grant from the Institute of Museum and Library Services, culminated this fall. It features nine segments on basketmaking, from the gathering and processing of the raw materials — brown ash and sweetgrass — to the creation of the artforms. Also featured are two birch bark artists, three carvers and a beadworker.

Once the Hudson Museum reopens next fall in the newly renovated Collins Center for the Arts, patrons will use media stations with touch screens to see these segments in the new Maine Indian Gallery. The documentaries also will be available to schools over the Internet to support LD291, a 2001 state law requiring the teaching of Maine Native American history and culture in schools.



These unique capabilities will put UMaine on the world map for composite technology development for renewable energy.”

Robert Lindyberg
AEWC Center Assistant Director

In August, the Maine Technology Institute identified the first 14 projects to receive nearly \$30 million of the \$50 million R&D investment Maine voters approved last fall. University of Maine researchers developed five of the funded projects, which were awarded more than \$13 million. The largest award of nearly \$5 million funds two Advanced Engineered Wood Composites (AEWC) Center initiatives focused on the renewable energy and transportation industries. One laboratory addition will support processing of nanocomposites from cellulose fiber. Another will be used for pilot manufacturing and large-scale structural testing of advanced composite structures for the energy industry, one of the fastest-growing markets for composite products. In such a facility, researchers will test the integrity of structures such as turbine blades to harness wind and tidal energy. AEWC has begun structural testing of wind blades and is pursuing research to integrate nanomaterials into composite products for improved strength and durability.

Alternative breaks

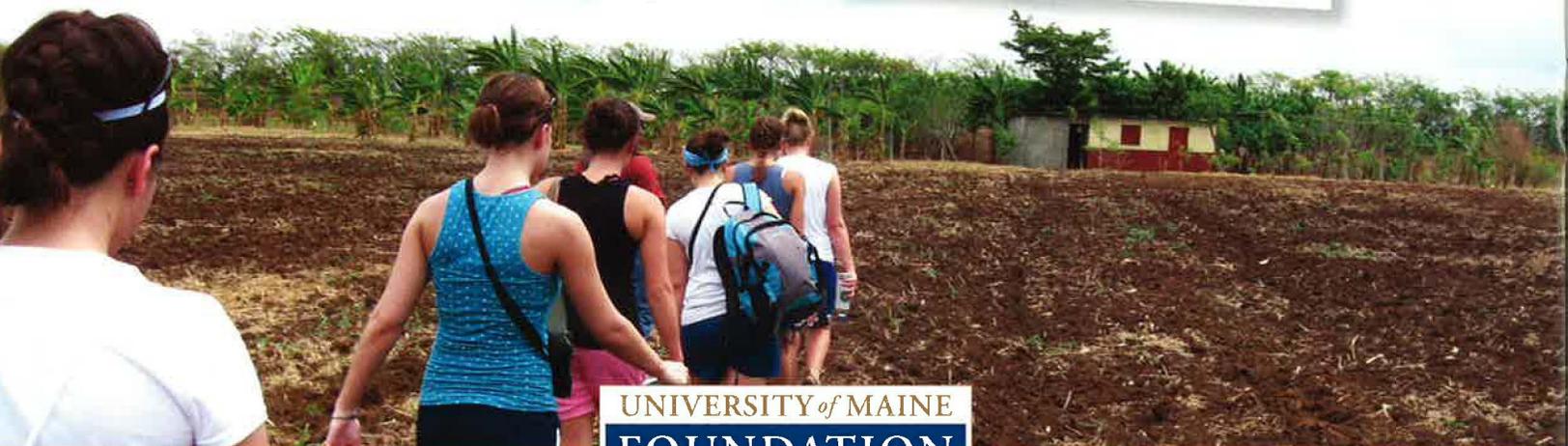
IN THE PAST DECADE, more and more University of Maine students have applied for the opportunity to experience Alternative Spring Break.

What started with 20 students and UMaine community members traveling to South Carolina to spend a week repairing homes of low-income families has grown to a contingent of more than 70 volunteers who this spring will head out to seven locations nationwide and one international destination. UMaine students contribute both time and some of their own money to travel to such states as West Virginia, Ohio, Michigan, Tennessee, New York and Louisiana to build houses for low-income families, mentor at-risk youths, help organize an AIDS walk, participate in an urban peace program, construct hiking trails, get involved in environmental cleanup and assist the elderly.

Alternative Spring Break promotes service on local, regional, national and international levels, immersing students in different cultures, heightening social awareness and advocating lifelong social action.

The **Alternative Spring Break Endowment Fund** was established in the **University of Maine Foundation** this year. Income from the fund supports Alternative Spring Break functions and trips.

Photos clockwise from the top: Rebecca Workman, Samantha Jewell and Audra Grady in Masaya, Nicaragua, working with Project Chacocente; Samantha Jewell and Laura Wood in Nicaragua; ASB Biscayne National Park 2008, Homestead, Fla.; UMaine volunteers in Nicaragua.



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