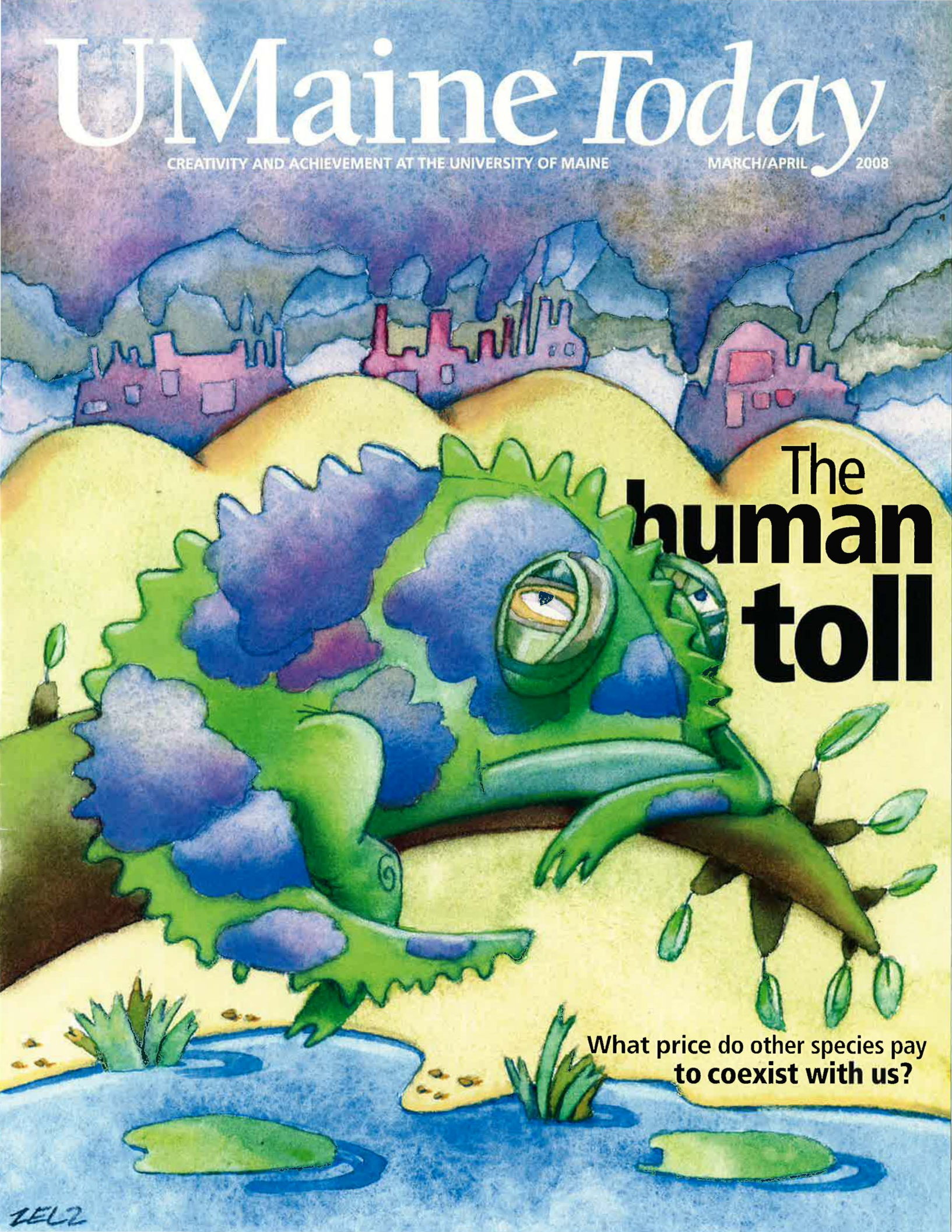
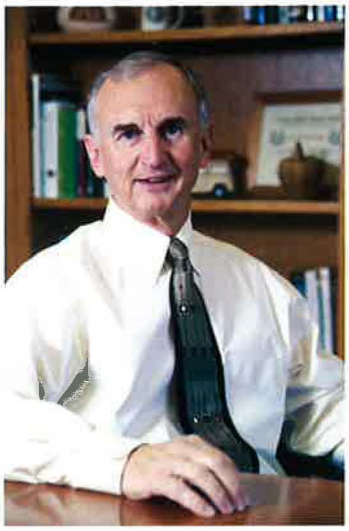
UMaine Today
CREATIVITY AND ACHIEVEMENT AT THE UNIVERSITY OF MAINE
MARCH/APRIL 2008



The human toll

What price do other species pay to coexist with us?

President's Message



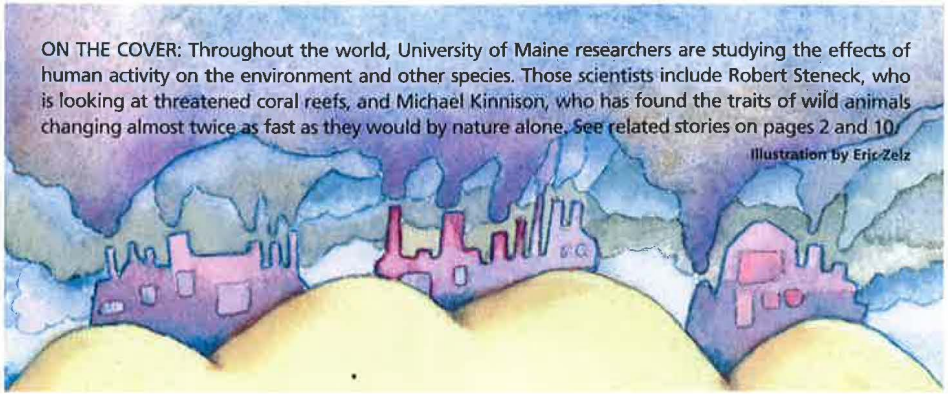
IN THIS ISSUE OF *UMaine Today*, John Rebar shares his thoughts on University of Maine Cooperative Extension. Extension brings UMaine's expertise and resources into every Maine county, connecting the university to thousands of people throughout the state. It is truly a modern manifestation of the land-grant tradition.

Extension is a prime example of outreach, or engagement, a foundational element of UMaine's three-part mission. While outreach doesn't always get as much attention as education and research — the other parts of that essential mission — it is critical to the way a public university like UMaine serves its state.

As John points out in his interview, this public engagement makes a real difference in people's lives. Extension faculty and staff make those real connections every day, providing the advice, support and education that Maine people need to find the way to a better life. At UMaine, we are proud to have such a committed and capable Extension staff working statewide.

University of Maine outreach takes other forms, as well. It involves faculty members who travel around Maine to share their expertise with groups or to provide perspectives to state government. It includes facilities like UMaine's Hutchinson Center, Darling Marine Center and research farms — all places where Maine people connect with their state university. Engagement is part of what we do at UMaine, and we are proud to be part of carrying on this tradition as Maine's people turn to the University of Maine to help deal with contemporary issues and rely on us to help.

Robert A. Kennedy
President



ON THE COVER: Throughout the world, University of Maine researchers are studying the effects of human activity on the environment and other species. Those scientists include Robert Steneck, who is looking at threatened coral reefs, and Michael Kinnison, who has found the traits of wild animals changing almost twice as fast as they would by nature alone. See related stories on pages 2 and 10.

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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 86 bachelor's, 92 master's and 29 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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Paradise lost

UMaine marine scientist warns of global harm to fisheries with collapse of the world's coral reef ecosystems

By Tom Weber
Photos by Robert Steneck

A rise in the temperature and acidity of the oceans that threatens the existence of the world's coral reef ecosystems could also have troubling implications for marine life and fishing industries as far away as Maine, a University of Maine researcher says.

Robert Steneck, a professor of marine sciences, is one of several authors of a new study predicting that increasing concentrations of carbon dioxide in the atmosphere, if not abated, will continue to deteriorate coral reefs to the point where they are likely to disappear altogether in the next few decades.

The potential collapse of these most biologically diverse and economically important ecosystems suggests a global atmospheric crisis that, Steneck says, could seriously harm fisheries worldwide.

"The Carbon Crisis: Coral Reefs Under Rapid Climate Change and Ocean Acidification," which represents the work of scientists from around the world, was published in December in the journal *Science*.

"While we are far from where coral reefs live, I think it's important to consider what this might mean in Maine," says Steneck, who is based at UMaine's Darling Marine Center in Walpole. "It's not as if coral reefs are on a different planet with a different atmosphere. They may be the canary in the mine shaft Earth, and the canary ain't doing so swell these days."

Scientists estimate that 25 percent of the world's coral reefs are already gone or severely damaged and that another third are degraded and threatened. Rapid increases in carbon dioxide emis-

A healthy Caribbean coral reef near Bonaire

Paradise lost

sions, which in the 20th century have raised the average temperature of the world's oceans by more than 1 degree Fahrenheit, "may be the final insult to these ecosystems," the study states.

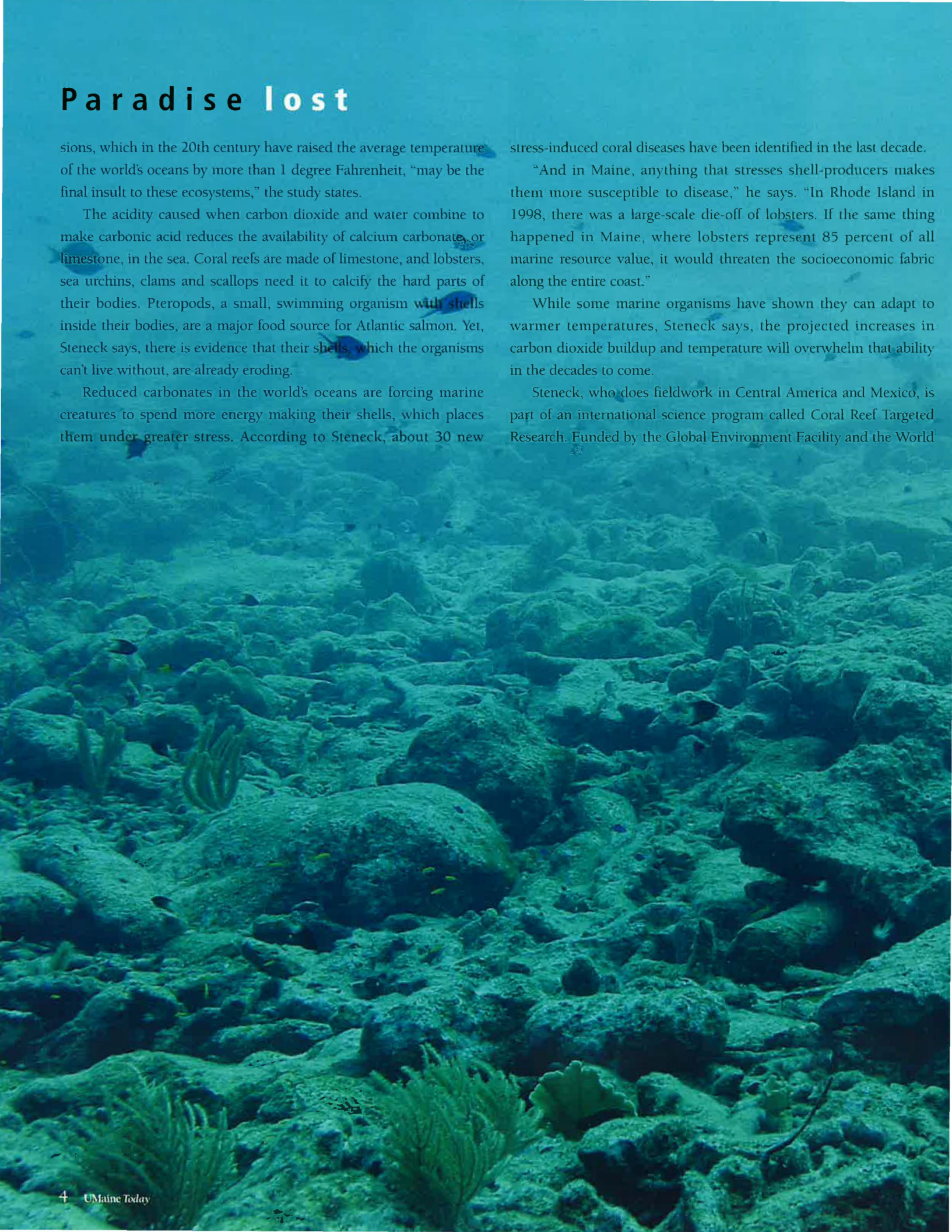
The acidity caused when carbon dioxide and water combine to make carbonic acid reduces the availability of calcium carbonate, or limestone, in the sea. Coral reefs are made of limestone, and lobsters, sea urchins, clams and scallops need it to calcify the hard parts of their bodies. Pteropods, a small, swimming organism with shells inside their bodies, are a major food source for Atlantic salmon. Yet, Steneck says, there is evidence that their shells, which the organisms can't live without, are already eroding.

Reduced carbonates in the world's oceans are forcing marine creatures to spend more energy making their shells, which places them under greater stress. According to Steneck, about 30 new stress-induced coral diseases have been identified in the last decade.

"And in Maine, anything that stresses shell-producers makes them more susceptible to disease," he says. "In Rhode Island in 1998, there was a large-scale die-off of lobsters. If the same thing happened in Maine, where lobsters represent 85 percent of all marine resource value, it would threaten the socioeconomic fabric along the entire coast."

While some marine organisms have shown they can adapt to warmer temperatures, Steneck says, the projected increases in carbon dioxide buildup and temperature will overwhelm that ability in the decades to come.

Steneck, who does fieldwork in Central America and Mexico, is part of an international science program called Coral Reef Targeted Research. Funded by the Global Environment Facility and the World

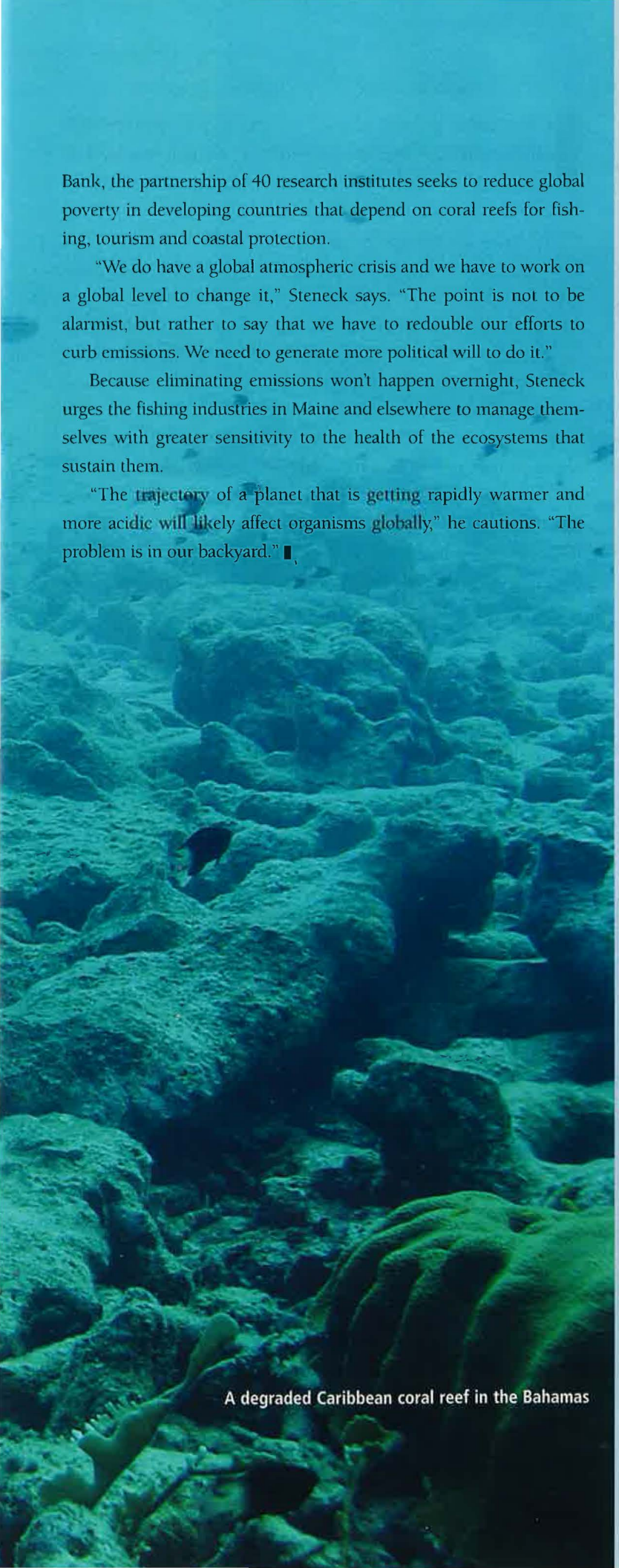


Bank, the partnership of 40 research institutes seeks to reduce global poverty in developing countries that depend on coral reefs for fishing, tourism and coastal protection.

"We do have a global atmospheric crisis and we have to work on a global level to change it," Steneck says. "The point is not to be alarmist, but rather to say that we have to redouble our efforts to curb emissions. We need to generate more political will to do it."

Because eliminating emissions won't happen overnight, Steneck urges the fishing industries in Maine and elsewhere to manage themselves with greater sensitivity to the health of the ecosystems that sustain them.

"The trajectory of a planet that is getting rapidly warmer and more acidic will likely affect organisms globally," he cautions. "The problem is in our backyard." ▮



A degraded Caribbean coral reef in the Bahamas

Suzanne Arnold on a dive near Palmyra Atoll, where she studied new and surviving corals growing on terra-cotta settlement plates anchored into coral rock, like the one in the foreground.

Recovery research

IN A WORLD in which climate change, pollution and overfishing are stressing reefs, an understanding of how new corals get started is essential to reef recovery.

That's the focus of research by University of Maine Ph.D. student Suzanne Arnold, whose work takes her to the healthy reefs of the Indo-Pacific and decimated sites in the Caribbean looking for answers.

"Caribbean reefs are in jeopardy and not recovering the way reefs are in the Indo-Pacific," says Arnold, whose doctoral research is in marine biology. "I'm trying to understand the processes through which reefs recover in an effort to help reef managers in the Caribbean."

Originally from Falmouth, Mass., Arnold received dual master's degrees from UMaine in marine policy and marine biology in 2007. In her research, she collaborates with one of the leading authorities on the ecology of coral reefs in the Caribbean, UMaine marine scientist Robert Steneck.

Arnold studies the establishment and survivorship of baby corals relative to their local surroundings.

In her master's work, she monitored the growth of new corals every three or four months on the reefs of Bonaire, a relatively healthy site in the Caribbean. The young corals are growing on terra-cotta settlement plates, tiles the researchers attached to the dead calcium carbonate reef skeleton. Species she's been tracking in the Caribbean for four years grow less than a centimeter annually.

Arnold found extremely low survival rates among the new corals due to overgrowth of algae and sponges. Essentially, the corals are being outcompeted for space. One of the main causes of algal overgrowth is overfishing, particularly of herbivorous fish.

Taking the HEAT

UMaine's newest sensors could be the Air Force's answer to monitoring jet engine reliability

By Tom Weber

IF YOU THINK keeping your car running at peak performance can be expensive and time-consuming, imagine the level of maintenance required to make the extraordinarily complex engines in military aircraft operate without a hitch.

A typical gas turbine jet engine can reach temperatures of more than 2,000 degrees Fahrenheit, with red-hot metal parts spinning at a nearly unfathomable rate. Determining when a critical component might be nearing the end of its useful life under such extreme conditions is difficult, though, which means that mechanics typically must tear apart the engine and replace parts to ensure an aircraft's readiness and safety at all times.

The Department of Defense recently decided that all of its new aeronautical and aerospace systems should be monitored continuously, using sensor technology that can automatically assess the health of the components and reduce costly manual inspections. The problem is that the high temperatures a jet engine generates can break down the diagnostic sensors, rendering them ineffective when things really get hot in flight.

But now researchers in the University of Maine Laboratory for Surface Science and Technology (LASST) believe they have developed the first sensor that truly can take the heat, and the U.S. Air Force is excited about the possibilities.

The high-temperature acoustic wave sensor, which is a few millimeters in size, is made of new materials that allow it to function at about 1,000 degrees Celsius (1,832 degrees F) and possibly much higher, thereby significantly surpassing the

In the University of Maine Laboratory for Surface Science and Technology (LASST), electrical and computer engineering associate professor Mauricio Pereira da Cunha, left, talks with graduate student Peter Davulis and research engineer Thomas Moonlight, two members of the research team working on high-temperature acoustic wave sensor development.

effective operating range of similar devices before it.

"The sensors will be targeting temperature, pressure, vibration and corrosion in the engines, and determining the probability of failure of the parts over time so they could be used longer," says Mauricio Pereira da Cunha, an associate professor of electrical and computer engineering and member of LASST. "The Air Force is very interested in this technology because it would potentially help save more than $1.6 billion in engine maintenance costs, and free up Air Force money to renovate the fleet."

Acoustic wave devices have been used commercially for more than 60 years, and can be found today in computers, quartz watches, cell phones, garage door openers, pagers and other modern electronics.

Applying voltages to the metallic electrodes on the device generates sound, or acoustic, waves that propagate along the surface. Any change at the surface of the device affects the wave propagation, which can be accurately gauged by measuring the frequency response. The wave speed's extreme sensitivity to environmental conditions allows the versatile devices to act as sensors that can precisely monitor such variables as temperature, pressure, vibration and corrosive gases.

Until now, however, the devices had never been used successfully at very high temperatures because of the limits of their materials. Pereira da Cunha and Robert Lad, physics professor and director of LASST, are confident that the new materials used in their sensors will change all that.

A DECADE AGO, Pereira da Cunha began researching the high-temperature behavior of a crystalline material called langasite, first grown in Russia in the 1980s, to determine its potential applications for acoustic wave devices. In 2001, shortly after coming to UMaine, he received a NASA-funded Maine Space Grant Consortium seed grant to test the feasibility of using acoustic wave devices made with langasite as sensors in aerospace vehicles to detect leaks of explosive hydrogen gas.

Pereira da Cunha's NASA research demonstrated that langasite works reliably at 750 degrees C in environments such as those found in gas and oil drilling operations, whereas other traditional acoustic wave materials degrade above a few hundred degrees C.

The improved high-temperature device also was tested for use as a hydrocarbon sensor to monitor the fuel-burning efficiency of combustion engines. Hydrocarbon in exhaust, the result of inefficient burning of fuel, pollutes the air and decreases the distance a jet, or any other vehicle, can travel.

With a nearly $392,000 grant from the Defense Department's Experimental Program to Stimulate Competitive Research (DEPSCoR), and additional funding from the Air Force Research Laboratory, Pereira da Cunha and Lad are now pushing the new sensor technology to operate at 1,000 degrees C and more for use in Air Force jet engines.

The acoustic wave sensors, like the one pictured above, right, are made using a crystalline material called langasite that is cut into wafers just 500 microns thick. To further enhance the sensor's high-temperature capabilities, ultrathin ceramic film materials have been developed to coat the device.

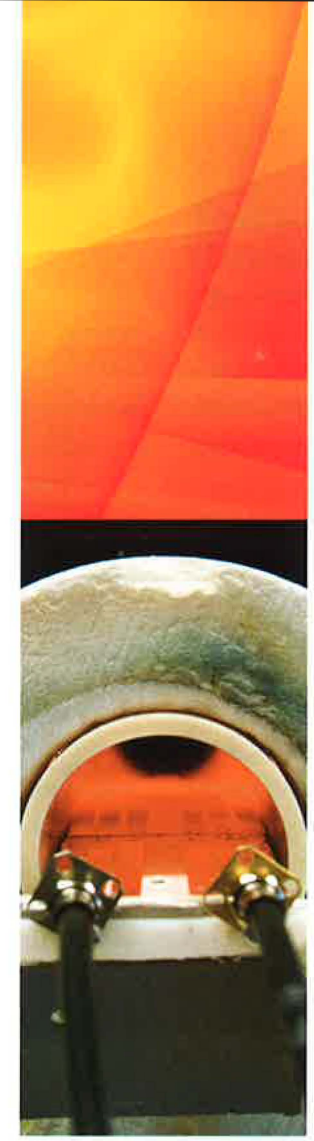
To further enhance the sensor's high-temperature capabilities, the UMaine team has developed a new configuration of precious metals to help electrodes maintain their integrity. Also created were very thin ceramic coatings to protect the devices from heat, abrasion and damaging particulates whirling inside the jet engines.

In March, the researchers will hand over three of the prototype sensors to the Wright-Patterson Air Force Research Laboratory in Ohio. The Air Force will put the devices in prototype turbine engines and run diagnostics.

"Measuring the condition of components in the Air Force environment will help transition our sensors from lab prototypes into routine devices in the field," says Lad.

The UMaine team also is hoping to eventually make the devices wireless, Lad says, so that they can be put on certain moving parts where the wired versions cannot function.

TWO UMAINE PATENTS are pending on the sensors, which are fabricated and tested on campus. Researchers have developed the capacity to cut the crystal substrate material into wafers just 500 microns thick (a human hair is about 100 microns in diameter), and have the machines to align, grind and polish them. The sensors are then equipped with patterned electrodes and thin film layers in the clean room microfabrication facility.

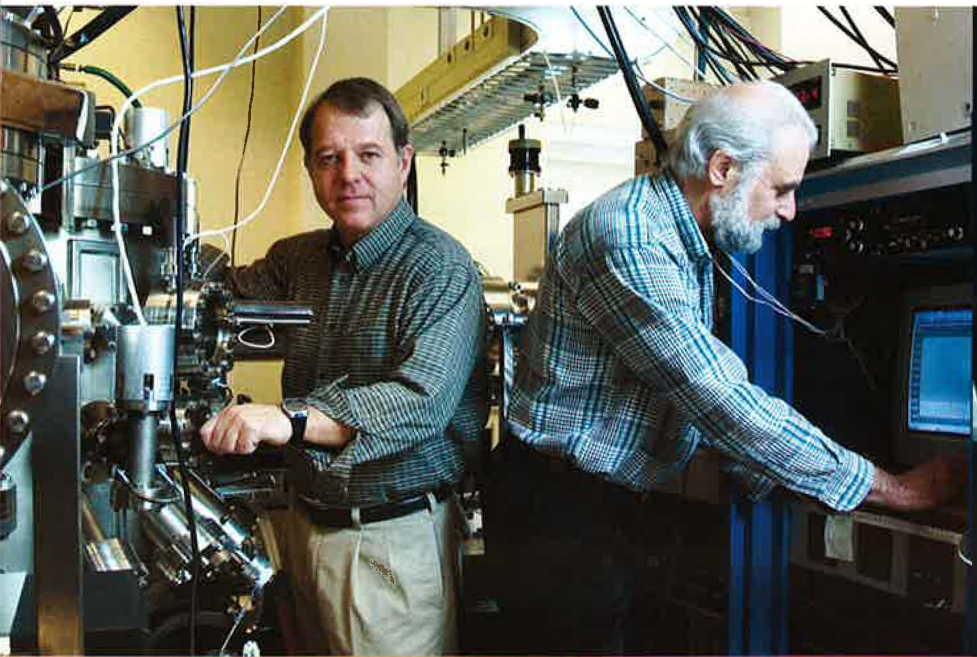


With UMaine chemical engineer and LASST member Paul Millard, Pereira da Cunha also is adapting the devices to rapidly and reliably detect potential bioterrorism-linked microbial pathogens in water supplies. With chemical engineer Clay Wheeler and Bruce Segee in electrical and computer engineering, Pereira da Cunha is helping develop sensors that can sniff out hydrogen fluoride, a potentially harmful gas found in solvents, refrigerants and herbicides that could be unleashed in industrial accidents or in breaches of homeland security.

In addition, Pereira da Cunha is researching wireless sensors with UMaine electrical engineers Ali Abedi and Don Hummels.

As for the new high-temperature turbine engine sensor, Pereira da Cunha and Lad believe the devices could be of enormous benefit to the commercial aviation industry as well as the military.

"We know that the sensors work, but we need to do more research and development to improve their operation," Pereira da Cunha says. "We would like to keep developing them here and possibly spin off a private company." ▮



LASST research scientists George Bernhardt, left, and David Frankel prepare to deposit thin film coatings on the sensor devices. The photo on the right shows the film deposition configuration inside a vacuum chamber. In the top photo, a prototype sensor is tested over the long term in a high-temperature furnace at LASST.

UMaine Extension

John Rebar

Title: Executive Director, University of Maine Cooperative Extension

Research focus: Outreach. In Somerset County, I conducted programs in 4-H youth development, family and consumer sciences and home horticulture.

Years at UMaine: 23

Milestones: A successful Extension educator for 10 years who earned three national awards. An administrator for 13 years, serving as a program administrator from 1994–2002. Assumed the role of program and financial administrator in 2002 and executive director in February 2007. Has served as associate director of the Maine Agricultural Center since its inception in 1999.

Question: Why is this a particularly exciting time for University of Maine Cooperative Extension?

Answer: Maine is ever changing. The challenges of today and the promises of tomorrow can only be addressed through education. The people of Maine need educational information that is relevant to their daily lives and for their future. UMaine Extension has a wealth of resources that can help in agriculture, natural resources, small business, aging, nutrition, community development, parenting, youth development and more. Our work is research-based and valued as credible and reliable.

Question: What is Extension's role as part of the state's land-grant university?

Answer: As the largest outreach component of the University of Maine System, we exist in Maine communities for Maine people. We like to say we are the University FOR Maine. For everyone, everywhere — we have something that can help people live the life they want.

Question: What does Cooperative Extension mean to you?

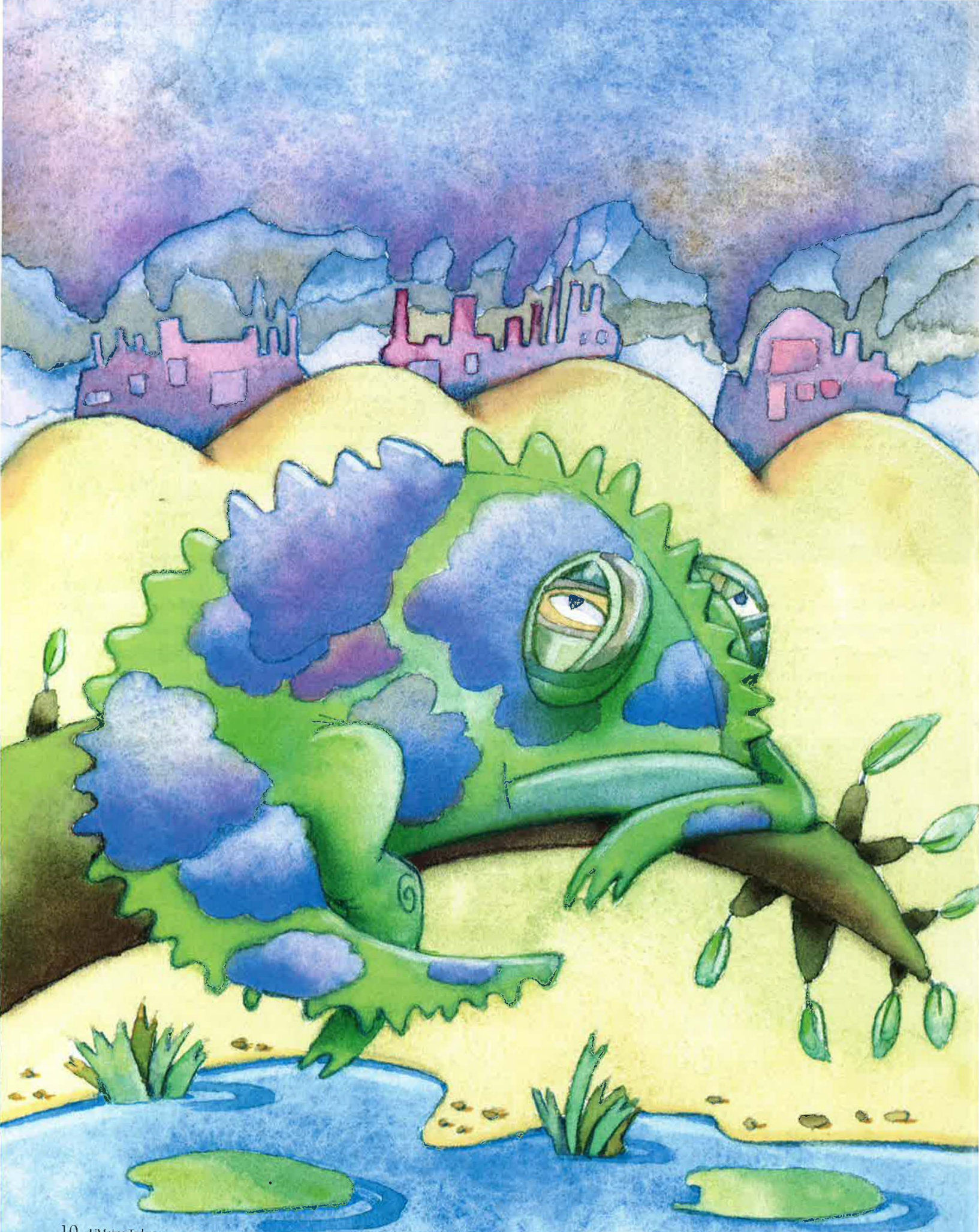
Answer: Opportunity. Extension can help people develop goals and build a process whereby they achieve their dreams and live their values. We have helped people develop business plans, create value-added products, learn public speaking skills through 4-H and a myriad of other things that shape who they are and who they want to be.

Question: What's your most memorable Extension moment?

Answer: Years ago when I was working as an Extension educator, an individual came to me seeking support to develop a plan for creating a food pantry that would be supported by local community tax dollars. She needed assistance in developing her presentation to the town selectmen of two communities. What she really needed was someone to believe in her and help her refine her request. She got funding and the food pantry is still in operation today. She made it happen, yet to this day she credits me for helping her. Sometimes the difference Extension makes is hard to measure, but very rewarding.

Question: What can we look forward to from UMaine Cooperative Extension in the coming years?

Answer: Our future will be "high-tech" and "high-touch" as we build on our strengths and incorporate innovations that are cost-effective and efficient. We have excelled at personal interaction for more than 90 years. Today, we are reinventing our presence on the Internet so that our Web site will become a virtual Extension office. Our clients expect immediate access to information and resources, and we are making that possible. People also want to be able to call, meet and consult professionals who can help them achieve their goals, and we continue that work, too. We are adding to our publications catalog continuously and many items are free to download. We strive to be relevant, accessible and affordable for all Maine people.



Life Altering

When faced with environmental change, countless numbers of species have adapted, allowing them to survive and, in some cases, thrive for millennia. Those without such resilience have not. But can species keep up with the modern changes wrought by humans?

For decades, scientists have studied threats to populations in an effort to advance their conservation. But only recently have they begun to consider how species might adapt to humans. Now for the first time, a team of biologists has quantified the rate and scale at which humans accelerate change in other species.

They have determined that humans are changing observable physical or behavioral traits in animals nearly two times faster than nature does.

As a result of their findings, the scientists — Michael Kinnison at the University of Maine and Andrew Hendry and Thomas Farrugia of McGill University — are calling for a reenvisioning of conservation biology, to include consideration of the changing nature of populations within the span of years rather than decades or centuries.

"Human influences are causing the features of animals to change much faster than what would happen in nature alone," Kinnison says. "In fact, we're changing the traits of animals almost twice as fast, and that gives us a lot to think about."

What is clear, Kinnison says, is that if we are concerned about these trait changes, we probably don't have the luxury of decades or centuries to deal with them.

"Our data suggest that changes seen in a few generations are often as large as those seen over hundreds," he says. "In some cases, we may be changing the face of life nearly as quickly as we are changing the environments on which life depends."

In an ever-growing database of trait studies, the researchers gathered more than 3,000 estimates of physical and behavioral changes occurring in recent times in wild species — from bugs to bighorn sheep — from around the world. They then compared the rates at which the traits of animal populations changed in one to 200 generations in response to either naturally occurring processes or human disturbances, such as harvesting (fishing, hunting), pollution and introduction of invasive species.

Their findings suggest that trait changes in animals can pick up the pace when exposed to human influences. When beneficial, these changes could help species persevere. However, the researchers caution that some of these changes may not be beneficial or sustainable over longer periods of human interference.

"The argument that observed changes in species are just isolated cases that can be brushed aside loses ground significantly when confronted by a pattern that emerges from the work of many scientists combined," says Kinnison, who, with his colleagues, published the findings in the journal *Molecular Ecology*. "It helps us to see the big picture."

Evolution is traditionally understood to be a life-altering process that is so glacially slow and gradual that only the ancient bones in the fossil record could prove that it even happens. But the science of evolution has undergone a dramatic evolution of its own in recent decades, providing ample evidence that it doesn't take millions or even thousands of years for animals to adapt to new environments. It's happening within our own lifetimes, in fact, at a pace swift enough that we're able to see life changing before our eyes.

Kinnison, an associate professor of biology, is at the forefront of the dynamic new discipline called contemporary evolution. He has witnessed evolution unfolding while researching guppy populations in the streams of Trinidad, chinook salmon introduced into the waters of New Zealand, and other fish species in Maine.

When Kinnison and Hendry first set out in the 1990s to build a database of rates of trait changes in animals through time and across generations, they discovered that evolution didn't play out exactly the way most people had always believed.

A new study shows humans cause the traits of other species to change at nearly twice the normal rate found in nature

By Tom Weber

Illustration by Eric Zelz

Life Altering

"We found that evolution is built upside down relative to most people's perceptions," Kinnison says. "Most people think it takes a long time for evolution to occur, but it's really buzzing along all around us, all the time. The fastest rates of change occur in the shortest time frames, but these changes often partly cancel out over longer periods. So while we can watch evolution in action, it will often appear slow when viewed over longer periods."

Take, for example, the Galapagos finches that inspired Darwin's early work on the origin of species. Modern research has found that in times of drought, when plant life is severely diminished and seeds become scarce, the little birds adapt by growing bigger beaks that can accommodate larger, harder and thornier seeds. In wetter periods, the finches' beaks get smaller as seeds become more abundant. Amazingly, these transformations can occur generation to generation.

"The beak size is going from big to small, back and forth, very quickly, following natural climate changes," Kinnison says.

"We found that evolution is built upside down relative to most people's perceptions. Most people think it takes a long time for evolution to occur, but it's really buzzing along all around us, all the time."

Michael Kinnison

Having amassed thousands of estimates of speedy and observable trait changes, Kinnison and Hendry then began to explore the twin influences that trigger this remarkable adaptive process: natural events, such as the weather patterns that alter beak size in Darwin's finches, and changes wrought by humans, such as the introduction of exotic species to native populations, hunting, fishing, pollution, urban sprawl and climate change.

"We looked at where nature was running the show and where humans were running the show," Kinnison says. "And where humans run the show, animal traits change almost twice as fast. Humans seem to be really stepping on the gas pedal."

The researchers also examined the biological mechanisms by which animals changed when human influences abruptly altered their worlds. Was classic evolution by natural selection — passing the most favorable, robust genes from one generation to the next — the primary adaptive method in most cases? Or was something called "phenotypic plasticity," the ability of organisms to change their physical and behavioral characteristics through existing physiological mechanisms, also important?

Their conclusion: phenotypic plasticity is an important component of these human-induced changes.

"That says that animals might be having to use their whole bag of tricks to cope with human influence," says Kinnison, a New Hampshire native whose interest in aquatic ecology and cold-water fish like salmon, trout and Arctic charr led him to UMaine in 2002.

Snails living in Maine tidal pools provide a good example of this plasticity phenomenon. After humans accidentally introduced the European green crab into their midst, certain periwinkles soon began to grow thicker, harder shells to better withstand the alien predators' crusher claws.

To learn what prompted the defense mechanism, and how quickly it happened, a researcher at Northeastern University placed snails in a tank with green crabs, separating the creatures by a flow-through barrier. It turned out that the snails could detect the crabs' presence in the water — "smell" them, as it were — and so produced thicker shells in as little as three months in response to the risk.

"And when the snails grow in less crabby water, their shells are thinner," Kinnison says.

But not all changes are phenotypic plasticity. Classic evolution by

natural selection is at work in many populations affected by humans. In the Rocky Mountains, researchers studying bighorn sheep have found that horn size in some populations has diminished over time as a result of selective hunting pressures. Because most jurisdictions specify that only rams with certain size horns can be shot, sheep with the biggest curled racks have been culled in some locations, leaving only smaller-horned animals to pass on their genes.

"So the changes we cause are not always to our advantage," says Kinnison. "Who wants to hunt small-horned bighorn sheep?"

Closer to home, as the fishing industry eventually depleted the cod populations, selection favored fish that started reproducing younger and smaller because those fish had better chances of reproducing before being netted. Unfortunately, the evolution of these smaller fish may not only have reduced their economic value, it may have also hastened the stock declines because those fish produce fewer offspring.

"Even though cod fishing has stopped, the fish are still smaller now and we may have to wait some time for them to get bigger," says Kinnison. "Natural selection favoring bigger fish might not be as strong as human selection was for smaller sizes."

Kinnison thinks his work provides compelling support for considering more than just outright extinction when assessing human effects on biodiversity. We need to consider how humans have changed many of the organisms that persist, and whether those changes will be sustainable, he says, which may be some of the toughest questions facing evolutionary and conservation biologists

"On the positive side, many animals seem to show more ability to change in response to human disturbances than many people might have suspected," he says. "The downside is that we might not always like those changes and they might not be sufficient to keep up with humans in the long run. Phenotypic plasticity and evolution might only go so far."

And if certain animals are dying out because they're too slow to adapt, do researchers wind up measuring only the winners who have managed to keep up with the hurtling pace set by humans?

"We also have to wonder whether those winners can keep up much longer," he says.

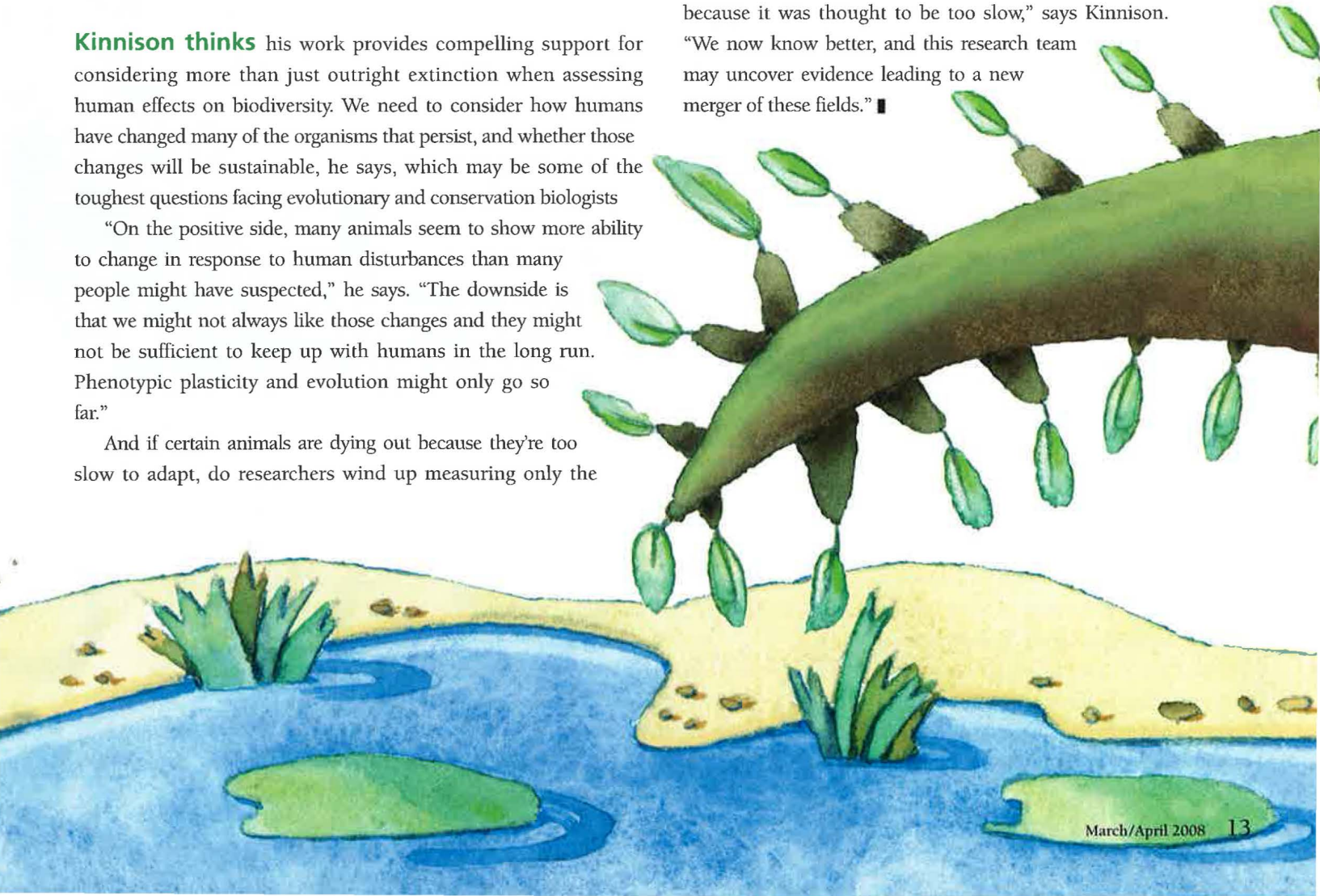
Kinnison will be exploring those kinds of questions this spring as part of a National Center for Ecological Analysis and Synthesis panel charged with predicting responses of salmon and other organisms to climate change.

He will also soon revisit the jungles of Trinidad to continue his work on guppies. This time, however, he will be part of an interdisciplinary scientific effort designed to explore the dynamic interactions of contemporary evolution and ecology in the wild.

Animals might be having to use their whole bag of tricks to cope with human influence.

The five-year, $5 million project, funded by the National Science Foundation's Frontiers in Integrative Biological Research, brings together experts from 12 universities worldwide to study how environmental changes can cause guppy populations to quickly evolve, and how that evolution can affect population growth, species interactions and even energy flow in an aquatic environment.

"In the past, evolution was largely ignored in ecological studies because it was thought to be too slow," says Kinnison. "We now know better, and this research team may uncover evidence leading to a new merger of these fields." ▮



From his student days, Anatole Wieck learned that music "is an indicator of a spirit that exists in a society."

The idea was ingrained in the Latvian-born violinist and violist as a youth studying in Riga and Moscow, then at Juilliard from 1973. Throughout his career as a soloist, conductor and college professor, Wieck imparted this philosophy inspired by his mentor, the iconic Russian composer Iosif Andriasov, to audiences and students across Europe and North and South America.

But in 2006, it was a youth orchestra Wieck mentored that showed him the ultimate ability of music to not only lift the spirit of a society, but also to bring about social change.

It happened in Guatemala.

Wieck was invited to spend three weeks in residence with the Jesús Castillo Orchestra and the national youth orchestra of the Music and Youth Foundation in Guatemala City, which provides classical music education and instruments to children and youth from all socioeconomic backgrounds, especially the rural and urban poor.

"Some of the kids are from middle-class backgrounds and others are from poor and underprivileged backgrounds without a chance to study music except for this program," says Wieck, a professor of music at the University of Maine since 1986. "But that's the amazing thing. They are taught by young professionals who gather them into the orchestra, and almost immediately by some kind of miracle they start making music.

"It happens because of the enthusiasm of the kids, driven by inspiration of the teachers and their young director and conductor Bruno Campo. I have to say that in 2006, I was skeptical, yet I had a feeling it might work because I met the people behind the program, who are very passionate about what they're doing.

A former post office is now the home of the Metropolitan Youth Orchestra and Arts Center in Guatemala City. Across the street, in a building that was once a palatial private home, sections of the children's orchestra rehearse. During his residency, UMaine Professor of Music Anatole Wieck led rehearsals and tutored members of the violin section of the children's orchestra. He also conducted the youth orchestra. Joining him in the instruction was Karla Laigh, one of three Venezuelan musicians also in residency to mentor the young musicians.

"When you have such passion, drive and love for music and children, then miracles happen," Wieck says.

The Metropolitan Youth Orchestra and school, founded in 2006 by Bruno Campo with the help of Isabel Ciudad-Real, president of the Music and Youth Foundation, is modeled after Venezuela's National System of Youth and Children's Orchestras that started more than two decades earlier. Guatemala's symphony began two years

Photos by Claudio Vásquez

Music that opens doors

laine virtuoso mentors youth orchestras bringing social change to Guatemala

Margaret Nagle

Music is used to change people's lives and the

after a historic peace accord was signed between the government and leftist rebels in that country, ending 36 years of civil war.

Music is "an important part of humanity," according to the foundation's statement of purpose on its Web site. "Respect, tolerance, discipline, solidarity, teamwork and leadership are some of the values to be developed and strengthened as the foundations for living in a democratic, sensible society in a culture of peace. The practice of music in an ensemble provides ideal tools in this process."

Similar national systems of orchestras for children and youths have been established in other Latin American countries, such as Argentina, Mexico and Bolivia, as tools of education, social development and cultural advancement. Music is considered an avenue of social action — a means of improving society and the lives of the youngest citizens.

In Guatemala more than 15 choirs and five orchestral ensembles now use music "to change people's lives and (the) social fabric of the most (needy) communities." The Metropolitan Youth Orchestra is becoming the model for other orchestral programs in the country, supported by the Guatemala Ministry of Culture.

Wieck's residency, originally funded by a Fulbright grant in 2006, involved tutoring and leading master classes for the members of the Jesús Castillo Orchestra and students of the National Conservatory, ages 18–23.

One of the strengths of the children's and youth orchestras is peer mentoring. Older members mentor the youngest musicians and perform alongside the children in performances. Members of the youth orchestra and guest conductor Anatole Wieck wear their signature white jackets during public performances, like the concert for nearly 800 prior to Wieck's departure in September.

That year, the symphony performed in the inaugural concert for the opening of the foundation's new arts center, where many of the members are now instructors for younger, incoming musicians.

Wieck returned to Guatemala early last fall to help those youngest musicians, ages 6–16.

"I was touched that I was invited back, that they considered me one of their own," says Wieck. "It's such a fantastic project. I feel it's a real privilege to be part of it."

The new youth orchestra pairs some of the most talented children with the young professionals, not only for instruction, but also for performance. In concerts, the more seasoned musicians perform next to the children in an atypical mentoring relationship Wieck says "is working."

"Theoretically, the children should be more nervous (before a concert) because they have less experience, but they feel secure because their teachers are with them," Wieck says.

social fabric of needy communities.

"My mentor Iosif Andriasov always talked about the importance of the arts in society. Music is not just entertainment. This experience goes to the core of that philosophy, showing that music can bring people together in a profound way that may improve their quality of life. And music is not just for one person, but for a whole society. That's what the Guatemalans behind this project believe."

Anatole Wieck

Wieck says signs of success are evident in the artistic quality of the performances. When the students play with their teachers in the advanced orchestras, they reach almost professional level. The music making in this group has passion and "a distinct feeling." Students performing in the younger group sound like a middle school orchestra.

"Yet, there's something else you don't expect in a performance by musicians at these ages with little experience. It's very appealing, with a definite excitement, and the audience feels that," Wieck says. "When people play with passion, they begin to shape the music. These are not kids playing separate notes. Their performances are compelling. That's what impressed me."

It was in his one-on-one sessions with the children that Wieck realized their individual drive — and their intensity. Most were performing on instruments provided by the foundation. In the week leading up to the public concert, the youngsters arrived daily by 9 a.m. and practiced throughout the day. It was in the rehearsals, without mentors performing at their side, that the young musicians had to "step up," says Wieck.

"For example, there was a boy about 14 from an underprivileged family who a year ago didn't know anything about classical music. He not only was introduced to it, but also learned to love and perform classical music as a percussionist. While his teacher spent time in rehearsals helping him find his place (in the music), in concert, the boy played Beethoven's *Fifth* correctly."

For some of the students, their participation in the national youth orchestra will lead to musical careers. For all, it opens doors to high culture.

"The way they're being taught opens a whole new world of beauty through music," Wieck says.

Despite his 34-year musical career, Wieck says he learned some powerful lessons from the young musicians. One of the most important: how strongly they feel about the privilege to be a musician.

"In a time when many rich countries, including ours and some in Europe, begin to think the arts expensive and, as a result, fund less and less, Guatemala, a country with limited resources, decided this kind of arts program is important and had no problem finding money. This is an example for everyone. It also really shows that supporting the arts is a question of priorities. I'm impressed that people in that country have the right priorities," he says.

"My mentor Iosif Andriasov always talked about the importance of the arts in society," he says. "Music is not just entertainment. This experience goes to the core of that philosophy, showing that music can bring people together in a profound way that may improve their quality of life. And music is not just for one person, but for a whole society. That's what the Guatemalans behind this project believe." ▮

Conservation and ecology

FROM THE WOODS of Maine to the Oklahoma prairie and the Arizona desert, Ben Wasserman has ranged far afield in the last few years from the New York City suburb where he grew up. Along the way, the University of Maine junior wildlife ecology and math major has done research on a broad range of animal species.

He even learned the proper way to take the temperature of a fierce-looking, spiny lizard that can squirt a 3-foot stream of blood from the corners of its eyes.

Last year, the honors student was awarded a prestigious Morris K. Udall Scholarship for demonstrating an exemplary commitment to making a career in the environmental field. While the $5,000 certainly will come in handy, Wasserman says the best part of the award was meeting the 79 other recipients from across the country who gathered for a few days in Tucson to talk about their common passions for the natural world and how they hope to put them to good use.

"It really was an incredible experience, being surrounded by so many like-minded, conservation-oriented people," says Wasserman. "It inspired me."

Wasserman wasn't exposed to much in the way of wildlife while growing up on busy Long Island, N.Y. But once he started working at a local natural history museum, he found that he enjoyed caring for the live animals that — except for a 6-foot iguana — represented a cross section of the regional fauna.

By the time he started thinking about college, Wasserman was already leaning toward environmental studies. At UMaine, he went looking for hands-on opportunities to learn.

The summer after his freshman year, he worked on three research projects led by graduate students. For one, he counted scat samples as part of an evaluation of the relationships between snowshoe hare, Canada lynx and vegetation in areas affected by forestry practices in northern Maine. He also trapped pine marten in northern Maine to validate a predictive GIS model, and did

At Floods Pond in Otis, Maine, University of Maine junior Ben Wasserman participates in research led by Associate Professor of Biological Sciences Michael Kinnison on Maine's Arctic charr living in a dozen freshwater bodies statewide. The fish are caught by net and brought on shore, where Wasserman takes measurements and digital photos of them to analyze their body shape. He also scans for passive integrated responder (PIT) tags, indicating previously caught charr, and inserts tags in new fish. The fish are then released. The mark-recapture techniques allow the researchers to estimate population size, which is valuable in management of the rare species.

"My motivation has always been conservation, but I want to do ecological research that informs conservation measures and policy. I guess I see myself pushing the envelope to better understand the ecology of the system, how humans are involved and how we can mitigate the damage we do."

Ben Wasserman

radio telemetry for a project that examined the threat of road mortality on the population viability of Blanding's and spotted turtles, two rare species in southern Maine.

As a sophomore, he joined UMaine's ongoing research led by evolutionary biologist Michael Kinnison on the Arctic charr population at Floods Pond in Otis. Maine's Arctic charr, a relative of trout and salmon, are found in only about a dozen state water bodies. They represent the most southerly populations of the salmonid fish and the only indigenous ones in the U.S. outside of Alaska.

In particular, UMaine researchers are looking at how body shapes of charr have evolved differently from lake to lake in relation to the food sources available to them in a competitive habitat.

"I'm interested in community ecology, the interaction of all different species that form a biological community," says Wasserman.

In addition to his wildlife ecology studies, Wasserman declared math as his second major last spring, convinced that it would play an important role in the computer modeling that is so much a part of ecological research.

"Math is huge," says Wasserman, who serves on the Dean's Advisory Committee for the College of Natural Sciences, Forestry, and Agriculture. "You can use it to go all sorts of places, from the very theoretical research to the very applied. I would like my future to walk that line between the two."

Eager to learn about reptiles and amphibians in the field, Wasserman worked last summer with a Southern Illinois University – Carbondale doctoral student who is studying a population of Texas horned lizards in Oklahoma. Largely desert dwellers, the lizards are a threatened species in much of their range. Wasserman's lizard study group lives near an Air Force base on the prairie, a northern outpost for their kind.

Wasserman and the team used radiotelemetry tracking and body temperature readings to observe how the lizards use the thermal landscape, moving from one zone to another as necessary throughout the day. The team also did a general survey of the full range of wildlife in the region.

"It was a great experience to be out on the prairie, to work in such unfamiliar territory," he says.

Wasserman hopes to one day carve out a career that incorporates a satisfying blend of ecology and conservation.

"My motivation has always been conservation," says Wasserman, who plans to get more wildlife fieldwork experience before going to grad school, "but I want to do ecological research that informs conservation measures and policy. I guess I see myself pushing the envelope to better understand the ecology of the system, how humans are involved and how we can mitigate the damage we do." ▮

Rural renaissance

FOR VISITORS taking a day trip to Gulf Hagas, a picturesque three-mile gorge along the Appalachian Trail, the Maine community of Brownville has long been a "last stop" for goods and services before heading deeper into the North Woods.

But folks in Brownville know that their community has more to offer visitors. With the help of University of Maine Cooperative Extension and the Piscataquis Tourism Task Force, Brownville and other communities are taking stock of their visitor assets — from unique natural areas to cultural landmarks — and putting themselves on Maine's tourism map.

"We work with communities across the county, helping them inventory and evaluate their tourism assets," according to Roger Merchant, a UMaine Extension educator and chair of the Piscataquis Tourism Task Force, who says Brownville's attractions include a monument to 19th-century Maine surveyor and mapmaker Moses Greenleaf, the Piscataquis County Soil and Water Conservation District Forest, the Pleasant River Walk and the town's untapped, long-standing role in railroading history.

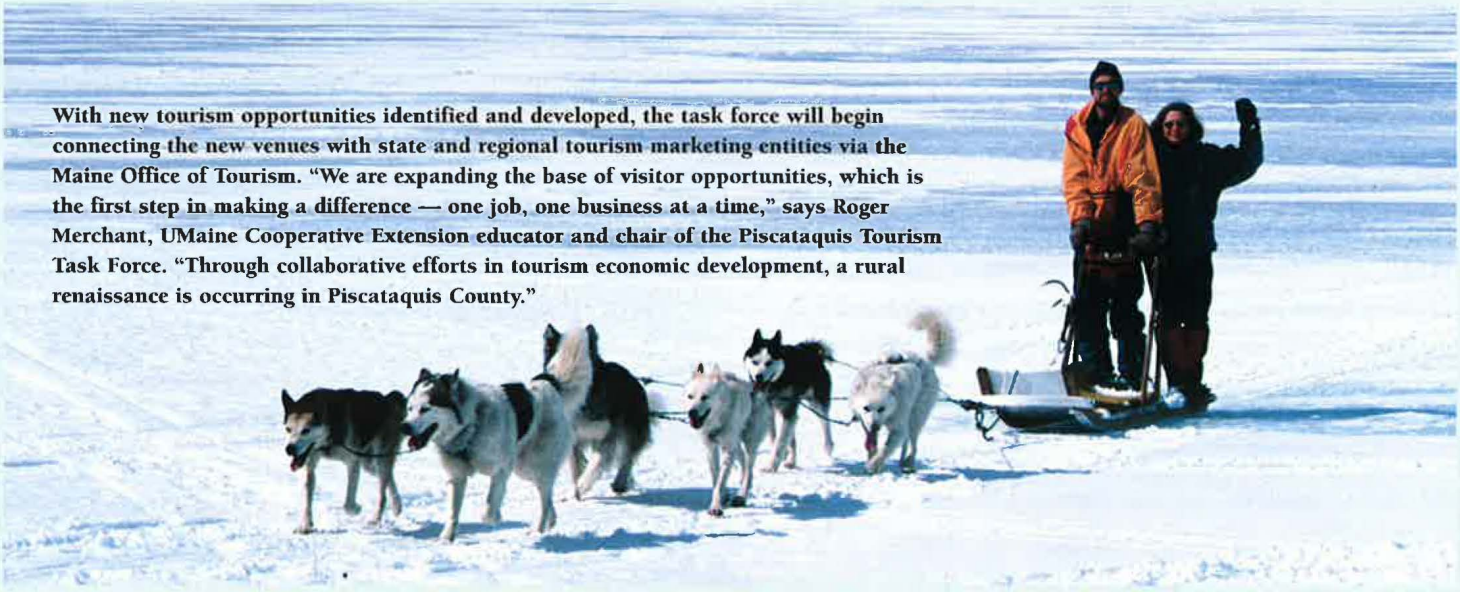
"It's created community pride and unlocked some of these best-kept secrets in the community and surrounding region."

The Piscataquis Tourism Task Force was established in 2005 through a partnership between UMaine Cooperative Extension, the Piscataquis County Economic Development Council, the Piscataquis County Commissioners and the county's key tourism stakeholders. Emphasizing countywide collaboration, it is redefining rural development by mixing grassroots tourism development with traditional economic development focused on business and industry.

In its first year, the task force reviewed new and existing tourism research to draw up recommendations for an action plan. Among the newest research was a 2004 study of local attitudes toward nature-based and cultural heritage tourism, conducted by UMaine's Margaret Chase Smith Policy Center. The survey found residents and business owners open to niche tourism opportunities that "do not erode or compromise rural quality of life."

"We're looking at new visitors as a way to stimulate the expansion and growth of small businesses. We are about developing new tourism products beyond our good outdoor traditions in hunting, fishing, rafting and snowmobiling."
Roger Merchant

The task force has supported four new complementary tourism development initiatives: nature tourism and "Villages of Piscataquis County" itineraries; interpretive enhancements at two trailheads for the Appalachian Trail; and a CD and guide to the 45 waterfalls of Piscataquis County.



With new tourism opportunities identified and developed, the task force will begin connecting the new venues with state and regional tourism marketing entities via the Maine Office of Tourism. "We are expanding the base of visitor opportunities, which is the first step in making a difference — one job, one business at a time," says Roger Merchant, UMaine Cooperative Extension educator and chair of the Piscataquis Tourism Task Force. "Through collaborative efforts in tourism economic development, a rural renaissance is occurring in Piscataquis County."

Photos by Roger Merchant

UMaine English professor amplifies Native voices in literature and theater

By Margaret Nagle

Staging area

THE "AGITATORS" started in soon after Margo Lukens began teaching a class in Native American literature at the University of Maine. The UMaine students — Penobscot and Passamaquoddy — discovered aboriginal plays in her classes and had a thirst for more.

The students were responding to familiar issues and situational humor in plays like *Dry Lips Ought to Move to Kapuskasing* by Canadian Cree writer Tomson Highway. The play's conversations and relationships tapping into the cultural undertow resonated with students like Dale Lolar of Indian Island in Old Town, Maine.

"The work we did in Native American literature caused me to pause and rethink," says Lolar. "The stories took me back to my childhood, helping me learn more about myself. After reading that play in her class, I wanted to do more than that, and I kept bringing it up."

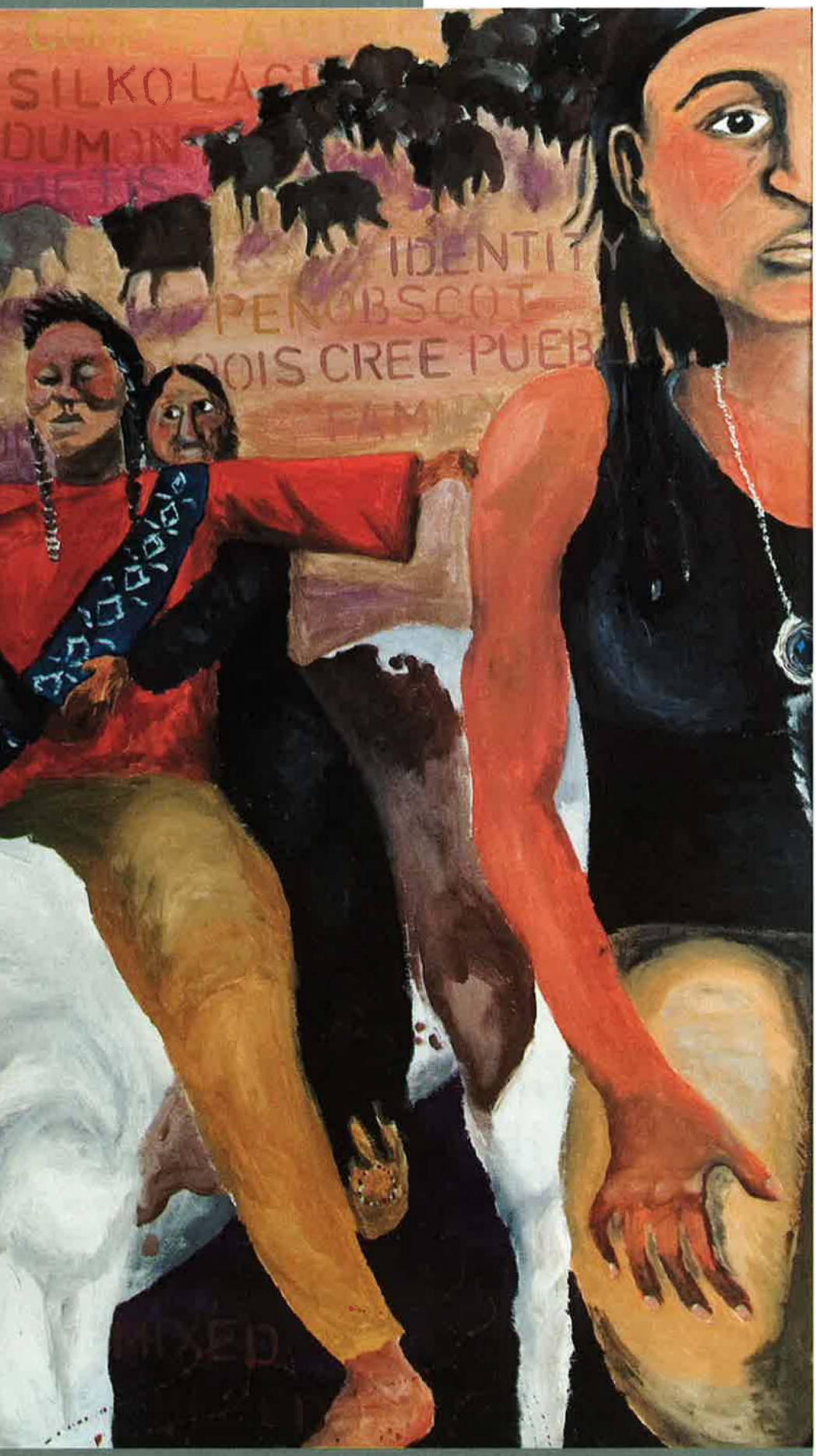
Inspired by their interest, Lukens developed a new graduate course in Native theater for spring 2003. Of the 10 students who signed up, more than half were Penobscot or Passamaquoddy. It was the first time Native students were in the majority in one of her literature classes.

That January, Lukens and a handful of the students traveled to Rhode Island to attend the Trinity Repertory Company's reading of *Grandchildren of the Buffalo Soldiers*, written by Assiniboine playwright William Yellow Robe. Following the production, actors and members of the theater company joined Yellow Robe on stage for a discussion of multiracial identity.

For Lukens, it was a watershed moment.

"It was emotional and interesting," says Lukens of the evening in Providence. "I'd also heard people on Indian Island talking about racial prejudice depending on whether someone is full or mixed blood. That's when I knew that, if the Maine community could see this play, it would be so healing and an opportunity for healthy discussion."

That semester, Yellow Robe accepted Lukens' invitation to visit her class at UMaine, and conversations began in earnest



about the utility of theater as "a tool for expression, healing and letting the world know the humanity and perspective of Native people." In some ways, says Lukens, Native theater echoes the oral traditions of the past and "the way people used to receive that kind of information."

"There is emotional and temporal/physical involvement of people — from the actors to the audience — in Native theater. That's part of the power of it," she says. "Audiences come expecting to have their emotions engaged. Actors give voice to characters that can work through and experience issues that we find personally difficult.

"Native playwrights often write merciless satire of people and institutions and forces that cause pain. They write of genocide, loss, stunted growth of generations of Native people. But when they take those themes on the stage in the caricature of nuns or (Gen. George) Custer or the enemy of the people in such a way that provides some release and relief, the playwrights and actors — and, ultimately, the community audience — get the upper hand."

Yellow Robe, who has been writing plays for three decades, as well as acting and directing, says his works are "an examination of humanity — how to nurture and maintain humanity in this pop culture of materialism."

"It's also about how to nurture and maintain your sense of humanity in the face of great adversity," he says. "Margo's work is looking at the issue of white privilege."

LUKENS' Ph.D. research at the University of Colorado focused on four 19th-century women — Margaret Fuller, Harriet Jacobs, Sarah Winnemucca and Zitkala-Sa — who subverted literary and imaginative paradigms of the dominant culture to express the particular reality of women marginalized because of gender or ethnicity.

During a 1999 UMaine sabbatical, she researched the literary history of Maine's

Wabanaki people. She sought out-of-print story collections of Wabanaki storytellers from the late 19th and early 20th centuries, and on the recommendation of a local tribal leader, she discovered *Aboriginally Yours, Chief Henry Red Eagle*, an anthology of writing by Henry Perley of Greenville.

Lukens also teaches what she calls "the literature of mixed blood," in which authors or their characters are of diverse racial heritage. In Anglo-American literature, especially that of the 19th and 20th centuries, mixed blood often was emblematic of disadvantage or convoluted loyalties; sometimes the idea of mixed blood inferred tragedy, a sense of doom over the character, or an evil that must be overcome.

In more contemporary Native literature, there's been a shift, with authors "beginning to see a different way of dealing with mixed blood and its widespread incidence," Lukens says. "What comes up is the idea of mixed blood having the potential for an amalgamation of strengths instead of weaknesses. Through cultural connection, the person goes through the difficulties of mixed heritage, but overcomes through ties to the community."

THE FIRST semester of her graduate course in Native theater, students performed two plays on two local radio programs: Yellow Robe's *Better-n-Indins* and *Indian Radio Days*, written by Choctaw playwrights LeAnne Howe and Roxy Gordon.

Later that year, members of the Penobscot community asked Lukens to serve as an adviser for their staging of scenes from *The Independence of Eddie Rose*. The production was part of Domestic Violence Awareness Month on Indian Island. The poignant play by Yellow Robe raises issues concerning sexual abuse, alcoholism and denial.

"It was held in the community center with an adult audience during the day," says Lukens. "It was very powerful. There were people in the audience who wept. It was at

Untitled diptych by one of Margo Lukens' former students

that moment that I learned how powerful this could be and how an amazing, instantaneous connection to deep issues can happen.

"My touchstone is that there are Native people for whom this is working."

In fall 2004, Lukens secured a Visiting Libra Diversity Professorship for Yellow Robe, who spent 10 weeks on campus, teaching playwriting and directing *Better-n-Indins* at the Cyrus Pavilion Theatre.

Since then, the presence of Native theater in central Maine has grown from a novelty to a nuance. This past September, UMaine's Readers' Theater featured two plays by Yellow Robe, *Falling Distance* and *A Great Thing*, performed by the playwright and three local Native actors, with Lukens reading stage directions.

In the community, members of the Penobscot Players, a group formed by Dale Lolar that includes other students who took Lukens' classes, gather informally for readings when not giving public performances.

"There are all kinds of dynamics when you grow up in an oppressed situation," Lolar says. "What happens when you put a lot of this stuff away is it stays inside you. But when you read this stuff (in literature and plays) happening to someone else and it's so similar, it reaffirms your own experience. Revisiting it helps to make sense of things you're struggling with and sheds light on your identity. To take that out and share it with each other, there's a sense of community that happens. We are all survivors."

WHILE LUKENS' scholarship is in Native American literature, she sees herself more as a facilitator than an authority on the subject, a position that has everything to do with being sensitive to a community finding its voice after generations of oppression.

"It's important always to be in consultation with the community," says Lukens. "It's also important that the publication of any of my work does no harm, that the Native community doesn't feel disempowered or that something was stolen from it."

According to Yellow Robe, Native communities "are tired of academics putting them under the microscope." But with Lukens, the relationship is different.

"They've never felt that with Margo, because they know they're being considered as human, not a theory or a research project," he says. "She wants to present documentation of life lasting, a framework of a new wheel to provide accessibility for Native and nonnative people to present ideas. Almost like a new thought," says Yellow Robe, who returned to UMaine a year ago where he is a part-time instructor in the English Department.

This past fall, Yellow Robe taught a 400-level topics course in Native American drama. In December, his play *A Stray Dog* was staged at the Public Theater in New York City as one of five productions in its Native Theater Festival. This spring, he is teaching Lukens' survey course on Native American literature while she is on sabbatical. In addition, he has been asked by some members of the Penobscot community to help them write a play.

"The Native community must know this is an achievable art form that they can develop," he says. "The nonnative community must know that this is the voice of their neighbors that they've not heard before and that they were not taught to listen to. It's not a question of being politically correct, it's a question of being aware of your environment, society, people who live in your community." ▮

"I love theater, and know and teach about Native American literature, and in a way, people want to use (that intersection) in the Native community to have a positive effect."

Margo Lukens

UMaine School of Performing Arts Readers' Theater, directed by Marcia Douglas, first invited Margo Lukens' students to perform in 2003. Last fall, Lukens, far left, read stage directions for actors Julia Sockbeson, Maulian Dana and William Yellow Robe in productions of *Falling Distance* and *A Great Thing*.

Social work abroad

Cindy DeWilde and Esther Palmans of Belgium, front, left to right, and Morten Andreasen of Denmark spent the past fall semester at the University of Maine as part of the United States-European Union social work-social education exchange. The three shared their perspectives on the client-oriented approach of their social education training. In turn, they were introduced to such aspects of social work as community-based service, mandated documentation, and boundaries between practitioner and client. "This experience has provided a mirror for me to see my own practice within a different culture," Andreasen said.

Photo by Michael Mardosa

IN THE UNITED STATES, the discipline is called social work. In the European Union, there is a type of social work called social education. Both focus on the socio-educational needs of individuals and communities, but each goes about it very differently.

Giving undergraduates an opportunity to understand the strengths of social work and social education through study abroad experiences and faculty exchanges is the goal of a four-year project involving three U.S. and three EU colleges and universities.

The project, the Transatlantic Alliance for Creating a New Social Services Practice Model, is funded by a more than $250,000 grant from the U.S. Department of Education through its Fund for the Improvement of Postsecondary Education. The grant has made it possible for students from the University of Maine, Barry University and Providence College, Plantijn Hogeschool in Belgium, Peter Sabroe Seminariet in Denmark and the Universitat Ramon Llull in Spain to be involved in semester-long exchanges, fieldwork, and Web-based coursework and collaboration.

"The goal is for our students to go abroad and learn some of the skills of social educators that they can bring into their social work practice, and vice versa," says UMaine Associate Professor of Social Work Gail Werrbach, who wrote the grant in collaboration with the nonprofit International Learning Exchange, based in Maine.

At UMaine, the first student exchange was in fall 2005. Since then, seven UMaine social work undergrads and one graduate student have studied in Belgium and Denmark, and nine students from those countries and Spain have come to Maine. Werrbach and her counterparts at the other institutions have been visiting faculty.

Both social work and social education strive to improve people's functioning and support the social-cultural areas of their lives, Werrbach says. But social work also emphasizes advocacy for populations of people and changing social policies. Social workers with bachelor's degrees are often case managers; those with master's tend to work in clinical treatment settings.

In addition, social work is empirically based, with an emphasis on how to measure effectiveness, she says.

Social education focuses on working with small groups and individuals. Social educators are trained to incorporate personal strengths into their practice.

"In some ways, social educators work more like the old-time group social workers. They incorporate personal interests (i.e. music, sports or crafts) into their professional lives to improve clients' functioning," Werrbach says. "In the U.S., we've become so totally into looking at behaviors that we haven't figured out how to get back to a holistic view of the individual client."

Kate Norman, one of two UMaine students in Belgium this past fall, says one of the most important lessons she learned was to view each client as a unique individual.

"It is my goal as a social worker to help meet their objectives instead of viewing clients as my objective," she says.

Norman says her study abroad experience challenged her personally and professionally, giving her increased confidence in her skills as a social work student.

"As a result of this experience," she says, "I am looking into joining the Peace Corps to do HIV outreach in Africa."

Up, Up and Away

NASA HAS CLEARED for takeoff four student scientists from the University of Maine and the University of Southern Maine. They'll have the chance to experience floating in near-zero gravity in a modified jetliner while performing experiments that could benefit astronauts.

UMaine's Michael Browne, a sophomore in chemical engineering, and Benjamin Freedman, majoring in both chemical and biological engineering, are teaming up with USM first-year biology major John Wise Jr., the team leader, and Adam Courtemanche, a senior information technology major, to participate in NASA's Reduced Gravity Student Flight Opportunities Program in Houston, July 10–19.

The team, the first from Maine, is one of 40 from around the country selected this year by NASA, which awards the coveted slots based on the merit of the students' research proposals. After their training and physical tests, the Maine team will carry out in-flight experiments to measure the response of human lung cells to certain toxicants that are known to damage DNA. The tests will determine whether microgravity and hypergravity affect the cellular uptake of the chemicals, and create differences in the amount of chemical-induced DNA damage and repair.

The students' mentors, Michael Mason, a UMaine assistant professor of chemical and biological engineering, and John Wise Sr., director of USM's Laboratory for Environmental and Genetic Toxicology, will travel to Houston as part of the ground crew.

The students will fly aboard an airplane that will perform parabolic maneuvers up to 34,000 feet over the Gulf of Mexico. The students will experience 30 seconds of hypergravity as the plane climbs to the top of the parabola. Once the plane starts to dive to Earth, the students will experience 25 seconds of near-zero microgravity. The plane will do this 30 times in one flight.

Art donation

EIGHT PAINTINGS by abstract expressionist Angelo Ippolito were donated to the University of Maine Museum of Art this past fall by his son, Jon Ippolito, a faculty member in UMaine's Department of New Media.

Angelo Ippolito was an influential member of the New York School. The career of the late artist included international exhibitions of his works on paper and oils on canvas, and faculty appointments at the International School of Art, Michigan State University and Binghamton University.

The donation came at the start of the museum's five-year anniversary celebration of its relocation to Norumbega Hall in downtown Bangor. The announcement coincided with a second gift to the Museum of Art from Machias Savings Bank — free admission to the museum from now through 2008. Bank President and CEO Edward Hennessey made the gift in memory of Bangor attorney Edward "Ted" Leonard, a museum benefactor and local arts advocate who died in October.

Sunset Regatta, 1986
Oil on linen, 40 x 50 inches

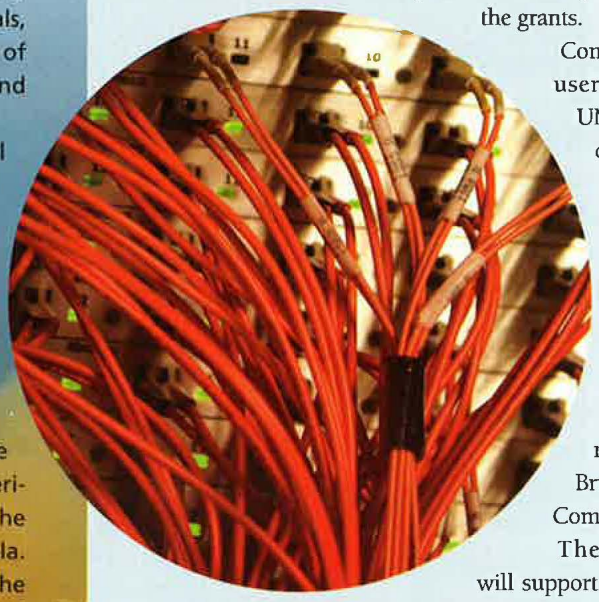
virtual climate change

and other supercomputing capabilities

SCHOOLCHILDREN IN MAINE soon will have an opportunity to experiment with variable climate change scenarios by accessing the University of Maine's environmental modeling programs from their classroom laptops.

The UMaine Department of Computer Science has received two National Science Foundation grants — $200,000 to buy a second supercomputer and $300,000 to develop new supercomputer software — to improve the transfer of massive data files.

The new supercomputer and an access portal being developed will allow Maine middle school students to access the University of Maine's Ice Sheet Model for environmental experiments. It also will enable the university to engage in much greater outreach and research activities, the type that require massive computing power, according to Phillip Dickens, a UMaine professor of computer science and the principal researcher receiving the grants.

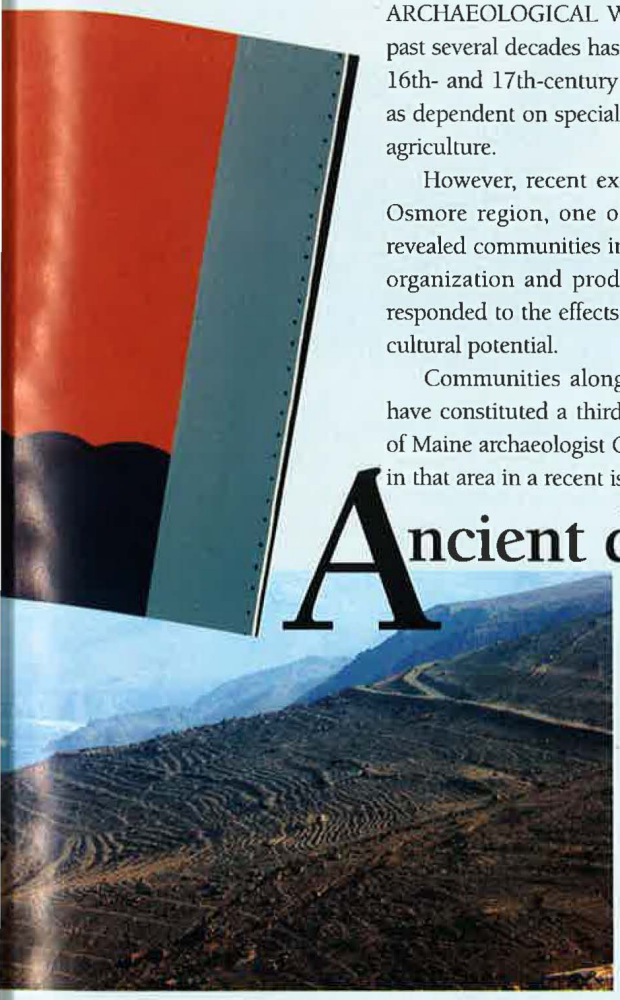


Computer science faculty and students will create a user-friendly, scientific grid portal for accessing UMaine's vast computing resources, scientific applications and research animations, Dickens says. Users, ranging from Maine's top research scientists to students, will access the grid portal with a standard Web browser.

The new 96-processor supercomputer will be housed at Target Technology Center in Orono. It will be overseen by Dickens and four grant project collaborators: Sudarshan Chawathe and James Fastook from the Department of Computer Science, and Yifeng Zhu and Bruce Segee from the Department of Electrical and Computer Engineering.

The supercomputer will support the work of participating faculty, in addition to research by members of Maine's general research community, including Jackson Laboratory.

Ancient diversification



The abandoned agricultural landscape of Wawakiki. Most furrows and terraces observed on the surface date to the Spanish colonial period or later, with earlier Chiribaya terraces buried underneath.

ARCHAEOLOGICAL WORK along Peru's southern coast over the past several decades has largely supported ethnohistoric accounts by 16th- and 17th-century Europeans, which depicted prehispanic life as dependent on specialized economic activities related to fishing or agriculture.

However, recent excavations at Wawakiki in the midst of the Osmore region, one of the southernmost valleys of Peru, have revealed communities involved in complex, wide-ranging economic organization and production strategies as the Chiribaya people responded to the effects of population growth and diminishing agricultural potential.

Communities along this rugged intervalley coastal zone may have constituted a third division of society, according to University of Maine archaeologist Gregory Zaro, writing of his field excavations in that area in a recent issue of *Latin American Antiquity*. Rather than relying primarily on the highland resources of the Andean slopes or specialized economic activities related largely to farming or fishing, communities along the intervalley coast appear to have satisfied economic needs by intensively pursuing multiple subsistence strategies in agriculture and fishing, and the gathering of wild terrestrial resources.

Due in part to centuries of decreased highland precipitation that stressed lower valley farming communities along the Ilo River, the Chiribaya expanded into the relatively unpopulated intervalley coast and focused more on diversified community-level production. According to Zaro, Wawakiki and some neighboring communities represent a historically contingent response to both cultural and biological necessities and the environment during the Late Intermediate period (A.D. 1200–1400) in southern Peru.

300 years of spruce budworms

The Maine study identified five major outbreaks, with a mean return interval of 67 years.

TO BETTER UNDERSTAND the frequency, severity and extent of outbreaks by the spruce budworm, one of the most devastating forest pests in eastern North America, researchers have reconstructed a 300-year history of invasions in northern interior Maine.

A similar timeline exists for the woods of eastern Canada, but this is the first time such a history was compiled for northeastern American forests.

The Maine study identified five major outbreaks by the insects that feed on buds and developing foliage of mature conifers, primarily balsam fir and spruce species. Those outbreaks began around 1709, 1762, 1808, 1914 and 1976. The mean outbreak return interval was 67 years, nearly two times longer than the cycle in eastern Canada, where there are slightly different forest types and stand dynamics.

The researchers from the University of Maine and Indiana State University combined historical documentation and analyses of growth rings in red spruce, which are host trees, and nonhost northern white cedar. Their study area was the Big Reed Forest Reserve, owned by the Nature Conservancy, one of the largest remaining tracts of old-growth forest in the Northeast.

The results of their research were published in the *Canadian Journal of Forest Research*.

encore

Native writers

FOR THE PAST YEAR, Assiniboine playwright William Yellow Robe has been a part-time instructor in the University of Maine English Department, where he has taught Native American drama and literature. Last fall, two of his plays were performed as part of Readers' Theater on campus, and in December, one was staged in New York City. We asked Yellow Robe to share his reading list of works by Native authors and playwrights.

Ghost Dance, a play by Annette Arkeketa

Seventh Generation: An Anthology of Native American Plays, edited by Mimi D'Aponte

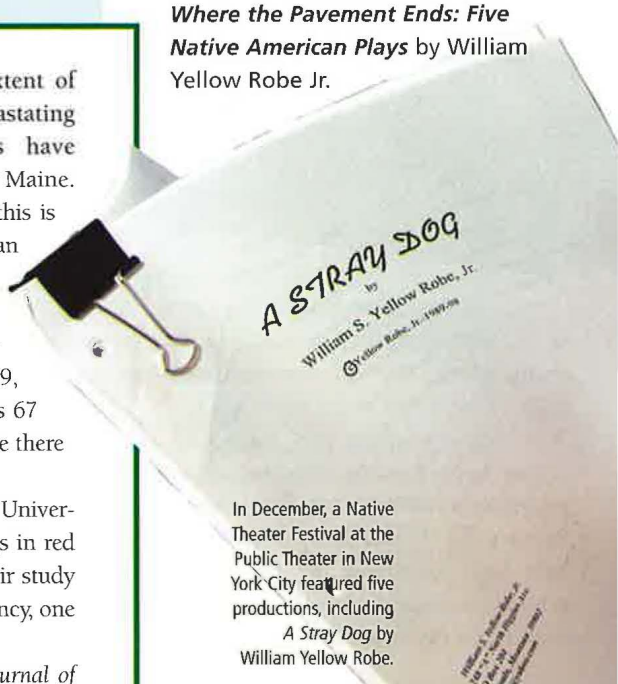
New Native American Drama: Three Plays by Hanay Geiogamah

American Indian Theater in Performance: A Reader, edited by Hanay Geiogamah and Jaye Darby

Inter-Tribal, a play by Terry Gomez

Staging Coyote's Dream: An Anthology of First Nations Drama in English, edited by Monique Mojica and Richard Paul Knowles

Where the Pavement Ends: Five Native American Plays by William Yellow Robe Jr.



In December, a Native Theater Festival at the Public Theater in New York City featured five productions, including *A Stray Dog* by William Yellow Robe.

Hitching a ride – with whom?

WHEN IT'S TIME for the larvae of freshwater mussels to disperse, they hitch a ride on the gills, fins or scales of certain fish species. Finding out which fish the parasitic larvae or glochidia prefer as hosts is essential to regional conservation efforts leading to recovery of natural populations.

In Maine, that's particularly important to two state-designated threatened species — the yellow lampmussel and tidewater mucket.

University of Maine wildlife ecologists Stephen Kneeland and Judith Rhymer have developed and used a molecular identification key to the 10 species of freshwater mussels in Maine in an effort to determine which fish in the wild serve as hosts for the larvae.

In their research, published by the international *Journal of Molluscan Studies* and, most recently, the *Journal of the North American Benthological Society,* DNA samples were taken from mussels in the Penobscot, Kennebec and

St. George River drainages in Maine. The key was used to successfully identify more than 680 larvae on the gills of 230 fish, representing 18 species from 13 locations in the study area.

As a conservation tool, molecular identification keys provide efficient and accurate information on host use by the entire mussel community. In this case, potential new host fish were identified for five of six mussel species, including three considered by the state to be of "special concern."

Best Friends

FOR FROGS in Acadia National Park, beavers are their best friends, according to a new University of Maine study.

In a survey of 71 freshwater wetlands in Acadia, the researchers found that active, beaver-modified wetland landscapes created such habitat diversity as to benefit all pond-breeding amphibian species, even those with very different living requirements. Sites richest in pond-breeding amphibians were those connected to stream corridors and those modified by beaver activity.

As beavers have recolonized areas of their former range in North America, they have increased the number and diversity of available breeding sites in the landscape for pond-breeding amphibians, according to UMaine wetland ecologists Jesse Cunningham and Aram Calhoun, and biologist William Glanz. The study highlights the importance of beavers in creating and connecting suitable breeding sites for pond-breeding amphibians in northern forested landscapes.

Their findings were published in the *Journal of Wildlife Management.*

Journalism exchange

THIS SUMMER, University of Maine journalism faculty members will participate in a professional exchange and certificate program with Tanzanian journalists.

From mid-June through August, six East African journalists will visit the university and several media organizations in Maine and on the East Coast to see how Americans cover the news, from small towns to large metropolitan markets.

The Certificate in Journalism Training for International Scholars program is possible through a $183,000 grant from USAID (United States Agency for International Development) to the UMaine School of Policy and International Affairs, the university's Communication and Journalism Department, and the Office of International Programs on campus.

"We need to be a little more cognizant of the importance of local journalists. We need to be more interested and more educated about reporting in tight-knit communities."
Shannon Martin

The Tanzanian journalists will be exposed to some of the latest information technologies employed by American media. UMaine faculty and American journalists the Africans meet during the summer will learn how Tanzanians have overcome some of the reporting challenges they face at home.

"The Tanzanian population relies much more on radio news mass media than many American media markets," says Shannon Martin, chair of the Department of Communication and Journalism, whose research has included work with journalists in Bosnia-Herzegovina. "One thing I'm hoping to learn from the Tanzania media is how they prepare their media broadcasts to reach rural markets."

Martin anticipates UMaine's journalist exchange continuing to include other countries.

last impression

THIS WINTER, University of Maine Climate Change Institute Director Paul Mayewski made history at the bottom of the world — again. Even more important, the research resulting from his polar exploration promises to further inform efforts to understand issues related to global warming. This past December, Mayewski and a team that included 11 other UMaine researchers and students completed the final 1,200-kilometer leg of an 8,000-kilometer, six-season International Trans Antarctic Scientific Expedition (ITASE) that began in 2000. Throughout the expedition, ITASE scientists collected nearly 4,000 meters of ice cores for use in environmental research. The journey generally followed the Commonwealth Trans-Antarctic Expedition route that Vivian Fuchs and Sir Edmund Hillary traveled from 1955–58. This latest Antarctic research expedition is a prime example of the major scientific investigations undertaken by the Climate Change Institute in its mission to unlock the secrets of climate change — past, present and future — and its impact on humans and the ecosystem. Throughout the world and in Maine, UMaine researchers in disciplines ranging from archaeology and geology to volcanology conduct field, laboratory and modeling studies in an effort to predict the future of climate change. In November, Maine Gov. John Baldacci called for a Maine Climate Change Assessment, citing the need for the state's policymakers to consider "management and policy decisions with the best available scientific information." Researchers in UMaine's Climate Change Institute will lead the study.

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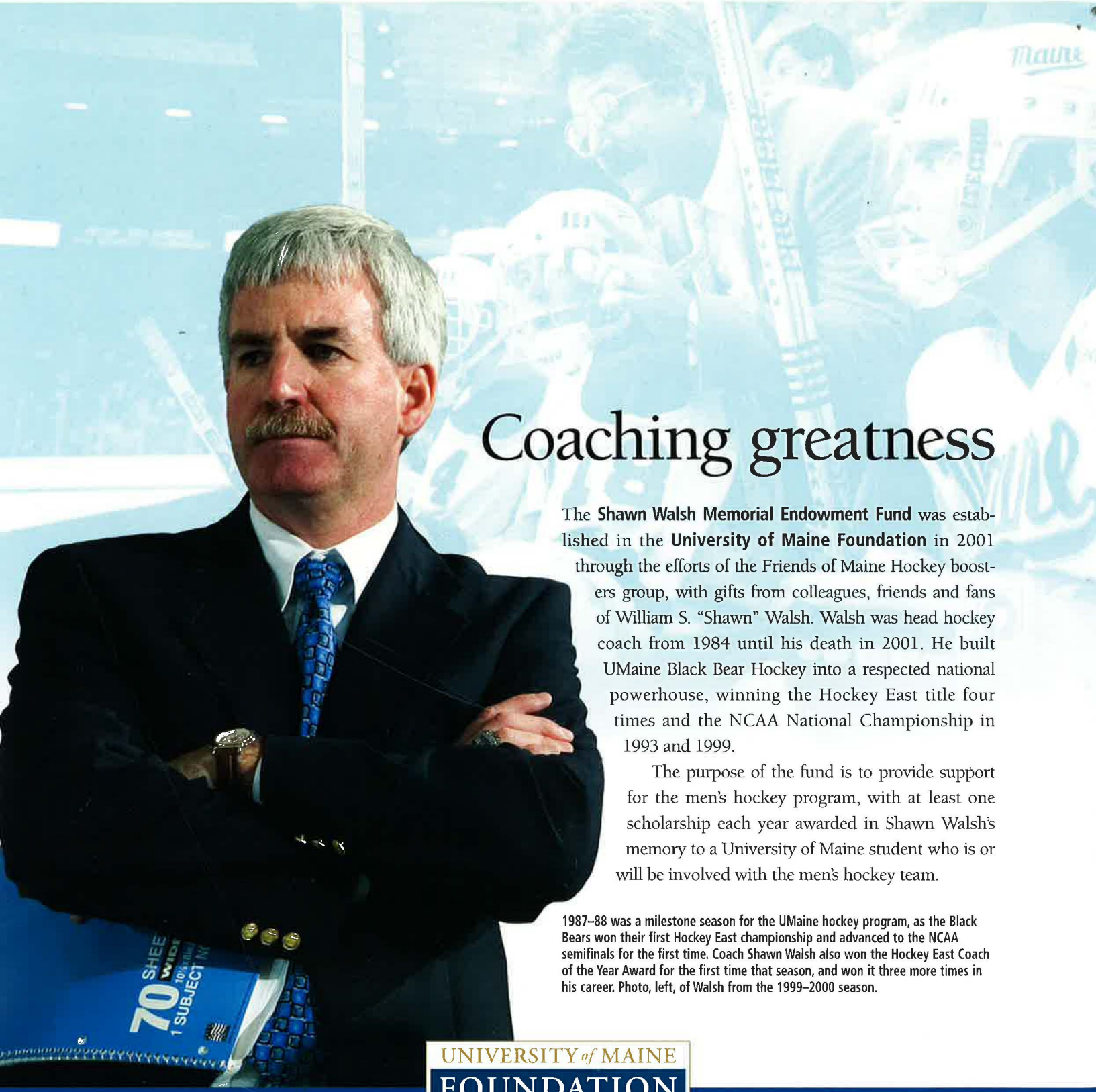

Coaching greatness

The **Shawn Walsh Memorial Endowment Fund** was established in the **University of Maine Foundation** in 2001 through the efforts of the Friends of Maine Hockey boosters group, with gifts from colleagues, friends and fans of William S. "Shawn" Walsh. Walsh was head hockey coach from 1984 until his death in 2001. He built UMaine Black Bear Hockey into a respected national powerhouse, winning the Hockey East title four times and the NCAA National Championship in 1993 and 1999.

The purpose of the fund is to provide support for the men's hockey program, with at least one scholarship each year awarded in Shawn Walsh's memory to a University of Maine student who is or will be involved with the men's hockey team.

1987–88 was a milestone season for the UMaine hockey program, as the Black Bears won their first Hockey East championship and advanced to the NCAA semifinals for the first time. Coach Shawn Walsh also won the Hockey East Coach of the Year Award for the first time that season, and won it three more times in his career. Photo, left, of Walsh from the 1999–2000 season.

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