A decade later, what has changed between ‘them’ and ‘us’?
I HAVE ENJOYED using this space to share my thoughts during my seven years as UMaine’s president. As I prepare to move on from this role, I would simply like to express my thanks.

In some way, virtually every UMaine Today reader has played a role in the university’s substantial progress over the past several years. Whether you have been part of our community as an alumna, alumnus, student or parent, shared your talents as a faculty or staff member, cast a vote in favor of a university-related bond referendum, contributed to Campaign Maine, attended an athletics contest or artistic performance, or simply told another person about your positive UMaine experience, you have made a difference. I truly appreciate every person who has played a role in helping make UMaine the wonderful university that it is.

The greatest benefit of this job is the opportunity to meet the people — alumnae, alumni, students, faculty and staff members, and friends — who exemplify the warm and welcoming nature of this magnificent university community. I will always treasure those relationships, and I will carry with me the memory of the innumerable stories that demonstrate so clearly the positive impact this institution has had on our state and on the individuals who have made the wise decision to join the University of Maine family.

With fondness and appreciation,

President’s Message

Robert A. Kennedy
President
IT'S ONE OF THE MOST impressive spectacles in the animal world, and one of a few of its kind remaining on Earth. Every year, millions of wildebeest migrate across the Serengeti-Mara ecosystem of southern Kenya and northern Tanzania, loping across the grassy plains, en route to dry-season lands and their calving grounds. Of course the approximately 500-mile journey is not without peril. Predators are a constant threat. Indeed, the wildebeest's migratory movements play a major role in the ecosystem's food chain.

However, through the last 40 years, something other than predation has hampered wildebeest migration, to the point that the animal's numbers have fallen 90 percent in some locales. In Kenya, human population growth in the capital city of Nairobi has sent development and urban sprawl spreading south, threatening to encircle Nairobi National Park. Increased development has meant more settlements and farms, more factories and quarries, new roads and more development along existing roads. More development has also meant more fences. As fences proliferate across the arid savannas, more of the wildebeest's migration routes are cut off — a scenario Robert Lilieholm has seen firsthand during research trips to East Africa.

Research hopes to aid wildebeest and other African species that are increasingly falling prey to shortsighted land-use decisions

By Jessica Bloch
Photos by Robert Lilieholm

"At the local level, people are fencing for a lot of reasons, foremost to establish ownership but also to exclude wildlife. To many Kenyans, the animals are a nuisance, devouring their crops," says Lilieholm, a natural resource economist at the University of Maine who is part of a $680,000 National Science Foundation grant with Colorado State University researchers to look at fragmentation in this particular region of Africa. "It's sad to contemplate, but for a lot of rural Kenyans, it would be OK if Nairobi National Park just became a large fenced-in zoo. And that's what is going to happen without any active engagement and creative land-use planning."

The losses could be huge. Tourism generates nearly $900 million annually for Kenya's cash-strapped economy. Last year, tourists topped 1 million — a 15 percent increase from 2009.

Using mapping and a concept known as alternative futures modeling, Lilieholm's research in Kenya will show people at local and regional levels that the land-use decisions they make today could have far-reaching impacts in the future.

And while there are no wildebeest in the western hemisphere, Lilieholm is working to promote the same concept of alternative futures modeling in Maine in order transform the way state and
local interests think about future growth, development and zoning. Using modeling systems such as logistic regression and Bayesian Belief Networks, Lilieholm is showing communities that instead of taking a laissez-faire attitude to development, they can thoughtfully consider how to set aside areas for conservation, agriculture and forestry while maximizing the net contribution of important development initiatives.

"You have to recognize that whether you plan or not, you're going to change the landscape, oftentimes in irreversible ways," Lilieholm says. "Do you want to do it with more information or less? Do you want to anticipate the impacts of what you're doing or not? I would hope most people would say, 'Let's go forward with better information.' Without that, you can really undermine your future. You see it all the time."

For example, Lilieholm cites a 2006 Brookings Institution study that found that although Maine's school-age population was declining, the state's four largest metropolitan regions spent $186 million building new schools.

"Unplanned growth is expensive, creating the need for more infrastructure like roads, sewers and schools, while established systems are underused and in need of repair," Lilieholm says. "The result is costly, inefficient growth and high taxes."

At a crossroads

Lilieholm hopes to demonstrate to various stakeholders in Kenya the wide-reaching effects of their development decisions so they can better plan for the future.

With more than a million wildebeest migrating, they comprise a huge percentage of the animal biomass in countries such as Kenya. And because of their vast numbers, they play a crucial role in the food chain. Wildebeest are a favorite meal of crocodiles, as shown in a recent segment of "60 Minutes" on CBS about the migration.

In addition, the wildebeest is susceptible to landscape and climate change because its mass migrations are driven by the region's seasonal rains. Wildebeest herds tend to spend the dry season in places such as Nairobi National Park, which like many African national parks and reserves was set aside because it contains vital dry-season water sources.

Nairobi National Park is immediately south of Nairobi, one of the fastest-growing cities on the African continent. Nairobi has seen its population numbers explode in the last 40 years — from about 500,000 in 1970 to more than 3 million today.

The city has expanded to the north, Lilieholm says, and now population has spilled south, encircling the national park. As in any expanding urban area, the swelling human population requires more commercial and residential development. That's happening in Nairobi and along the Mombasa Road, the major north-south highway linking the capital to Mombasa, a key port city on Kenya's coast. In addition to new farms, plantations and homes, several cement plants have been built in the last five years just outside the boundary of Nairobi National Park.

However, it's not just buildings that are being erected. Residents of Nairobi's southern reaches are heavily fencing their property to establish boundaries and exclude wildlife. When the rainy season begins in March, the wildebeest herd in Nairobi National Park begins the migration east to its calving grounds. But with the growing patchwork of development...
Fences and development have also affected the Maasai tribe, a politically powerful ethnic group in East Africa. Traditionally nomadic and pastoral, the Maasai too were used to migrating unencumbered through the landscape.

“When I was in Kenya in 2005, the location of the fences south of the park had been mapped and for the first time, people could view the extent of the fencing,” says Lilieholm. “The Maasai saw this and knew it had to stop, because it would be the death of their way of life.”

Lilieholm and his Colorado State colleagues, including biologist Robin Reid, are also looking at development around the Maasai Mara National Reserve and Amboseli National Park, which have much larger wildebeest herds. Although urban sprawl is not a problem in those locations, which sit along Kenya’s southern border with Tanzania, ecotourism is a huge issue.

“In Kenya, we’re looking for ways to generate revenue to help the park,” Lilieholm says. “Although nationally there was a huge benefit through tourism and international aid, it wasn’t getting down to the people on the ground, and that’s where the coffee project came in.

“We were trying to find a way to get local people direct access to resources in a carefully monitored, controlled way, to build support and sustainability for the park.”

Lilieholm also worked on bioregional planning with a Utah State group looking at alternative futures modeling in western areas of the U.S., such as earthquakes and mudslide zones, and land management and development around military bases in California’s Mojave Desert. Initially, some saw the approach as anti-development or overly concerned with environmental issues. But his colleagues, including landscape planning legend Carl Steinitz of Harvard University’s Graduate School of Design, understood the value of using maps to help stakeholders visualize what’s happening across the landscape.

That’s what really sold Lilieholm on alternative futures modeling. And that’s what he now brings to Maine.

“Here, manufacturing towns can consider alternative futures to respond to a null closure or changing technology. Given existing infrastructure and land suitability, growing municipalities can target land for future development. A coastal community can evaluate how its waterfront should grow or which lands to protect for agriculture or forestry uses.

“In Maine, we’re looking for ways to develop alternative futures that identify the trade-offs and opportunities of different growth scenarios,” says Lilieholm, who will be an instructor this summer in UMaine’s Acaadian Internship, a new program in which students study large-scale conservation efforts.

“The exciting thing is, once people begin thinking about alternative futures, their ability to generate and evaluate future landscapes increases. As a result, we can be more effective, not only in protecting resources, but in ensuring that future development complements, rather than detracts from, local quality of life.”

Robert Lilieholm
Innovative teaching key to classroom success

Name: Chance Nalley  Hometown: Perham, Maine  Graduation year: 2004

Current position: Sixth- and seventh-grade mathematics teacher, Manhattan Middle School for Scientific Inquiry, New York City

Degrees: University of Maine, mathematics B.A. and secondary education B.S.; Columbia University, M.A. and M.S. in mathematics education

What brought you to New York?
I am a minority and I grew up with only my father to relate to in regard to culture and acceptance, and what it is like to be different. Then, while studying at the University of Maine, I read a research paper that correlated student success with having at least one teacher/role model of the same ethnicity. Moving to a diverse city seemed like an opportunity for me to learn and help urban minority students.

The realization of this vision was made possible by Associate Dean O.J. Logue, who had a summer program, The Future Teachers Academy, which brought high school students from New York and Maine together at UMaine. He made arrangements for me to start at a school in the Bronx and everything played out well.

Tell us about the math skills curriculum you developed.
After a few years of teaching and adding two graduate degrees to my experience, I decided I was going to deal with what virtually every mathematics teacher already knows: There aren’t any perfect mathematics textbooks, and as a sequential curriculum, everything in existence becomes even more devalued. We have a saying in the middle schools: “Seventh grade is sixth grade only louder, and the relation between eighth grade and seventh grade is no different.” Each year, most students review previously learned topics with more difficult problems or deeper explorations. Only a handful of new topics are introduced each year.

I decided to view grades six through eight as a singular curriculum that started where fifth grade left off, and would logically and sequentially lead to rigorous courses in algebra and geometry. I reviewed the curricula and textbooks of over a dozen publishers, and many that were no longer in print, to create a scope and sequence that left nothing out. However, I’m not perfect and every year I make adjustments and add or modify the topics. The goal is to explore each topic in great depth, from the introduction through the mechanics, then the details and applications, to be sure that each student masters the skill.

The “mastery” idea really sets my work apart from that of others. I created individual student checklists to monitor that. Each week, students choose which topics they want to prove they have mastered and take quizzes focused on them. If a student scores 80 percent or better on the objective quiz, then the objective is checked off on his or her individual checklist, which is meant to follow him or her until every objective is mastered. Traditional curriculum ends in unit exams that cover many objectives; whether a student passes, fails or doesn’t understand some objectives, he or she still moves on with the hope that he or she will learn it next year. Mathematics in the middle school is cumulative by nature. Not understanding an objective inhibits students’ future ability to learn other objectives. I want my students to be fully prepared for algebra, geometry and any other course they take in the future.

What is the outcome? Do you feel like the students are better prepared?
The students know they are held accountable and that completing their objectives list is their mission. It fosters a different frame of mind than “this week’s test” does. In the past three years, all my students significantly outsourced city and state averages on standardized tests, even though we don’t prepare for them directly. One hundred percent of my students were ready for algebra at the beginning of eighth grade and all passed the New York State Regents Exam in algebra at the end of the year for high school credit.

I moved to a new school last year and my students have all gone on to different high schools in the city. I hear back frequently from them or their parents, and always with the same comments: They are so well-prepared that they are bored. Some of my students have gone on to the top specialized high schools in NYC and others have gone on to private schools. Some have been placed in junior and senior mathematics classes to provide them with a rigorous learning experience.

Tell us about the honors and awards you received as a result of your work.
In 2008, I received the Manhattan Blackboard Award for Mathematics Teaching and also received a Math for America Master Teacher Fellowship. I am very proud to be part of Math for America, where I can work with other talented and dedicated mathematics educators and receive top-quality professional development. In 2010, I was recognized by Kappa Delta Pi as a Teacher of Honor.

How did UMaine prepare you for this career?
UMaine has caring and dedicated professors who make good role models for quality teaching. I was a lost soul that found direction and guidance at UMaine. When I work with student teachers from other schools, including Columbia University’s Teachers College, they do not feel nearly as prepared as I did. People frequently ask me how I came to teach the way that I do, and I simply reply, “I’m from Maine.”
IN THE MONTHS AND YEARS following Sept. 11, 2001, the terrorist group that carried out the attacks on the United States was seen, at least by some Muslims, as somewhat heroic. That terrorist group, the Islamic fundamentalist collective known as al-Qaeda, and its leader, Osama bin Laden, had reacted to what it and many other Muslims considered to be U.S. oppression and occupation of the Middle East. In striking the Pentagon and World Trade Center, al-Qaeda hit directly at the heart of the enemy Americans in their government and financial centers.

Bin Laden, whom U.S. forces killed in early May of this year, was a Muslim fundamentalist who saw the world in terms of a basic dichotomy between believer and infidel. In his rhetoric, he stressed what he saw as the oppression of the Muslim world by the unbelievers of the West.

“Osama bin Laden succeeded in articulating widespread grievances, so for a while at least there was a certain perception of bin Laden as a hero, standing up to the imperialists,” says University of Maine anthropologist Henry Munson, who has since the early 1980s studied fundamentalism and religion as they relate to violence, politics, and nationalism. “You had that perception even among some Arabs who would have been horrified at the thought actually of living under a government led by bin Laden.”
A decade after the day bin Laden-directed zealots hijacked three airplanes, felled the World Trade Center, and killed thousands in the worst-ever terrorist attack on U.S. soil, Islamic fundamentalism is still thriving in the Middle East in the form of groups such as Hamas, Hezbollah, and the Muslim Brotherhood. Munson stresses that each is very different, with very different agendas, although they all endorse states based on Islamic law. It’s difficult to predict the roles they will play, especially as we look at the region through the lens of recent pro-democracy movements and the fallout from bin Laden’s death continues to be assessed.

“The Islamic movements often articulate resentment of foreign domination in terms of a basic dichotomy of us versus them, or believer versus infidel, but it is a mistake to ignore the nationalistic and social grievances these groups exploit,” Munson says.

In 1996, bin Laden told journalist Robert Fisk that Saudi Arabia had “become an American colony.” Munson stresses that although Islamic fundamentalists condemn nationalism in principle, they often articulate nationalist grievances. “Bin Laden repeatedly said 9-11 was a response to American policies, that as long as Muslims are suffering under Israeli control in Palestine, the U.S. will have no security, and that the U.S. had occupied Saudi Arabia during the first Gulf War,” Munson says. “He (saw) himself as a Muslim anti-imperialist fighting the infidels who seek to dominate the Islamic world.”

Under President George W. Bush, the U.S. led a coalition that invaded Iraq and overthrew the regime of Saddam Hussein in 2003. The exercise in so-called regime change reflected, among other things, a failure to understand how fundamentalist movements like al-Qaeda exploit resentment of Western domination, Munson says.

Although he agrees that it was necessary to destroy al-Qaeda training camps in Afghanistan, Munson argues that occupying Iraq simply served to reinforce bin Laden’s message that the U.S. was trying to dominate the Islamic world. “In the case of Iraq, we had been stung by a wasp and decided to punch a hornet’s nest,” he says. “The decision to invade Iraq was made without looking at its internal political dynamics. Saddam Hussein was an easy target to target and some people had been advocating going after him for some time. But a sensible foreign policy is based on careful calculation of likely costs and benefits.”

Ultimately, the decision to invade Iraq in 2003 was based on rash decision-making, Munson says. The emotional impact of the events of 9-11 short-circuited some of the rational analysis that should go into decisions about whether to go to war. And Iran has benefited from Saddam Hussein’s overthrow far more than has the U.S.

“The current prime minister of Iraq, Nouri al-Maliki, is a longtime member of a group called Al-Dawa, according to Munson. Al-Dawa was the first group to use suicide bombing against Saddam Hussein’s government in the 1980s. The group also has close ties to Hezbollah and Iran. In fact, Hezbollah was initially widely seen as a Lebanese branch of Al-Dawa, Munson says, and many of its leaders spent years in exile in Iran.

“If we look at the government that exists in Iraq, it is dominated by Shiite fundamentalists with close ties to Iran. Yet this is a government created thanks to the loss of more than 4,440 American lives, and the expenditure of billions of American dollars,” he says.

THE SO-CALLED “Arab Spring” of 2011 had little to do with Islamic fundamentalism, and more to do with demands for democracy and economic opportunity. The widespread protests were initially sparked by the self-immolation of a vegetable vendor in Tunisia Dec. 17, 2010, to protest his treatment by local officials. From Tunisia, the protests spread to Bahrain, Egypt, Libya, Syria and Yemen. There have also been protests in Algeria, Jordan, Morocco and even Iraq, where the residents of Baghdad still only have electricity a few hours a day (which makes coping with summer temperatures that reach 120 degrees Fahrenheit rather difficult).

As of mid-April 2011, protesters had...
only succeeded in overthrowing the governments of Egypt and Tunisia. What will rise in place of those governments is, for now, uncertain. Egypt could provide an interesting case study of fundamentalism’s future in the Middle East, says Munson, who lived in Egypt during the mid-1970s while pursuing a certificate in literary Arabic at the American University in Cairo.

Egypt is the most important Arab nation, he says, considering the strength of its military and its 1979 peace treaty with Israel, which has the strongest ties to the U.S. of any nation in the Middle East. The recent successful protests in Egypt were sparked by societies w ill remain in the vanguard of creating more humane and egalitarian formulas of the people or the language. So she took adult-ed classes in English. And she sought out advice from experts, including Cooperative Extension specialists Bassano and McConnon, who offer small-business workshops and one-on-one consultations.

In the case of Iraq, we had been stung by dynamics.” Henry Munson

The brotherhood put forward a draft political platform in 2007, which it hoped would be seen as reformist and moderate, but which sought to prevent women and non-Muslims from serving in high government positions. Many Egyptians, including the roughly 10 percent of the population that is Christian, were outraged by the platform and remained determined to prevent the government from taking advantage of the overthrow of Husni Mubarak.

Munson notes that no matter how much one may disapprove of the rhetoric and agendas of groups such as the Muslim Brotherhood, one should not confuse them with more militant groups, such as al-Qaeda. The Muslim Brotherhood and other fundamentalist groups do see opportunities for themselves in Egypt and other nations in the new Middle East.

“Some of these groups are licking their chops,” Munson says. “However, the fact that they’re licking their chops doesn’t necessarily mean they’re going to get to exploit the current turmoil to gain power. The key activists in Tahrir Square were clearly not Muslim Brotherhood people.”

Munson does not think the death of bin Laden changes the basic political situation in the Middle East. He notes that the number of Muslims expressing support for bin Laden has dropped dramatically in recent years. According to the Pew Research Center, for example, 36 percent of Jordanians had “expressed confidence” in bin Laden in 2003. By April 2011, only 13 percent did so.

“The hope of many Muslims is that the democratic activists who talk about creating more humane and egalitarian societies will remain in the vanguard of those movements, and that when elections take place, they will be won by such people rather than by the Muslim Brotherhood,” Munson says.

Egypt’s Muslim Brotherhood was initially not involved in the demonstrations in Tahrir Square — the flash point of the protests — until the group realized the protests had widespread support.

The Muslim Brotherhood has existed for decades, but has not resorted to violence since the 1940s, according to Munson. For that reason, more militant fundamentalist groups consider it too docile.

9.11+10

Sweet success

Rural Maine chocolate shop an inspiration

IT WAS THE FIRST SESSION in the three-part University of Maine Cooperative Extension workshop for people interested in starting their own businesses, and participants were encouraged to bring samples of the products they hoped to sell. Among them were handmade, gourmet chocolate bonbons individually wrapped in cellophane the colors of Mardi Gras. The confections made from an old family recipe were a sensation as much for their presentation as their taste.

“You could tell from the beginning that she had a knack for business,” says Regional Small Business Educator Louis Bassano, who led the workshop with Extension Specialist and UMaine Professor of Economics Jim McConnon. “This was a professional product she had developed and people loved it. And she was 100 percent committed to making it a reality.”

In the 10 years she has been in Maine, Elliott has turned tragedy into triumph. She and her husband, Stanley, had moved from Lima, Peru, to Lubec, where he had just started working as a fisheries consultant when a brain aneurysm left him in a coma and nearly took his life. Elliott, who had spent 30 years building a successful fashion design business in Peru, found herself in a Down East Maine community where she didn’t know the people or the language. So she took adult-ed classes in English. And she sought out advice from experts, including Cooperative Extension specialists Bassano and McConnon, who offer small-business workshops and one-on-one consultations.

Monica’s Chocolates opened in downtown Lubec in 2005 with the help of $26,000 in loans from townpeople and one of the Elliotts’ two daughters — all of which she paid back within a year. Four years later, it was clear that Monica’s Chocolates had to expand to keep up with online and on-site sales. To do that, she needed a bank loan. And for that, she needed a detailed business plan. Bassano and McConnon helped her write one, complete with data on one of her strongest customer bases — bus tours headed to Campobello Island and West Quoddy Head Lighthouse.

Today, Monica’s Chocolates offers 90 varieties of fine chocolates and employs 11. Last year, Elliott received the Business Leadership in Action Award from Washington County Cooperative Extension.

“Monica is a shining example of what small rural communities can do to enhance their economic future,” Bassano says.
**Calanus finmarchicus** research is leading to better understanding of how the copepods power the Gulf of Maine ecosystem

**Fueling the ocean**

**Calanus finmarchicus** are succulent little butterballs. Simply scrump-tious to a whole host of marine animals.

No bigger than grains of rice, the translucent crustaceans that look like a cross between a crayfish and a flea gorge on spring phytoplankton blooms and microzooplankton in the ocean to bulk up with energy-rich lipids. It’s those lipid reserves that make the planktonic copepods particularly delectable — and power-packed.

In the northern Atlantic Ocean, **C. finmarchicus** is the primary prey for a range of species — fueling schools of herring and powering pods of endangered northern right whales. This and other **Calanus** species are such vital intermediary links in the marine food web that changes in their populations could profoundly affect the health of marine animals — from leaner fish of lesser value to fewer whale calves — and the structure of the pelagic ecosystem in northern oceans.

That’s why Andrew Pershing and Jeffrey Runge study them. The two research scientists, who hold joint appointments with the University of Maine and the Gulf of Maine Research Institute, consider **C. finmarchicus** a linchpin whose role must be better understood in the face of growing ecosystem variability and environmental change.
Fueling the ocean

“Arguably copepods are the most abundant multicellular animals in the world, yet most people don’t know much about them,” says Runge, a biological oceanographer. “*Calanus finmarchicus* is among the most predominant of the copepods in the North Atlantic, including the Gulf of Maine. If its special capacity to produce large amounts of lipids were substantially reduced here, what would be the impact on species like herring, sand lance, mackerel and the rest of the system? It could have implications for the region’s fisheries.”

Runge studies ocean ecosystem productivity. He focuses on the physical and biological factors that can affect zooplankton production — from variable ocean currents and temperatures to the growth and survival of fish larvae. Pershing focuses on what causes changes in the Gulf of Maine ecosystem over time. He uses satellite and other data to develop computer models of marine ecosystems that can reconstruct and forecast population dynamics in *C. finmarchicus* and other key species.

For both scientists, the implications of climate change on *C. finmarchicus,* such as warmer water temperatures and acidification, loom large.

“There are huge changes going on in the marine environment,” says Pershing. “Some of them are natural. We’ve always had changes in the climate. But then on top of that, we’re adding this new signal of global warming and climate change. What effect that’s going to have on ocean ecosystems is really important, both for understanding fisheries and the way humans interact with these systems, and for understanding the ocean’s ability to take carbon out of the atmosphere and lock it away. The big question for me is really all about change: how things shift from one year to the next and what drives that.”

*C. finmarchicus* dominates the zooplankton community in the Gulf of Maine, the southern edge of the large copepod’s subarctic range. Here, the one-eyed crustaceans that grow about 3 millimeters long spend their lives moving vertically in the water column, transporting carbon and valuable nutrients from the surface. As omnivores, they put a big dent in spring blooms, eating diatoms and phytoplankton, and preying on smaller zooplankton.

The spring phytoplankton blooms give the copepods tremendous reproductive capacity. Over a two-month period, a female will release 3,000 or more fertilized eggs into the water column, where they develop and hatch. The copepod has a complex 12-stage life history, maturing from an egg to six nauplius and five copepodid stages to reach adulthood. During late summer through early winter, fifth-stage copepodids known as C5s constitute the majority of the *C. finmarchicus* population in the north Atlantic. At that time, the preadults either molt into adults or enter a state of reduced activity — a kind of dormancy or hibernation — known as diapause.

C5s in diapause have adapted to survive months with little food, at depths of around 150 meters in the gulf, with the help of the rich lipid stores they packed on in the spring and summer months. The lipids in the form of wax esters stored in an oil sac ultimately make up nearly 70 percent of the copepod’s body weight.

Fish and whale species depend on that lipid source for their own survival. Herring predation, which is highest in the summer, is a big source of mortality for *C. finmarchicus.* Then there’s the northern right whale, which eats at least 2,000 pounds of copepods daily. Of the nearly million calories a cetacean needs each day to function, the vast majority come from copepods.

In the late winter and spring, C5s emerge from overwintering to molt into adults, feed and reproduce. The population increases rapidly, with a new generation of C5s appearing in mid-April. By early summer, some of those preadults will begin their own cycle of dormancy.

That’s the typical seasonal production cycle. But when the Gulf of Maine is too warm because of the intrusion of warmer Atlantic Slope water or above-normal surface temperatures, *C. finmarchicus* breaks its dormancy in late summer and fall and produces another generation, contributing to the overwintering stock. But these outside influences, what scientists
Fueling the ocean

refer to as forcings, can not only accelerate but also hinder develop-
ment of a fall generation if temperatures are too warm.

The concern is that climate change may result in substantial
reduction in Calanus populations, according to a research team
led by Runge that reported its findings most recently at the 5th
International Zooplankton Production Symposium in Chile.
"What’s needed are models that couple what we know about the copepods’ life
cycle and the physical circulation in the ocean to better understand the roles of transport and
production. Also needed is a long-term, inte-
grated observation system in American and
Canadian waters focused on collecting data on
zooplankton abundance and diversity in the
north Atlantic.

"It’s an important priority to have the capac-
ty to observe how the system is changing," says Runge. "We have the pieces — the researchers and physical models — and can put them together models that are very insightful, not just for understanding climate forcing on cope-
pods, but also on the planktonic life stages of marine fishes." RUNGRE’S RESEARCH examines the role of
zooplankton in marine food webs, including the biological mechanisms behind diapause. He collabo-
rates with Pershing and other oceanogra-
phers to create 3-D models integrating
zooplankton production, larval fish survival and recruitment — the number of fish surviv-
ing the larval and juvenile phases to enter the adult population each year.

"The new tools, including computer model-
ing, are giving us tremendous capacity to address the questions we have about cope-
pods and the potential to understand scenarios of climate change and how they will impact
plankton populations," he says.

Runge and Pershing helped develop a life cycle model that
examines the controls on diapause and can be used to investigate
copepod population responses to climate change scenarios for species of copepods. In collaboration with UMaine Postdoctoral Research
Associate Frederic Maps and UMaine Research Associate Rebecca
Jones, as well as researchers from NOAA, the University of Mary-
land and East Carolina University, they have studied the life histo-
ries of Calanus species and their response to climate forcing, looking in particular at the role of
dormancy in both the north Atlantic and north Pacific.

Most recently, Runge received a nearly
$700,000, three-year National Science Founda-
tion grant to study the impact of ocean acidifica-
tion on three dominant species of high-latitude Calanus, including C. finmarchicus in the north-
ern Atlantic. He and ocean chemist John Chris-
tensen will study the impact of increases of
carbon dioxide, higher temperatures, and lower
surface and deep pH on population dynamics on
the copepods.

In the next century, ocean acidification and temperatures are predicted to rise. Previous
studies have shown they could affect copepods’ reproductive success and early-life stages.

Pershing is currently looking at how the
number of copepods has changed in the last
half-century. To do that, he uses data from the
Continental Shelf Region (CPR) record held by
the National Marine Fisheries Service that has been collecting information on plankton since 1961.

Pershing is particularly interested in the
monthly CPR data collected across the Gulf of Maine from Boston to Yarmouth, Nova Scotia.

The continuous record offers an unparalleled perspective of year-to-year changes and patterns
during three decades, beginning in the 1980s when herring stocks were low. The researchers hope to better understand the critical links between copepods and herring and how trade-offs between fish abundance and fish weight are linked in fishery ecosystems.

How environmental conditions, including the degree of stratifi-
cation and production of phytoplankton, determine species composition is now driving Pershing to develop a new class of copepod model.

In 2003, he used an NSF Information Technology Research grant to develop a zooplankton model that is now the basis for forecasting C. finmarchicus distributions that are right
whale feeding areas. His newest NSF-funded research is expected to help scientists make even better predictions concerning the effects of climate change on this critical trophic level.

"Once we have an estimate of what will happen to the cope-
pods, I think we can have a much better estimate of how fisheries in a particular region will respond, as well as the birds, whales and other animals people really care about," Pershing says.
THE QUESTIONS come in rapid succession, like machine-gun fire, sharp, fast, relentless:

“You can see the bacteria?”

“Do you want to say the quality value of biofilm formation?”

“Why would isolating them give you a different value?”

“Are there any other explanations?”

“How do you have 1.8 fish?”

Things can get pretty intense in the hallway outside Carol Kim’s microbiology lab in Hitchner Hall at the University of Maine. For the casual observer — especially one without a science background — the barrage of questions is overwhelming, like listening to an auctioneer calling in a foreign language. But the three undergraduates standing there explaining their senior research projects, pointing to printouts of data and microscopic images of zebrafish taped to the walls, are completely unfazed. They answer Kim’s questions almost as quickly as she asks them. When she challenges them, they challenge back. They are confident. Eloquent.

“I love doing the brainstorming, working with a student to figure out the best question to ask.”

Carol Kim

Professor Carol Kim, center, discusses details of a groundbreaking virus study in zebrafish with students Kristin Gabor, left, and Bradie Mansion.

For students in Carol Kim’s lab, enthusiasm for research is infectious

By Kristen Andresen

Going VIRAL
Going viral

“I want to set up an environment where students feel comfortable and nurtured,” Kim says. “They have to know I’m going to ask tough questions and they have to be prepared. It’s going to be a lot nicer for me to ask them than to have them present in front of five professors cold. If I can be tough on them and they can answer the questions, they’ll have confidence.”

Kim is emblematic of a major push on campus to involve undergrads in research, and science like the one outside her lab play out across campus daily, especially in the weeks leading up to graduation. At UMaine, hundreds of science, humanities and engineering majors are involved in research, and close collaborations with faculty are common.

Increasingly, UMaine has become a destination for top students interested in pre-med and biomedical studies, in large part because of the mentoring and rigorous preparation that Kim and her colleagues provide. As a result, many undergraduates are working at a graduate level long before they earn their bachelor’s degree. Like the students in the hall, they know the answers. But more importantly, they know which questions to ask.

Kim’s research has moved the entire field of virology forward. She conducts disease studies with zebrafish, a model organism, to better understand the human innate immune response to infection. She’s the driving force behind UMaine’s Zebrafish Facility, and since she arrived at UMaine in 1998, Kim has received continuous funding for her zebrafish research — more than $4 million in federal grants, primarily from the National Institutes of Health. Among her landmark discoveries is a zebrafish gene that produces interferon, which can inhibit the growth of a virus. She and colleague Rob Wheeler recently received a $600,000 NASA planning grant to study the effects of radiation on innate immune response and the progression of cancer.

Her work provides a better understanding of how bacteria infect and cause inflammation in cystic fibrosis patients. Kim’s studies shed light on the connection between the cystic fibrosis transmembrane conductance regulator, or CFTR, and the innate immune response. That connection may someday be used as the basis for therapeutics that combat bacterial infections in cystic fibrosis.

“Clinical researchers are trying to develop therapeutics for the immediate needs of these patients, and as a result, we’ve seen significant increases in their quality of life. We’re on the other end, with basic research, trying to figure out what’s happening at the molecular and cellular level with the hope of developing those therapies. This project will be ongoing until CF is completely cured, until it’s no longer a problem. It’s going to take a while.”

Another recent collaboration with UMaine physicist Sam Hess and graduate student Kristin Gabor focuses on immune response to viral infection — not necessarily in CF patients. By using super-resolution microscopy, the researchers are the first ever to view the single-molecule cellular interactions involving antiviral signaling in caveolae, which are flask-like invaginations in the cell membrane.

While previous research has shown that viruses exploit caveolae to enter host cells, Kim took it a step further by demonstrating that viruses can evade host cell defenses by disrupting clusters of signaling molecules within the caveolae. Through a combination of fluorescence-tagging and super-resolution imaging of viruses and zebrafish cells, Hess FPALM (Fluorescence Photoactivation Localization Microscopy) system has allowed Kim and her team to see how individual molecules and clusters move during a viral infection.

“No one has ever really looked at this,” Kim says. “No one’s been able to see it the way we’ve been able to see it.”

To the uninitiated, these may seem like disparate projects, but they all have two things in common: zebrafish and the innate immune response. The body’s first line of defense against infection. Innate immunity deals with how the body reacts immediately after it comes in contact with a pathogen. This happens daily, almost constantly, and it’s why healthy people don’t get sick every time they encounter a new pathogen. It’s why your skin swells when you get a splinter or a paper cut. This is not to be confused with adaptive immunity, which is acquired through vaccination or prior infection.

Zebrafish are the ideal model for this research for several reasons, including the fact that they develop rapidly and their embryos are clear, allowing researchers to see infection as it happens.

Carol Kim is emblematic of a major push on campus to involve undergrads in research. At UMaine, hundreds of science, humanities and engineering majors are involved in research and close collaborations with faculty.

Innate immunity is pivotal to learning how the body defends itself against infection, how viruses and bacteria adapt to the body’s defenses, and how more effective treatments might be developed.

Even one of these accomplishments would be noteworthy. Together, they’re huge. But when asked if there is a single moment that has defined her time at UMaine, Kim doesn’t miss a beat.

“Every year, when students in our department get into the top graduate schools, the top medical schools, the top dental schools, when they get great jobs I think of what they’re going to do. I think of what they’re going to make. I think of what they’re going to find and what they’re going to publish and what they’re going to do. I think of what they’re going to do in the world. I think of what they’re going to do.”

Carollyn Baker, a professor of microbiology in zebrafish, gave Kim a $60,000 NASA planning grant to study infection as it happens. ‘No one has ever really looked at this,’ recalls Baker. ‘They’ve been able to see it the way we’ve been able to see it.’

Kim will do whatever it takes to instill confidence in her students. Sometimes, that means an informal hallway conversation. Other times, it means meeting on nights or weekends to make sure that her students are prepared to consider every angle when defending their theses or dissertations. And sometimes, it just means handing over the reins.

When Steve Altman was at UMaine — he earned a bachelor’s in microbiology in 2002 and a master’s in molecular biology in 2003 — he worked on basic immunology in zebrafish. Kim gave him a lot of wiggle room with his experiments, but she also challenged him to try things that might be outside his comfort level, and that continues to influence the way he does science.

“Some of my friends worked in labs where the principal investigator told them what to do,” recalls Altman, who now conducts Alzheimer’s research for Amgen in Cambridge, Mass. “With Carol, it was a little bit more open ended. She gave me guidance, but she also allowed me to make decisions on my own.”

Inspiring the next generation of doctors and researchers is what gets Kim out of bed in the morning. She wants them to get jazzed about how crafty bacteria and viruses are.

“I love doing the brainstorming, working with a student to figure out the best question to ask,” Kim says.
Is it possible that those who are on hand... in 2013 will find multimillion-dollar research laboratories adjacent to pulp and paper schools, where basic investigation, as well as the search for new products and new processes, is a major function? Whether the examples of the Massachusetts Institute of Technology and Stanford in their association with electronics and other space-related industries is a pattern for others to follow, or whether these experiences are unique, will probably be answered in the next 50 years.

University of Maine President Lloyd H. Elliott, speaking to the Newcomen Society on “Unique Partners in Progress, the University of Maine and the Pulp and Paper Industry,” Boston, 1964

JAKE WARD THINKS that former University of Maine President Lloyd Elliott would be pretty impressed with the University of Maine in 2011.

As UMaine’s assistant vice president for research, economic development and government relations, Ward has seen the university’s research and development enterprise evolve — especially in the past decade — to the point where the fulfillment of Elliott’s prediction represents only a small part of a thriving, comprehensive research enterprise.

“IT’S easy to quantify the growth in research and development just by looking at research grants and expenditures,” he says. “But the change in culture has been equally important. Our researchers really understand and embrace the responsibility of helping grow Maine’s economy through R&D.”

In 1997, the Maine legislature and Gov. Angus King created the Maine Economic Improvement Fund (MEIF), designed to boost Maine’s economy in seven targeted technology sectors through university-based research. Triggered by the grassroots efforts of five UMaine professors — the rightful heirs to Lloyd Elliott’s legacy, if you will — MEIF has been the true catalyst for the dramatic progress of the past decade.

These funds, often used to match federal grants, have allowed UMaine researchers such as Habib Dagher (AEWC Advanced Structures & Composites Center), Hemant Pendse (Forest Bioproducts Research Institute), Robert Lad (Laboratory for Surface Science and Technology) and others to move their programs to a higher plane. It also has led to what Ward calls a “new wave” of researchers, for whom the link between the laboratory and the economy has always been at the forefront of their thinking.

“The university has changed at the same time the state has changed,” says Ward, a Saco native who has been at UMaine since 1990. “The research community embraces its responsibility to help improve Maine’s economy and we understand that we can have our greatest success by engaging statewide partners in academic institutions, public and private research institutions, and industry.

“Our combined resources, especially in fields like the biosciences, are significant enough that we can bring in grants and develop the ideas that will create economic opportunity in research, create businesses and create jobs.”

The research and development landscape continues to shift, Ward says, ratifying the expectations.

“We were like newborns (in research) in 1998, then we were toddlers and adolescents for a few years,” he says. “Now we’re becoming young adults. We’re growing state and societal expectations.

Research economics

A decade of exceptional growth reflects
energetic and we've shown that we can deliver. The challenge now is to find ways to continue to grow, in the face of economic challenges, and lead the initiatives that will expand Maine's economy in sustainable ways."

Those challenges are significant, he says. Research programs need capital to grow and foster economic development while providing more and better educational opportunities. UMaine's research programs are attracting good students and that's a positive sign of meaningful growth.

The challenges are also significant for many of Maine's core businesses, the small and medium companies, especially in traditional industries in the rural areas of Maine, Ward says. In fact, these types of companies may be well positioned to take advantage of an economic turn-around if they can bring innovative products and services to the market in time.

Ward points to UMaine's new Innovation Engineering Program — which a student in any major can attach to his or her curriculum as a way to foster entrepreneurial education — as a key component that can differentiate the UMaine academic experience from others while providing innovative employees Maine employers need to grow and succeed.

A recent National Governors Association Center for Best Practices report challenges states to align higher education curriculum with the needs of the marketplace to foster economic development. The report points to Minnesota, North Carolina, Ohio and Washington as states that have already undertaken comprehensive strategies to create those connections. A key component of a successful strategy, according to the report, is an effort to encourage employers' input in higher education. The University of Maine System, in partnership with the Maine Development Foundation and the Maine State Chamber, has recently taken that step by creating two reports: "Making Maine Work: The Role of the Public University System."

"In a state like Maine, there are high expectations placed on the primary research university because there is only one," Ward says. "We need to embrace that responsibility and hold ourselves to a high level of accountability. The changes we are experiencing can also create more and better educational opportunities in disciplines across the university as we educate our students for leadership roles in our statewide community. It's more than workforce development; it's using education, research and development to shape Maine's economy and its culture."

As Maine and UMaine evolve within the changing global economy, the university is on pace to continue and expand its impact, Ward says. He sees a university that is starting to look like the one Lloyd Elliott described in 1964. Building on the progress of the last decade, especially by taking advantage of the opportunities of public-private partnerships, he envisions UMaine as the key driver of Maine's future economy.

"There's an emerging and growing recognition of Maine's land-grant university as a key component of the state's future," Ward says. "With that recognition comes expectations, but we have the pieces in place, along with the institutional commitment, to live up to those responsibilities."

The report points to Minnesota, North Carolina, Ohio and Washington as states that have already undertaken comprehensive strategies to create those connections.

The undergraduate experience at LASST

In the lab: My research in the Laboratory for Surface Science and Technology (LASST) involves the surface characterization of langasite (LGS) crystal wafers in high-temperature environments. LGS is used in surface acoustic wave sensor devices that operate at high temperatures (more than 800 degrees Celsius). Because these sensors are extremely surface-sensitive, it's important that we know exactly how the crystal surface changes when heated. Knowing this will give us more insight into long-term crystal stability at these temperatures, thus ensuring the longevity of the sensor platform.

In the real world: The real-world applications include high-temperature monitoring of turbine engine components during operation. Hopefully, the feedback from the surface acoustic wave sensors will help better predict engine component failure and give a more accurate picture of the wear occurring in these engines. It has the potential to save lots of money and increase the safety of turbine engines.

A summer of sensors: I became involved in this research through the National Science Foundation Research Experience for Undergraduates Sensors summer program at LASST in 2009 and 2010. I began my research during the summer project and continued it through the school year. The program is an excellent way to be more involved in in-depth research and it really helped me decide what I wanted to do after graduation. I look back at my participation in the REUs as one of the most important things I did.

LASST word: It has been really wonderful. I worked in cutting-edge facilities with some of the most experienced and talented professional researchers in the country. It was a lot of work, but I found the research I am doing to be extremely rewarding and I learned a lot.
Among the research team’s findings, threats to the viability of the species.

Another at-risk species, the spotted turtle, artificial nest sites to modify or reduce irradiance of Maine and the Maine Department of Inland Fisheries and Wildlife conducted by licensed social worker Adrienne Cohen, also found that nature and the ability to interact with it through activities such as gardening, walking and bird watching. A smaller study in Vermont, conducted by licensed social worker Adinshire Cohen, also found that nature or “esthetic capital” contributed to the well-being of elders. For them, just seeing nature outside their window at home or in a car was important.

The researchers’ findings, reported in a recent issue of Nature and Culture, underscore the fact that proximity to nature contributes to quality of life.

Going the Distance

This year, female Blanding’s turtles travel more than half a mile from their wetland homes to their favorite upland nesting sites. But that’s a problem in areas like York County in southern Maine, where development has not only altered the habitat, but also increased the danger of road mortality. To better understand the upland movements of Blanding’s and another at-risk species, the spotted turtle, wildlife ecologists at the University of Maine and the Maine Department of Inland Fisheries and Wildlife radio-tracked 46 nesting females between April and November over a three-year period. The data will help determine the extent to which the female turtles would use artificial nest sites to modify or reduce risks to their upland treks, decreasing the risks of road mortality and predation that threaten the viability of the species. Among the research team’s findings, reported in the journal Herpetological Conservation and Biology:

- The average number of feet traveled by female Blanding’s turtles as they move from wetlands to upland nesting sites, which is more than six times the distance covered by spotted turtles.
- The percent of Blanding’s turtle nests found in human-altered sites, such as pastures, roadsides and backyards.
- The number of weeks of the longest upland foray during the nesting season of the female Blanding’s turtle, which included nonrectilinear, meandering movements.

Lobster golf balls a hit

Golfers on the high seas can breathe a little easier — and so can the marine life around them — thanks to researchers at the University of Maine.

In collaboration with the Lobster Institute at the University of Maine, Biological and Chemical Engineering Professor David Neivandt and undergraduate student Alex Caddell of Winterport, Maine, have developed a prototype of a biodegradable golf ball made from lobster shells. The ball is intended for use on cruise ships.

Cari Poeschel Or, who earned a master’s in marine biosciences at UMaine in 2002, suggested the idea to Lobster Institute Director Bob Bayer. Bayer turned to Neivandt, who is known on campus as an innovative problem-solver.

Though biodegradable golf balls already exist, this is the first to be made with crushed lobster shells and a biodegradable binder and coating, creating value from waste material.

“We’re using a by-product of the lobster canning industry which is currently misused — it ends up in a landfill,” Neivandt says. “We’re employing it in a value-added consumer product, which hopefully has some cachet in the market.”

And that cachet doesn’t come with a higher price tag. Biodegradable golf balls that are now on the market retail for under $1 per ball. The raw materials for the lobster shell balls cost as little as 19 cents per ball.

Caddell, a golfer, says the balls perform similarly to their traditional, white-dimpled counterparts. And they can be used with both drivers and irons.

“The flight properties are amazing,” Caddell says. “It doesn’t fly quite as far as a regular golf ball, but we’re actually getting a similar distance to other biodegradable golf balls.”

UMaine has filed a provisional patent for the lobster-shell mixture, which can also be used for such products as plant pots that decompose in the ground, surveying stakes and other applications.

For Caddell, a junior biological engineering major and honors student, the opportunity to do research that has a real-world application has been a highlight of his UMaine experience.

“I didn’t really think it would turn out to be this fruitful,” Caddell says. “What really makes UMaine great is that there is a lot of funding available here, as opposed to private schools where it’s hard to get research opportunities. Here, all sorts of professors are willing to take on students.”

News of the innovative golf balls has made headlines worldwide, attracting attention from as far afield as New Zealand and Pakistan, and UMaine’s Department of Industrial Cooperation has fielded many queries from private firms interested in commercializing the product.

Aging with nature

Growing old in the country has its disadvantages. There’s less access to shopping and healthcare, and fewer employment opportunities. Even traveling distances to a neighbor’s house can be difficult. However, two social science researchers have found rural elders have one advantage over their urban counterparts: nature.

University of Maine Professor of Social Work Sandra Butler conducted interviews with elders living in rural Maine and found that nature’s beauty, peace, safety and open space are treasured aspects of their lives. Those surveyed said they value nature and the ability to interact with it through activities such as gardening, walking and bird watching.

A smaller study in Vermont, conducted by licensed social worker Adiushere Cohen, also found that nature or “esthetic capital” contributed to the well-being of elders. For them, just seeing nature outside their window at home or in a car was important.

The researchers’ findings, reported in a recent issue of Nature and Culture, underscore the fact that proximity to nature contributes to quality of life.

Paying for food safety

At the federal level, it’s easy to quantify the cost of foodborne illness as measured in terms of death and illness. But it’s a lot harder to quantify benefits of stronger food safety regulations.

That’s where UMaine economist Mario Teisl comes in.

In an article recently published in the journal Food Policy, Teisl and Brian Roe of Ohio State University propose an alternative to the traditional cost-of-illness approach. The cost-of-illness approach is straightforward — it measures such tangible values as lost work time, cost of medical treatment and loss of life. But it doesn’t take into account things that are a little harder to gauge, such as pain suffering, worry or loss of leisure time. This means that current regulation methods may underestimate the benefits of stronger food safety measures.

Through a national survey that centered on hot dog and hamburger consumption, Teisl and Roe found that consumers would be willing to pay more for safety-enhanced products — especially if the increased cost was relatively low and the decrease in probability of illness and contamination high.
Insights

Rethinking catch and release

REQUIREING ANGLERS to catch and release wild brook trout is one way to help conserve the native species that is in decline. But a new study shows that the resource management strategy also has a downside: hooking mortality rates with the potential to significantly reduce the number of trophy fish, according to two University of Maine wildlife ecologists.

In their modeling study, graduate student Casey Risley and Joseph Zdylofski, an assistant professor in the Department of Wildlife Ecology and a member of the U.S. Geological Survey Maine Cooperative Fish and Wildlife Research Unit, found that even modest increases in hooking mortality rates associated with catch and release fishing were enough to strongly shift the age structure of a brook trout stock. The higher the angling pressure, the higher the angling pressure on its leading edges, or fringes of the plume. Such biological analysis offers increased detection sensitivity over conventional hydrochemical testing in wells, which could improve long-term water quality monitoring efforts near leaking solid waste disposal sites. Just as important, early detection could prevent widespread contamination or increase remediation efficiency.

While at the University of Vermont, Mouser led a research team that profiled microbial communities in monitoring wells at the 30-acre Schuyler Falls Sanitary Landfill in Clinton County, N.Y. Their findings were published in the journal Water Resources Research and featured in the New York Times.

Responding to bullies

WHEN SUPPORTING a friend who has been victimized by a bully, young adolescents respond with a range of advice and actions. Girls most often suggest telling an adult or confronting the bully to try to understand the conflict, while boys are more apt to minimize the seriousness of the incident or, to the other extreme, encourage aggression toward the assailant, according to a psychological study at the University of Maine.

Understanding young adolescents’ responses to the bullying of peers is one way in which students can help themselves and others in need. Bullying is a form of aggression that demands skillful responses from those who wish to help.

The University study is one of the first to examine whether the way in which middle school students respond to support-seeking friends is associated with positive and negative peer experiences, including friendship quality, conflict in friendship and victimization.

Life on the fringes

USING GENETIC TESTING to identify which microbial communities are present in groundwater — and which are not because of their sensitivity to low levels of contamination — could improve water quality monitoring near leaking municipal landfills, says a University of Maine environmental engineer.

UMaine assistant research professor Paula Mouser profiles microbial communities found in the groundwater using a strand of their rRNA. The bacteria and archaea communities have particular sensitivity to landfill leachate, and shift in response to the introduction of nutrients or contaminants. Some bacteria disappear, while others increase in abundance near the leading edges, or fringes of the plume.

Such biological analysis offers increased detection sensitivity over conventional hydrochemical testing in wells, which could improve long-term water quality monitoring efforts near leaking solid waste disposal sites. Just as important, early detection could prevent widespread contamination or increase remediation efficiency.

While at the University of Vermont, Mouser led a research team that profiled microbial communities in monitoring wells at the 30-acre Schuyler Falls Sanitary Landfill in Clinton County, N.Y. Their findings were published in the journal Water Resources Research and featured in the New York Times.

All for one

AS A FORMER hockey player, Nicolas Erhardt knows the importance of teamwork. But the concept is equally important in his current role as an assistant professor of management in the Maine Business School. The journal Management Learning recently published, “Is It All About Teamwork? Understanding Processes in Team-Based Knowledge Work.” According to Erhardt, teamwork is best when:

- the task is complex
- team leaders understand the type of know-how necessary to address the problem
- there’s open communication and people are kept in the loop
- status differences are checked at the door, since titles are barriers for effective knowledge integration
- participants are able to physically get together to hash out complex questions

The fiercely competitive are less forgiving

FORGIVE AND FORGET? Well, that all depends on how competitive you are. University of Maine researchers Shawn Collier, Richy Ryckman and Joel Gold, along with University of Southern Maine researcher Bill Thornton, conducted a survey to determine what effect competitive attitudes have on forgiveness. Their findings, published in the Journal of Psychology, show that hypercompetitive individuals — those who are individualistic, who see their competition as enemies, and who are willing to win at all costs — aren’t likely to forgive transgressions. However, people whose competitive nature focuses on personal development — who are motivated to win by a desire to improve themselves, and who see their competitors as worthy opponents — are more likely to forgive. Ryckman’s previous studies also showed that they’re more psychologically healthy, altruistic and caring.

Mussels to fight sea lice

RAISING BLUE MUSSELS with farmed fish may help reduce the infection of sea lice that decimates salmon and other species, according to University of Maine aquaculture and microbiology researchers. Initial research findings demonstrate that blue mussels eat the larvae of the parasite, best that has recently made a comeback on Maine fish farms, if further analysis in the field holds up, the use of mussels on salmon farms could be another disease management strategy for reducing the infectious pressure of sea lice in the farmed fish industry. The research also has implications for the development of integrated multitrophic aquaculture, an alternative to the standard monoculture aquaculture with the potential to reduce environmental impacts by combining the farming of fish with filter-feeding shellfish.

Postdoctoral researcher Sally Molloy, a microbiologist at UMaine’s School of Marine Sciences, made the discovery last summer along with graduate student Michael Pietrak and colleagues in Fisheries and Ocean Canada (FO). Ian Bricknell, the Libra Professor of Aquaculture Biology and director of UMaine’s Aquaculture Research Institute, and Debbie Bruchaud, manager of the Maine Aquatic Animal Health Laboratory at UMaine, provided research support.

Their findings have been published in the journal Aquaculture. The research was funded by nearly $1.6 million in grants from groups that include Maine Sea Grant, the Maine Technology Institute, Maine Technology Asset Fund, the U.S. Department of Agriculture’s Northeast Regional Aquaculture Center, USDA and the Maine Aquaculture Innovation Center.

Many scholarships, research opportunities and academic offerings for UMaine students are made possible by donations to THE FUND. Annual gifts.gov UMaine, the flexibility to address its most pressing needs and to take advantage of opportunities. Please consider a gift today. Contact the Office of University Development, 207-581-3100 or 800-671-2085 (maine.edu/give).

UMaine Today is produced four times a year by the Department of University Relations, University of Maine, 5701 Howard A. Kyes Public Affairs Building, Orono, Maine 04469-5701, 207-585-3749. In complying with the letter and spirit of applicable laws and in pursuiting its own goals of diversity, the University of Maine System shall not discriminate on the grounds of race, color, religion, sex, sexual orientation, including transgender status and gender expression, national origin, citizenship status, age, disability or veteran status in employment, education and all other areas of the University System. The university provides reasonable accommodations to qualified individuals with disabilities upon request. Questions and complaints about discrimination in any area of the university should be directed to: Equal Opportunity Director, 3734 North Stevens, Room 101, Orono, Maine 04469-3734, 207-581-1226 or 207-585-9494 (TTY). Printing and distribution of UMaine Today are underwritten by the Office of the Vice President for University Development and Alumni Relations, and the University of Maine Foundation.

© 2011 by the University of Maine System
Sharing spirit

The Maine Spirit Fund was established at the University of Maine Foundation in 2007 to provide stable, long-term financial support for student groups at the University of Maine. As the university's goodwill ambassadors, student organizations bring entertainment and spirit to events on campus, throughout the state and beyond. Income from this fund supports those student groups and organizations in such endeavors. Investing in today's students is an investment in the future. They deserve our support.