November 21, 2007

umlshuttle

A Publication of the University of Massachusetts Lowell

New Electronic 'Nose' to Sniff for Explosives

UML Researchers Say Device Will Be As Sensitive As That of a Bloodhound

A new electronic "nose" being developed by a group of UMass Lowell researchers will be able to detect and predict threats from explosives with high precision. This multidisciplinary collaborative effort, which recently received a three-year, $800,000 grant from the National Science Foundation, will develop and integrate novel sensor arrays based on different sensing principles with multisensor "data-fusion" techniques to detect traces of TNT and other explosives as tiny as one part per trillion, or even smaller. Such a system can mimic the keen olfactory ability of bloodhounds.

"Data fusion is a relatively new term that's gaining popularity, but its concept is not a new one," says Pradeep Kurup, a professor of civil and environmental engineering who is the project's principal investigator. "The human brain is perhaps the best example of a data-fusion system. The brain fuses data—sight, sound, smell, taste, and touch—from multiple sensors—eyes, ears, nose, tongue and skin—and uses its memory, experience, and a priori knowledge to make inferences about the external world. For example, the sound of a voice combined with visual information, such as hair color or distinctive facial features, aids a person in recognizing an acquaintance."

There are a number of explosives-detection systems currently available. However, they're based on a single sensing principle. "For the first time, we'll develop data-fusion algorithms and artificial neural network to interpret data from different types of detectors—fluorescent polymer nanofibrous sensors, nanowire sensors and surface acoustic wave sensors—that operate simultaneously,"

▲ Pradeep Kurup

says Kurup. "By identifying coincidences in the predictions made by the different sensors, our 'intelligent' explosives-detection system will reduce uncertainties associated with the interpretation of data gathered by the individual sensing systems. This makes the overall

Continued on Page 2

Plans for $1 Million Remodeling of Bellegarde Boathouse Described

UMass Lowell Student Safety Net is a Model for Region

UMass Lowell officially received $1 million from the state on Nov. 2 for extensive repairs to the Bellegarde Boathouse in Lowell at an event that drew more than 100 people to hear plans for the community resource's future.

"Our goal is to have a first-rate facility that will draw people to the Merrimack River and all the activities that this vital natural resource generates," UMass Lowell Chancellor Marty Meehan told those gathered for the announcement.

The event was held at the boathouse, which is located on the banks of the Merrimack River along Pawtucket Boulevard, and was attended by the UML and Lowell High School crew teams; the Merrimack River Rowing Association; community members; Sen. Steven Panagiotakos, chair of the Senate Ways and Means Committee; Rep. Thomas Golden, chair of the Committee on Bills in the Third Reading; and Lowell Mayor William Martin and other city officials.

"It is extremely important that we turn this boathouse back into the jewel it once was," said Golden. "I know the Bellegarde family will be happy at the end of the day, with a premier facility."

Continued on Page 2

▲ Rep. Thomas Golden, right, and Sen. Steven Panagiotakos, left, announced the transfer of $1 million from the Commonwealth to UMass Lowell for renovations to the Bellegarde Boathouse. Chancellor Marty Meehan, center, and Lowell Mayor William Martin, to his left, were joined by members of the Lowell High School and UMass Lowell crew teams for the event.

Photo by Marylou Hubbell

International Conference Examines Nanotechnology, Literature and Society

UML to Host Experts December 6-7

Every great scientific revolution promises new products, improved manufacturing methods and dramatic social change. With these benefits, however, there is often a struggle between scientists and society as change erupts. The nanotechnology revolution is no different.

Nanotechnology, defined as "the art of manipulating materials on a very small scale," is enjoying an enthusiastic reception from scientists for its enormous potential in a variety of fields including medicine and engineering, and by economists for its ability to fuel economic growth. UMass Lowell has been instrumental in developing appropriate research, processes and tools design and creating biocompatible, flexible materials that are low-cost and environmentally benign. In fact, UMass Lowell has been named a Center of Nanomanufacturing Excellence.

Now, UML will complement its leadership position by hosting an international, interdisciplinary conference designed to gather workers in the humanities, social sciences and hard sciences to reflect on the technological, cultural, literary, ethical and social aspects of nanotechnology.

Twenty speakers—including humanists, scientists and social scientists—will visit UML in December at a conference called "Nanotechnology, Literature and Society."

"We're bringing experts together from many different, disparate fields," says English Prof. Todd Avery, organizer of the

Continued on Page 4

Continued from Page 1

New Electronic 'Nose' to Sniff for Explosives

detection system extremely precise, significantly lowering the incidence of false alarms."

Kurup's co-principal investigators include Profs. Zhiyong Gu (chemical engineering), Ramaswamy Nagarajan (plastics engineering), Hongwei Sun (mechanical engineering) and Jayant Kumar (physics).

The group's project will have a global impact not only in the areas of law enforcement, defense and homeland security and counterterrorism, but also in environmental monitoring, biotechnology, pharmaceuticals, and medical diagnostics. For example, the electronic nose can be used in detecting subsurface soil contamination following a chemical spill, in safeguarding the handling and transportation of hazardous materials, in search-and-rescue operations, in testing for explosive or toxic gases in battlefields, coal mines and archeological sites, and much more.

"Our biggest challenge right now is for the electronic nose to be able to track a scent, say a gas leak, to its source," says Kurup.

Researchers hope to come up with a product prototype by 2010. Partnerships with Massachusetts-based companies, such as Foster-Miller Inc. and Linden Photonics, will facilitate the technology's transfer and commercialization.

—EA

The Shuttle is published by the Office of Public Affairs, UMass Lowell, One University Ave., Lowell, MA 01854 Tel.978-934-3223

Go to www.uml.edu/enews for a more complete overview of all news relating to UMass Lowell and it's programs, faculty, students and staff.

Chief Public Affairs Officer:
Patricia McCafferty

Editor:
Mary Lou Hubbell

Staff Writers:
Geoffrey Douglas
Jack McDonough

Other Writers:
Edwin Aguirre
Renae Lias Claffey
Sheila Eppolito
Jennifer Hanson
Elizabeth James
Kristen O'Reilly
Sandra Seitz

Interns:
Morgan Hough
Devonne Sutton

The University of Massachusetts Lowell is an Equal Opportunity/ Affirmative Action, Title IX, H/V, ADA 1990 Employer.

To submit information for possible inclusion in UMass Lowell enews or *The Shuttle* email us at: enews@uml.edu

Continued from Page 1

Plans for $1 Million Remodeling of Bellegarde Boathouse Described

Thomas Bellegarde, son of Edmund, for whom the boathouse was named, was also on hand for the announcement. The boathouse was built in 1982, and includes offices, locker rooms, storage bays for boats and equipment, a training area, and space for history and science programs for local students. Although the boathouse is still used by rowers, its condition has deteriorated in recent years, particularly from spring flooding, to the point it can no longer host educational programs as it once did through the Tsongas Industrial History Center.

Panagiotakos said Golden quarterbacked the funding process for the Lowell delegation in the House. "The improvements will bring the community a public boathouse that the University, high school and rowing association can be proud of," he said.

The $1 million from the state will go toward a new roof, windows, doors, gutters, trim, siding, bathrooms, boat docks, signs, and systems to prevent flooding at the boathouse, as well as repairs to fencing and the building's deck. Funding for the project was approved by the state in August 2006, but could not be transferred until the University assumed care and control of the facility from the Department of Conservation and Recreation (DCR), which was authorized under the legislation.

"To see how the river has been transformed and now to see the boathouse transformed and world-class rowing coming to UMass Lowell and a world-class crew team at Lowell High School," said Martin, "all of us are very proud."

While the funding will get the renovation project started, it will not pay for all of the work. Meehan said the University will seek donations and other sources of support for the renovations.

The University will work with the city and DCR to have the work on the boathouse completed as soon as possible, Meehan said. An advisory committee has been established and is working with user groups on the renovations and will to establish a policy for the boathouse's operation.

"We look forward to working with DCR, the delegation and the community to help make the Bellegarde Boathouse and this beautiful stretch of the Merrimack River a destination spot in the city," Meehan said.

—*CG*

University Partners with Lowell Company to Make Campus Safer

More than 1,000 fires a year occur on campuses around the country, causing injuries, even deaths, and resulting in more than $4 million property damage, according the U.S. Fire Safety Administration.

UMass Lowell is working with a local company to prevent such tragedies from happening here. Since this spring, the University has been using a new fire-retardant paint, called PyroTarp, made by Lowell-based Bradford Industries in residence halls and other buildings.

"The use of this paint within the University environment here has two primary benefits," explains Richard Lemoine, assistant director of Environmental Health and Safety. "The first is that it provides further protection for life safety for all occupants in the University community. The second is that it also provides further protection to the infrastructure, our buildings.

"Many of our buildings, as many people know, date back to the early 1900s or late 1800s," Lemoine says, adding that those structures are typically constructed of wood, and while they are equipped with sprinkler systems, there are computers, paper and furniture inside that add to the risk of fire. "By introducing a nonflammable, nontoxic paint into the University environment, if a fire occurs, it should minimize the amount of damage that possibly could take place."

The fire-retardant paint project got its start in late 2006, when Bradford Industries brought the idea of using PyroTarp here to the University.

"Paint is generally used for aesthetics. We're providing esthetics and fire protection," says Eric Ciccone, a manufacturer's representative for Bradford Industries.

A simple demonstration by Bradford representatives convinced Lemoine that the paint should be used on campus. First, a butane torch was aimed at a square of ordinary cardboard, and nearly instantly, flames burned a hole through it. When PyroTarp was applied to the same type of cardboard, and the torch was held to it, the paint simply bubbled and turned black. Lemoine recently re-enacted the demonstration for FOX 25 News in Boston for a segment on college fire safety programs, showing how he could place his hand directly behind the piece of treated cardboard while the torch was trained on it—and not even feel the heat of the torch.

After he was convinced by the PyroTarp demonstration last year, Lemoine and others from the University worked with Bradford Industries on similar demonstrations for city public safety officials and state lawmakers.

Through the support of Lowell's legislative delegation, the PyroTarp program got its start in April with the painting of Concordia's corridors and a lab in Pinanski. An additional $150,000 above University operating funds will go to further it this academic year.

Before any PyroTarp was applied to walls on campus, it was reviewed by the Toxics Use Reduction Institute to ensure that its fire-retardant properties did not pose a health risk, according to Liz Harriman, TURI's deputy director.

Exactly which buildings will be repainted with PyroTarp during this phase of the program is still being determined, according to Lemoine, but the focus will likely be on residence halls, wood and timber buildings, and laboratories with a higher risk of fire. The work will be done as such facilities are renovated or are part of other capital projects.

Jerry Ryan, a foreman with Building Services, worked on the painting project, and provided Bradford Industries' chemist with input on issues such as how to make it easier to use and commercially acceptable.

Lemoine says he's already hearing that other universities and colleges are interested in similar painting programs, adding that it's an example of the important partnerships the University is forging, and how it supports local businesses.

"It's made here in Lowell and part of our mission statement is to partner on projects like this," Lemoine says.

▲ **Richard Lemoine, assistant director of Environmental Health and Safety at UMass Lowell, demonstrates how a piece of cardboard treated with PyroTarp paint will not burn through, even when a torch is directed at it. The piece of cardboard on the right was not treated with the fire-retardant paint and burned all the way through during the demonstration, which was presented for a camera crew from FOX 25 News in Boston. The paint is made by Lowell-based Bradford Industries.**

Photo by Christine Gillette

Chancellor Meehan Calls on Legislature to Back Bond Bill

Chancellor Marty Meehan told a State House hearing on Gov. Deval Patrick's higher education bond bill this month that 90 percent of all UMass Lowell structures are more than 25 years old and have crossed a major life cycle threshold. The bill would invest $1 billion in repairs and new facilities at the five UMass campuses.

"No new academic buildings have opened at UMass Lowell in more than 30 years," Meehan told legislators on the Higher Education and Long-Term Debt committees. In addition to funding renovations on UML North, the Governor's bill proposes $26 million for a portion of a new $40 million academic building on UML South, $2.5 million for Olney upgrades, $1.5 million for storm water management, and undesignated funding for other projects. It also proposes $1 billion in bond funds for the state and community colleges.

Lowell Rep. Kevin Murphy, who chairs the Higher Education Committee and who co-chaired the hearing, indicated support for significant funding for the system. "Right now, the established capital needs at the UMass system is $2.9 billion, and for the state and community colleges it's another $2.9 billion," Murphy said. He pointed out to the Patrick Administration that its bill funds only $2 billion of that $5.8 billion total.

▲ **Kevin Murphy, House chair of the Higher Education Committee, co-chaired a recent hearing on a bond bill for the state's higher education facilities. Chancellor Meehan testified at the hearing.**

The two committees will likely make changes to the bill, then send it to the House and Senate floors for action. The 2007 legislative session closes in late November. If a bill is passed before that deadline, it will move to the governor for a veto, changes or approval. If it fails to pass, it will be taken up when the new session convenes in January.

Sovereign Bank Donates $2,500 to Mary Bacigalupo Forum

▲ **Sovereign Bank donated funds to help underwrite the cost of the Mary Bacigalupo Educational Forum, held recently in Lowell. Pictured at the check presentation are, from left, Prof. Sharyn Hardy Gallagher, College of Management; Interim Provost Don Pierson; Chancellor Marty Meehan; Bill Hardy, senior vice president, Sovereign Bank; David L'Heureux, senior vice president, Sovereign Bank; and Karla Brooks Baehr, superintendent, Lowell Public Schools.**

UMass Lowell Leads New Breast Cancer Prevention Initiative

State Invests $250,000 in Focus on Environmental Links

Citing the links between breast cancer and environmental exposures, Chancellor Marty Meehan recently announced a $250,000 state grant for further research. UMass Lowell is partnering on the initiative with the Silent Spring Institute and the Massachusetts Breast Cancer Coalition.

"We know that Massachusetts has one of the five highest incidence rates of breast cancer in the nation," said Meehan at the press conference. "We also know that some communities have rates well above the state average, including Cape Cod, Westford and Andover. This project will provide some answers."

Breast cancer lifetime risk has increased from 1 in 20 women in 1940 to higher than 1 in 8 women today. Massachusetts has taken the lead among states in investigating the causes of the disease and reducing the use of carcinogenic chemicals.

Rep. Kevin Murphy, House chair of the Committee on Higher Education, praised UMass Lowell for its leadership in innovative research, especially in environmental causes of illness.

"The increase in cancer has affected women more than men," he said, adding that it is an issue people can take personally. "We all know people who have battled breast cancer."

The state has made "a visionary investment in prevention," said Julia Brody, executive director of the Silent Spring Institute, the research organization dedicated to finding and breaking the links between the environment and women's health issues, especially breast cancer. "Massachusetts was the first."

Brody led the first comprehensive study of women's exposure to harmful substances—endocrine disruptors—in their homes on Cape Cod, a "hot spot" of breast cancer incidence. Rep. Cleon Turner, representing the Cape, and Rep. Stephen D'Amico, representing Seekonk in Bristol County, spoke at the press event and supported the legislation.

"Now we can do the prevention better, and work with UMass Lowell," said Turner, adding that the Silent Spring Institute has an excellent track record in researching environmental links to breast cancer.

D'Amico said, "What would it be like if one in eight men suddenly had tuberculosis—would money go into treatment or into finding the causes? Lots of money goes into treatment (of breast cancer). It's important for the public sector to invest in prevention."

David Wegman, M.D., dean of the School of Health and Environment, said the School's Center for Sustainable Production will direct the research. The lead investigator is Richard Clapp, adjunct professor, epidemiologist and founding member of the Massachusetts Cancer Registry.

"How do we live our lives in an environment that increasingly is contaminated in ways we don't understand?" said Wegman. "We want to use chemicals, but we want to do so knowingly and responsibly."

"In facing this epidemic (of breast cancer), we need more than awareness—we need answers," said Deborah Shields, executive director of the Massachusetts Breast Cancer Coalition, the education and advocacy arm of the project.

▲ **Julia Brody, executive director of the Silent Spring Institute, with Chancellor Marty Meehan and Rep. Kevin Murphy, House chair of the Committee on Higher Education**

Continued from Page 1

International Conference Examines Nanotechnology, Literature and Society

first-of-its-kind conference. "We'll have noted literary critics, philosophers, scientists and engineers all in the same room, all talking nano from their own perspectives—it'll be very interesting." Testament to the widely different backgrounds of attendees, the call for papers encourages presenters to "present in language that will engage the attention of a disciplinarily diverse audience."

The conference, sponsored by the UMass Lowell Nanomanufacturing Center of Excellence and the UML/University of New Hampshire/Northeastern University Center for High-rate Nanomanufacturing, will feature UML's Theater Production Workshop in a staged production of Bertolt Brecht's classic drama of \scientific responsibility, "Galileo."

For more information about the conference, go to UML.nano.

—*SS*

Fans Flocking to the Tsongas

Season Tickets, Creative Promotions Pushing Up Hockey Attendance

Attendance at UMass Lowell River Hawks hockey games is up significantly through the first four home games, a result of a strong season ticket sales effort and creative promotional activities that are attracting new fans. Despite playing teams that historically don't draw big audiences—in months when baseball is more on sports fans minds than hockey—the River Hawk attendance is averaging about 3,500, including a large student fan base.

"The buzz I'm hearing is about the change in the environment at the arena," says Athletic Director Dana Skinner. "Coach Blaise MacDonald told me the UMass Amherst game (on Nov. 10) was the first time he could remember when the fans cheering actually picked the team up in the third period. There's really a buzz at home games this year."

Two of the first home games of the season were wins against the University of Alabama-Huntsville, a team without a local fan base or a well-known national reputation. Attendance is expected to climb as the powerhouse Hockey East teams of Boston College and University of Maine come to the Tsongas Arena in January and February, bringing with them their own fans.

"In the past, we've had to depend on the visiting schools to bring lots of people to the arena. What's significant is that in these first few games, most of the fans were our own, and that gives our team a competitive advantage. Hopefully this will continue into the winter when teams with large numbers of fans come to town," says Skinner.

New activities during the game are helping to improve the experience as well. Two of the three Hanson brothers from the movie "Slap Shot" took to the ice between the first and second periods of UMass Amherst game to reenact scenes from the cult movie. They also signed autographs during the game and posed for pictures.

Taking a page out of the Lowell Spinners marketing handbook, the Athletic Department has created theme nights including special giveaways. Fans received T-shirts on opening night on Oct. 26, and masks the following night as part of the "Halloween and Hockey" celebration that included a costume contest. Fans competed in the "Hanson Brothers Look-Alike" contest at the Nov. 1 game against Merrimack College

Upcoming promotions include a "Play or Prey 50's Night" on Saturday, Dec. 1 against the University of New Hampshire. The first 1,000 fans will receive River Hawks Talons that night. The Dec. 1 game against Boston University is also "Jimmy Fund Yo-Yo Night," and fans will receive free River Hawk Yo-Yos.

Student attendance is up as well, and the local business community is joining in the excitement by using blocks of club season tickets to reward employees and business partners.

The River Hawks are 2-2-3 after tying two nationally ranked teams, No. 6 UNH on Nov. 9 and No. 20 UMass Amherst the following night.

▲ **Two of the three Hanson brothers from the movie "Slap Shot" signed autographs during the game and posed for pictures.**

Nobel Laureate Delivers 2007 Tripathy Lecture

Robert Grubbs Discusses Metathesis Method of Synthesis

The late Sukant K. Tripathy was an internationally recognized leader in research in the area of thin polymer films in electronics and optics, publishing more than 200 refereed papers and holding two dozen patents. A UMass Lowell professor of chemistry, he founded and served as director of the Center for Advanced Materials and was formerly the University's provost and vice chancellor for academic affairs.

Tripathy passed away in December 2000 in a swimming accident in Hawaii, while attending a conference. Each year, around the time of his death, a leading scientist in the field of materials science comes to UML to present a lecture in his memory.

The speaker at this year's Konarka Sukant K. Tripathy Endowed Memorial Lecture was Robert Grubbs, a professor of chemistry at the California Institute of Technology, who spoke on "Synthesis of Molecules and Materials Using Olefin Metathesis." His seminal research on the development of a stable catalyst for metathesis reactions used in organic synthesis won him a share of the 2005 Nobel Prize in Chemistry.

"Olefin metathesis provides a new method for the synthesis of new compounds that are being used for new pharmaceuticals and plastics," says Grubbs. Thanks to his work and those of other researchers, the process is now more efficient, simpler to use and more environmentally friendly.

Grubbs joins a growing list of Nobel laureates and leading figures in materials science research who have delivered the memorial lecture. This includes Profs. Alan MacDiarmid and Alan Heeger, who were co-winners of the 2000 Nobel Prize in Chemistry for their discovery and development of electrically conductive polymers, and Robert Langer, George Whitesides and Edwin Thomas.

Earlier, the lectureship was co-sponsored by the Tripathy family and the Center for Advanced Materials. This year, Konarka Technologies donated an additional $25,000 to the endowment fund, which was matched by the UMass system. Konarka is a world leader in developing technology and applications for low-cost, flexible photovoltaic polymers.

"It's a wonderful series remembering a major contributor to materials science," says Grubbs. "It's good that his colleagues and family can attend and remain part of the process. [Tripathy] was a major visionary for the University and the field of materials science."

Other activities honoring the professor's memory include the Tripathy Summer Graduate Fellowship, which is awarded to doctoral students for outstanding research in the fields of materials and polymer sciences, and the Tripathy Symposium, which showcases the latest advances in the field each year.

This year's symposium will held November 30 at Wannalancit Mills. For more information, visit www.uml.edu/centers/CAM/Memorial/Symposium.html.

▲ **California Institute of Technology's Robert Grubbs, middle, delivered the 2007 Konarka Sukant K. Tripathy Endowed Memorial Lecture in October. With him are, from left, Assoc. Chancellor Jacqueline Moloney, Prof. Daniel Sandman, Dean Robert Tamarin, and Prof. Jayant Kumar.**

Lawrence Celebrates Opening of New High Schools

A standing-room-only crowd made up of students, educators, community leaders, politicians and local residents recently celebrated the official opening of the new Lawrence High School campus. Built to replace an overcrowded and outdated school, Lawrence High School is now considered one of the largest and most progressive high schools in all of New England.

Billed as "the new 21st Century prototype" for conversion of large urban high schools into small, stand-alone thematic secondary schools, the new campus offers Lawrence students six separate high schools that will provide a college-like culture.

The opening festivities come a month after the schools opened their doors for the start of classes in September. The official dedication featured guests such as Gov. Deval Patrick, State Treasurer Tim Cahill and UML Chancellor Marty Meehan.

Lawrence School Superintendent Wilfredo T. Laboy hosted the event, which included a speaking program and performances by the students held in the Performing Arts Center, and tours of the campus. In his remarks, Laboy called the project "a national model for urban education and school transformation across the nation."

Students proudly wore their color-coded uniform shirts as they participated in the festivities. "This is a beautiful school, I just love it. As a teenager, it is important to learn for the future and this is a great place to do it," said Marchochee Constant, a junior in the International School.

The six new schools include Lawrence High School for Fine and Performing Arts, Lawrence International High School, Lawrence High School for Health and Human Services, Lawrence High School for Humanities and Leadership Development, Lawrence High School for Math, Science and Technology and Lawrence High School for Business Management and Finance.

Students are given the opportunity to choose the school they would like to attend, based on their interests. Each of the six schools is run independently with a separate principal, staff and budget, classrooms and computers.

The student body will share certain features on campus, such as a 12,000 square-foot media center and a 3,400-seat field house. The six schools and the main building (which houses the cafeteria, field house and media center) are connected by a bridge walkway for easy access.

UML, with the assistance of the Center for Field Services and Studies (CFSS) and the Graduate School of Education, helped support the development of the schools through an educational partnership. With a renewed partnership, UML and the Lawrence Public School system will continue to provide additional educational services and opportunities to students, school personnel and the community. Examples of further collaboration include programs such as dual enrollment opportunities for juniors and seniors, on-site undergraduate and graduate studies, and a scholarship program for students planning to continue their education at UML.

The University already has a College Prep Program office on-site. The College Prep Program offers programs for Lawrence students planning to pursue higher education. According to Dr. Hector N. Torres, director, "our presence within the walls of the new school allows UML to provide better educational opportunities for the students. This creates a win-win situation for all," he says. The University is conferring with the Lawrence Public Schools about opening another office on the new high school campus to help students make the transition from high school to college.

▲ Participants in the opening ceremonies at Lawrence High School included, from left, Paul Reville, chair of the Massachusetts Board of Education; Hector Torres, director of the College Prep Program; Anita Greenwood, Interim Dean, Graduate School of Education; Wilfredo T. Laboy, superintendent, Lawrence Schools and Michael Sullivan, mayor of Lawrence.

▲ Hector Torres and Cynthia Bent, director and assistant director of the College Prep Program, respectively, have a permanent office at the recently-opened Lawrence High School.

UML Researchers Study Greenhouse Gases Emitted by Wetlands

Methane Contributes Greatly to Global Warming

When someone mentions greenhouse gases, chances are your first thought would be carbon dioxide (CO_2). Although CO_2 emissions get most of the media attention with regard to global warming, methane (CH_4)—a colorless, odorless and highly flammable gas that is a major component of natural gas—accounts for about 25 percent of this warming, and the level of atmospheric CH_4 is currently increasing at a rate of about 1.0 percent per year. Much of the natural flux of methane to the atmosphere is from freshwater wetlands, which dominate northern latitudes.

The production of methane is a bacterial process that occurs in the absence of oxygen and is widespread in flooded wetlands. For several years Prof. Mark Hines, chair of the Department of Biological Sciences, and his colleagues have been investigating factors that control emissions of CH_4 from high-latitude wetlands. Despite the high potential for these wetlands to emit methane gas, previous studies in Hines's laboratory determined that CH_4 production in many of them is much lower than expected because these habitats tend to inhibit the activity of methane-producing bacteria.

▲ Mark Hines

"My fieldwork in Alaska revealed a connection between vegetation distribution and the biochemical pathway leading to methane," he says. "I've been studying the idea that methane emission to the atmosphere from wetlands will respond to climatic warming in a highly non-linear manner, leading to increased methane fluxes well above current predictions based on temperature alone." This increase is due to the fact that warming causes changes in vegetation patterns, which in turn favor CH_4 production.

Hines recently returned from a five-week research trip to Switzerland, where he worked with colleagues at the Swiss Federal Research Institute to further quantify the relationship between the pathway of CH_4 formation and the distribution of vegetation in Swiss bogs. One aspect of these studies was to include the influence of annual temperature on how methane is formed, which was achieved by investigating wetlands at various elevations.

"Wetlands at 6,000 feet behaved similarly to those in Alaska, and our results support the notion that global warming will affect methane production via both vegetation changes and temperature-controlled timing of when rapid methane formation will commence each year," he says.

Hines will expand the Swiss studies to test the hypothesis that a northward-moving front of high methane fluxes can be described by explaining the biochemistry of CH_4 formation through understanding the effects of plants and temperature changes on microorganism activities. Increases in CH_4 formation during these changes represent a potentially strong positive feedback on global warming since even a slight rise in temperature can lead to a sharp increase in methane production, which further exacerbates warming.

"Aspects of these studies are also being conducted at sites in the Adirondacks in New York, with funding from the National Science Foundation, and in wetlands in Andover, Massachusetts, and Barrington, New Hampshire," he says.

For more information, visit the UML Biogeochemistry website at http://biogeochemistry.uml.edu.

Nanomedicine Technology Applied to Health and Performance

Military Meals Ready to Eat (MRE's) May Include Nanoscale Nutrients

Soldiers in the field have little or no access to fresh foods and the important nutrients that such foods contain—especially antioxidants. So, the U.S. Army Soldier Systems Center in Natick turned to Prof. Robert Nicolosi of the Clinical Laboratory and Nutritional Sciences Department.

"The Army uses some antioxidant additives now, such as Vitamin E, amino acids and spice derivatives, to support health and enhance performance," says Nicolosi, who directs the Center for Health and Disease Research and conducts extensive research on nutrient delivery systems. "But these are dissolved as suspensions in a drink powder where the nutrient particle sizes are large and not very soluble or stable.

▲ Prof. Robert Nicolosi

"We have demonstrated that nanoemulsions are more stable and more effective—that is, more bioavailable," says Nicolosi.

With a $50,000 grant, Nicolosi's team will conduct two studies. The first will produce and characterize the formulation, starting with 100 variations to determine the optimal formulation. Tests will measure solubility, loading capacity, nutrient release and stability under extreme conditions of temperature and pH.

The second study will determine the bioavailability of the compounds when delivered as nanoemulsions, using animal models and testing for oral, transdermal and intramuscular delivery.

"We hope to complete these pre-clinical trials in one year and then advance to human trials, possibly using soldiers at Natick and University athletes," says Nicolosi, who is joined on the study by Assoc. Prof. Thomas Wilson of the same department and co-director of the Center, and by doctoral candidates Srikanth Kakumanu and Fonghsu Kuo.

UML Art History Prof. to Judge Exhibit

Liana Cheney, UMass Lowell professor of Art History and Chair of the Department of Cultural Studies will judge the annual members' art exhibit for the Whistler House Gallery. The exhibit offers a diverse collection of work including oil, watercolor, sculpture, mixed media and monoprint.

The members' exhibit runs through Monday, December 31 at the Parker Gallery, 243 Worthen Street, Lowell.

For more information, visit www.whistlerhouse.org.

UMass Lowell, High-School Faculty Join Forces to Create a College-like Experience

Twenty-five members of the UMass Lowell faculty, from a broad range of disciplines, spent a week earlier this fall partnering with the Lowell High School faculty in a series of LHS classes that sought to mirror the college experience.

As participants in Partnership for College Success (PCS), a five-year initiative funded by the Nellie Mae Education Foundation, the 25 faculty members, as part of the high school's first annual College Week Program this October, served as co-teachers or guest lecturers in a range of classes from history and modern languages to computer science, chemistry and engineering.

The idea is to bring the college experience directly to high-school students in their classrooms

—Elaine Donnelly

"The idea is to bring the college experience directly to high-school students in their classrooms," says Elaine Donnelly, the UMass Lowell Partnership facilitator. "We see this as a prospective model for the region, for the nation as a whole."

The PCS initiative, now in the third year of its cycle, placed a larger number of UMass faculty at LHS this fall, in a wider range of disciplines, than at any time before. The project, says Donnelly, is on target to be repeated in the spring.

"It's really hitting its stride, I think. We're doing things we've never done before. And the feedback we're getting is overwhelmingly positive. Most of the faculty we've surveyed say they want to do it again."

The Nellie Mae Foundation, based in Quincy, targets its funding efforts on educational projects in the New England region. The Partnership initiative embraces five separate sites, two in Maine, three in Massachusetts—including the Lowell project-that can claim a pre-existing partnership between a school system and a college or university.

The faculty partnering is only one of the program's initiatives. Others include vertical-teaming efforts with chemistry faculty from UMass Lowell, Middlesex Community College and LHS to assess the effectiveness of academic programs; a TV series on college-related issues for Channel 22 in Lowell, co-produced by a team from the high school and University; a series of data-tracking projects that chart the progress of LHS students through their first years of college; a series of collaborative workshops, co-designed by LHS and UML guidance and admission personnel, that deal with the college-admissions process; and other, similarly co-authored efforts.

The PCS program on the UMass Lowell campus is coordinated out of the Center for Family, Work and Community. The Center is headed by Linda Silka, who is among the 25 participating faculty.

University of Massachusetts Lowell

Publications Office
University of Massachusetts Lowell
One University Avenue
Lowell, MA 01854

Non-Profit Org
U.S. Postage
PAID
Lowell, MA 01854
PERMIT No. 69

Deadline for the Next Issue of UML Shuttle Is November, 30