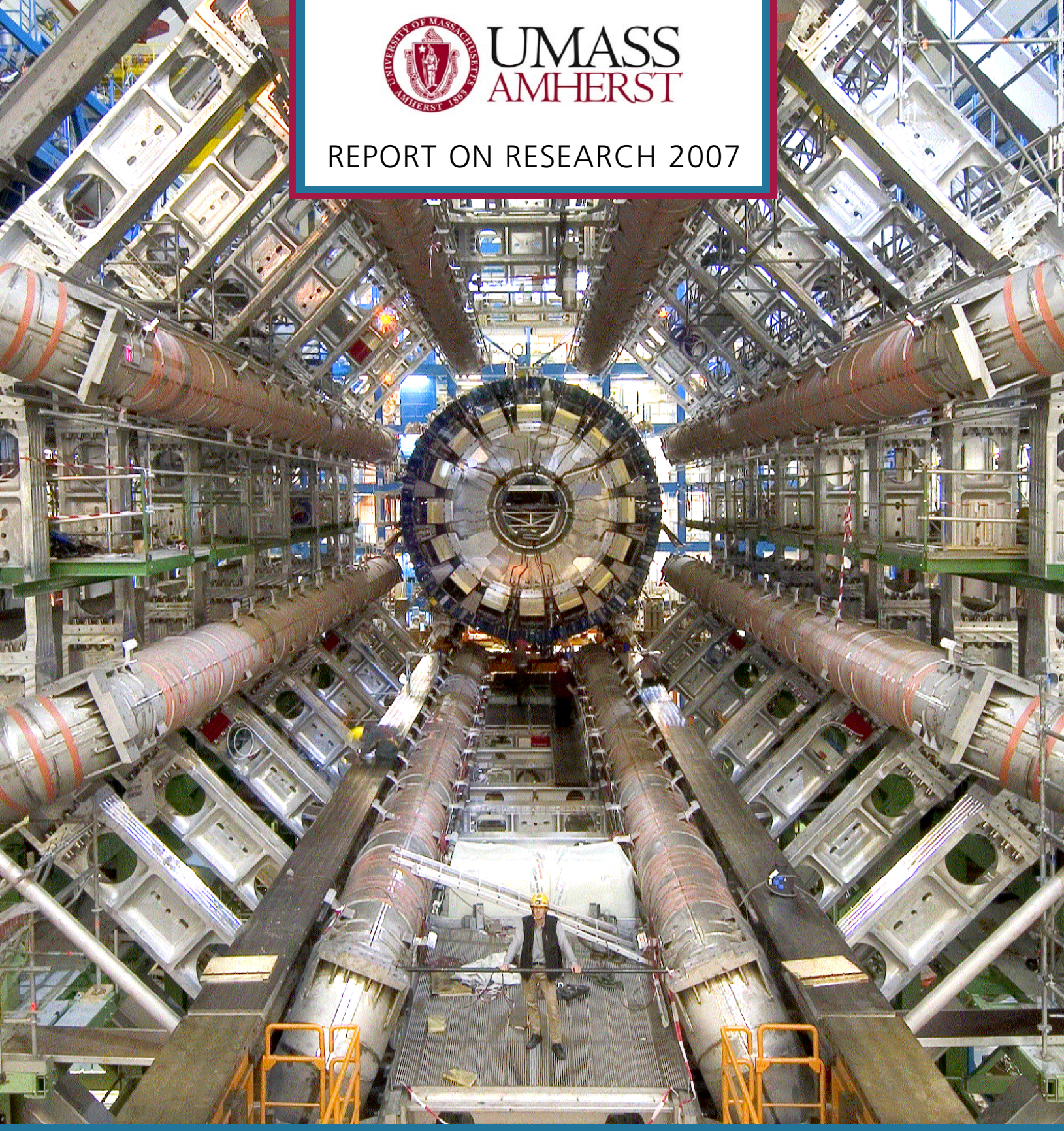
UMASS AMHERST

REPORT ON RESEARCH 2007



A World of Research

UMASS AMHERST

REPORT ON RESEARCH 2007

From **A**nimal biotech to **Z**eolite-based nanotechnologies, UMass Amherst research and innovation reaches across Massachusetts, the nation and the world.

The Office of the Vice Provost for Research provides services in support of research and scholarly activity on the Amherst campus. Our goal is to foster collaborative research, innovation, technology commercialization and entrepreneurship by providing expertise, counsel, oversight and access to funding.
Visit us at www.umass.edu/research.

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FRONT COVER PHOTO: Eight superconducting coils of the ATLAS Muon Spectrometer. ATLAS is a large particle detector under construction at CERN, Geneva Switzerland. UMass Amherst researchers are contributing to the development of software for this international project. Photo credit: CERN-ATLAS Experiment

The data in this report reflects activities from July 1, 2006 – June 30, 2007.
For additional copies of this report: Research Liaison and Development, 70 Butterfield Terrace, University of Massachusetts, Amherst, MA 01003 or www.umass.edu/research/

A World of Research

FROM THE VICE PROVOST

I am pleased to present this year's University of Massachusetts Amherst *Report on Research* for fiscal year 2007. This year saw dramatic increases in sponsored activity - a testament to the hard work and excellence that is personified by our faculty members and students. With more than five hundred research active investigators on campus bringing in more than $131 million in awards - the largest percentage increase in research funding the campus has experienced in over a decade - it's safe to say the research enterprise is thriving.

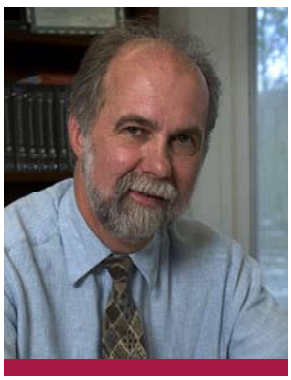
As you look through this report, you'll see that our reach and impact extends well beyond our New England borders to all corners of the earth. For example, in Geneva, Switzerland, campus researchers are working with scientists and engineers at 165 institutions in 35 countries to construct the ATLAS large particle detector (featured on the front cover of this report) at the European Organization for Nuclear Research (CERN). The campus is heavily involved in software development for this project which is the largest and most complex particle detector ever built.

And, on the top of Sierra Negra Mountain in Mexico, a collaborative partnership between the United States and Mexico is well underway. When the Large Millimeter Telescope (LMT) - still under construction - is completed in 2008-2009, it will be the largest of its kind and will allow astronomers to see farther into space than they ever have before (see page 19). We take pride in knowing that this project is the largest scientific collaboration between Mexico and any country.

The reach of technology developed on campus is also expanding. 2007 saw the spin off of a new Amherst-based company called SunEthanol. Formed around research on a novel bacterium that efficiently converts plant matter to ethanol, the technology developed could have a profound impact on biofuels production (see page 23). As the campus's pipeline of technology disclosures grows, so does the opportunity for more spin-off companies in the future.

I invite you to explore this expanded world of research at UMass Amherst and to see how the campus is connecting with the Commonwealth and with countries around the globe. The research we chose to highlight on the following pages - in the life sciences, clean energy and human health - will change our world. Also highlighted are projects showcasing student research experiences. The positive impact student research has on the teaching and learning experience at UMass Amherst cannot be understated. Underlying all of this activity are the programs and offices of the Research Area. They enable this expansion by supporting new initiatives, technology transfer, sponsored activity, and internal grant programs.

UMass Amherst researchers are accomplishing great things. This exciting work wouldn't be possible without the support of the campus's administration and the support of our partners and sponsors. We know that distributing research funds is more competitive and selective than ever. On behalf of the campus, I thank you for your confidence in UMass Amherst.



Sincerely,

Paul Kostecki
Vice Provost for Research

CANCER-FIGHTING AGENTS

The American Cancer Society estimates that over 178,000 new cases of invasive breast cancer will be diagnosed among women in the U.S. in 2007. **Professors BARBARA OSBORNE and JOSEPH JERRY of the Veterinary and Animal Sciences department** are adding to the arsenal for the war on breast and various other cancers. They are two of a number of campus researchers working to demystify cancers by analyzing enzymes and genes that could play significant roles in their diagnosis and prognosis.

UMASS CREATIVE SERVICES

PROFESSOR BARBARA OSBORNE WORKS ON AN ENZYME CALLED GAMMA-SECRETASE AND ITS IMPLICATIONS FOR VARIOUS CANCERS

Barbara Osborne's work is focused on the immune system. A recent $5 million grant from the National Institutes of Health (NIH) supports her work on an enzyme called gamma-secretase. In patients with breast cancer and leukemia, the enzyme activates a protein called "Notch." The cell-signaling system to which Notch is important is often activated in cancer patients. Gamma-secretase also activates a protein called amyloid precursor protein, a precursor to proteins that comprises the plaque found in the brains of Alzheimer's patients. Osborne is using the NIH grant to investigate whether inhibiting gamma-secretase would be a useful supplemental therapy for some of these diseases.

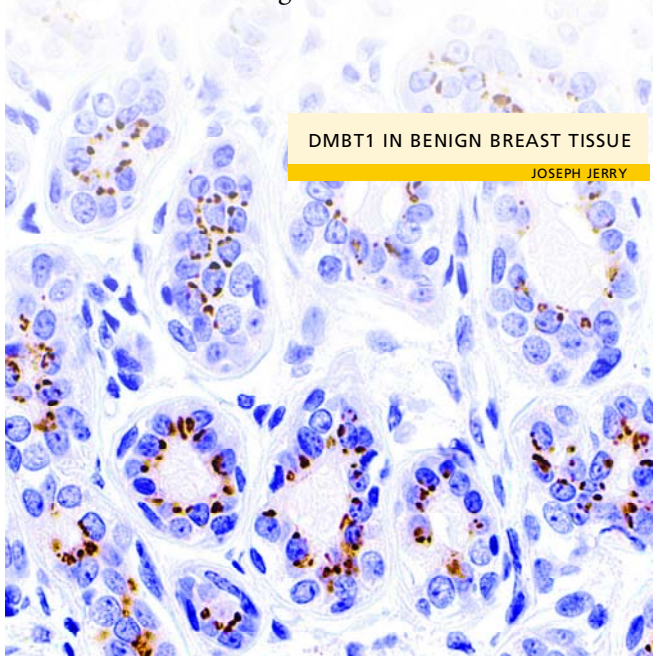
UMass Amherst researchers are working to demystify cancers by analyzing enzymes and genes that could play significant roles in their diagnosis and prognosis.

PVLSI

PROFESSOR JOE JERRY PERFORMS BREAST CANCER RESEARCH AT THE PIONEER VALLEY LIFE SCIENCES INSTITUTE IN SPRINGFIELD, MA.

Joe Jerry is forwarding the fight to treat and prevent breast cancer with his identification of genes that appear to modify the actions of mutations in p53, a tumor suppressor gene. The genes also seem to explain why some people with p53 mutations do not develop cancer. His discovery came after his research team found differences in a section of DNA belonging to two groups of mice that had identical mutations in p53, with only one group developing mammary tumors. He isolated one particular gene, DMBT1, as the gene that was missing products or occurred at low levels in the tumor group. As director of the Pioneer Valley Life Sciences Institute's (PVLSI) Breast Cancer Working Group, Jerry's subsequent collaboration with pathologists at Baystate Medical Center in Springfield, MA led to the discovery of low levels of DMBT1 in women with breast cancer. PVLSI is a partnership between UMass Amherst and Baystate Medical Center that aims to improve human health by developing new ways to diagnose and treat disease.

Jerry's findings on DMBT1 can be used for development of drugs for prevention or treatment of breast cancer and are available for licensing and research collaboration.



DMBT1 IN BENIGN BREAST TISSUE

JOSEPH JERRY

Professor Lila Gierasch's work explores how diseases arise from folding mistakes in cell proteins. She is one of over 300 UMass Amherst faculty performing research in the life sciences.

PROTEIN FOLDING PIONEER

Distinguished Professor Lila Gierasch of the Biochemistry and Molecular Biology program is a protein folding pioneer. A leading authority on protein chemistry, Gierasch investigates how proteins fold and why they misfold, a characteristic of many neurodegenerative diseases. The National Institutes of Health (NIH) recently recognized Gierasch with a $2.5 million NIH Director's Pioneer Award to continue her work. The Pioneer Award is designed to support individual scientists of exceptional creativity who propose highly innovative and potentially transformative approaches to major challenges in biomedical and behavioral research.

Developing strategies for treatment and prevention of neurodegenerative diseases has presented major challenges to biomedical researchers because their causes are often unknown. Gierasch specializes in understanding the protein folding problem by studying how local amino acid sequences guide folding and how the folding assistants in the cell, so-called molecular chaperones, optimize this process in living organisms. Her work explores how diseases arise from folding mistakes through investigations of the complex environment of a cell. The results of her work have implications for a variety of diseases and disorders, including Alzheimer's disease, cystic fibrosis, transmissible spongiform encephalopathy ('mad cow' disease), and certain cancers.

"I'm absolutely thrilled to be one of the thirteen 2006 Pioneer Awardees and tremendously excited by the impact this grant will have on our research on protein folding in the cell," says Gierasch. "We are now able to tackle really risky questions that we've wished to address but were not able to because of the more conservative nature of traditional funding."

PROFESSOR LILA GIERASCH ACCEPTS HER PIONEER AWARD FROM NIH DIRECTOR ELIAS A. ZERHOUNI (L) AND JEREMY M. BERG (R), DIRECTOR, NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES.

BEN BARNHART

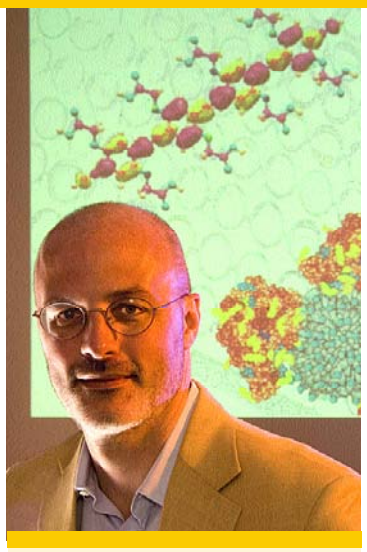
UNCOVERING THE CAUSES OF DISEASE

DISTINGUISHED PROFESSOR LILA GIERASCH (L) AND DR. QUINGHUA WANG DISCUSS PROTEIN FOLDING RESEARCH IN THE LAB.

BEN BARNHART

NANO NOSE KNOWS SICKLY CELLS

MICHAEL ZIDE



VINCE ROTELLO RESEARCHES THE BIOLOGICAL AND MATERIALS APPLICATIONS OF NANOPARTICLES.

Human and animal noses are great diagnostic tools, allowing their owners to identify pleasant smells or alerting them to danger. A group of researchers led by **Chemistry professor VINCENT ROTELLO** have mimicked the smelling process by developing a kind of molecular nose that could eventually serve as a medical diagnostic tool by sniffing out the proteins made by sickly cells. Using nanoparticle-based sensors, this "Nano Nose" can be trained to sniff out and identify proteins, which play a prominent role in the health and disease of human cells.

The Nano Nose is an alternative to existing methods of protein detection that are accurate but expensive and highly specific. The team set out to design a more holistic sensor akin to the human nose that uses a combination of receptors to interpret and identify smells. The resulting Nano Nose is made of gold nanoparticles that can be manipulated into various shapes and sizes and fluorescent dye that allows researchers to see which sensors react with a particular protein. Researchers can then read the glow pattern, with the assistance of a computer to identify the protein. The result is a sensor that can identify a wider variety of proteins than existing methods with much less effort. "The goal is to make a sensor that works like the cancer-sniffing dogs we have been hearing about in the news," says Rotello. Though the research team is currently focusing on sensors for detecting the malformed proteins produced by cancer cells, the technique holds promise as a means for detecting a wide variety of diseases.

VIRUS SECRETS

It takes more than just breaking and entering for a virus to successfully invade a cell. Getting to the cell's center where the host cell's machinery will be co-opted to make more virus requires navigating obstacles such as membranes and avoiding being recognized and kicked out by the host.

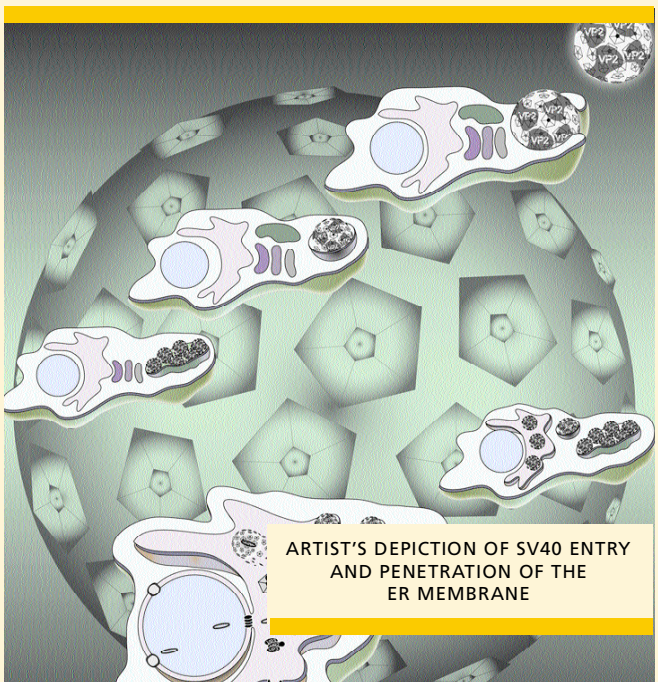
Now campus scientists have uncovered the secret to one virus's success: a concealed pair of proteins that when unleashed can slice through membranes that are normally impenetrable. The work has implications for fighting a group of viruses that infect the kidneys, respiratory system and brain, and sheds light on potential gene therapy techniques and how viruses exploit the cellular pathways of their hosts.

MOLECULAR AND CELLULAR BIOLOGY PROGRAM

DANIEL HEBERT STUDIES PROTEIN FOLDING, QUALITY CONTROL AND DEGRADATION OF MEMBRANE GLYCOPROTEINS

"Viruses provide a valuable window to the cell to follow fundamental cellular processes and we can learn a lot by uncovering how these pathogens exploit their cellular host," says **DANIEL HEBERT, Associate Professor of Biochemistry and Molecular Biology,** who leads the research effort. The research was published in the December 8, 2006 issue of the journal *Molecular Cell*.

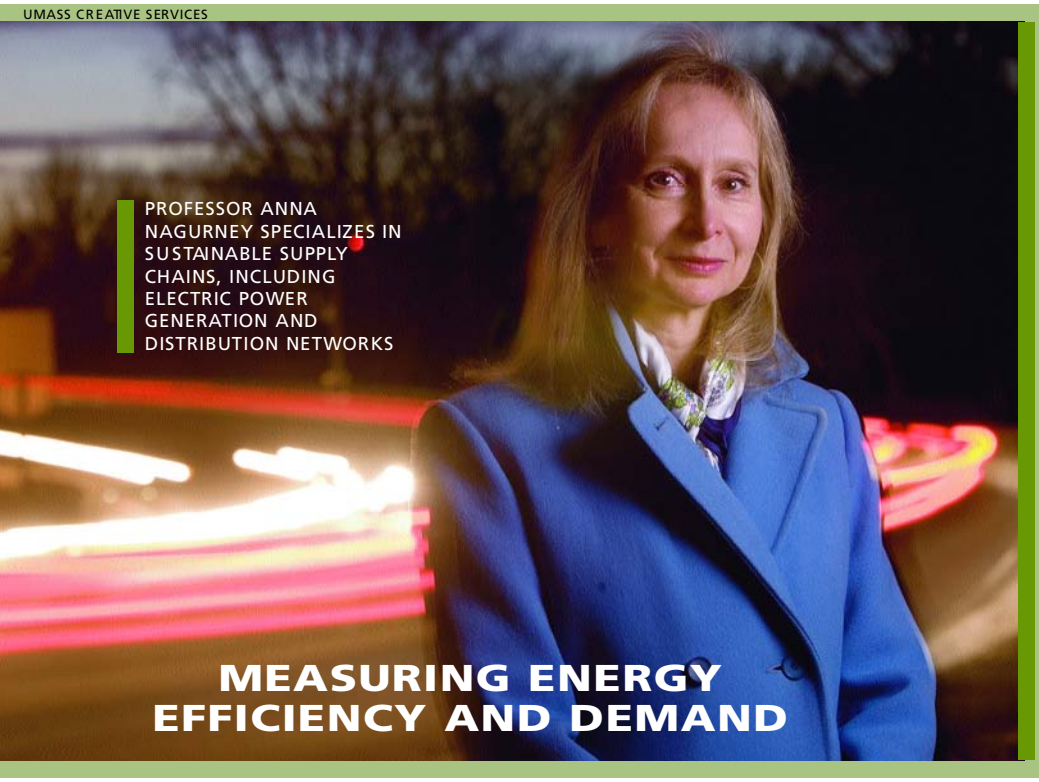
ROBERT DANIELS



ARTIST'S DEPICTION OF SV40 ENTRY AND PENETRATION OF THE ER MEMBRANE

ADVANCING ENERGY RESEARCH

UMASS CREATIVE SERVICES



PROFESSOR ANNA NAGURNEY SPECIALIZES IN SUSTAINABLE SUPPLY CHAINS, INCLUDING ELECTRIC POWER GENERATION AND DISTRIBUTION NETWORKS

MEASURING ENERGY EFFICIENCY AND DEMAND

Professor Anna Nagurney and her students have developed a computer-based tool to assist with the analysis and management of power generation and distribution networks.

Natural disasters, accidents and the failure of aging equipment can have serious consequences for electrical power supply chains. Researchers in the Isenberg School of Management have developed a new tool to help policy analysts and decision makers identify the most important components of these critical infrastructure networks and how they should be managed if such disruptions occur.

John M. Smith Memorial Professor ANNA NAGURNEY, director of the campus's Virtual Center for Supernetworks, and doctoral student Qiang "Patrick" Qiang have developed a computer-based network efficiency measure that determines the demand for network resources based on user behavior and associated costs. It also determines the loss of efficiency that occurs when key components like roads, electrical power stations or transmission lines are destroyed and it captures how users of a network readjust after network disruptions.

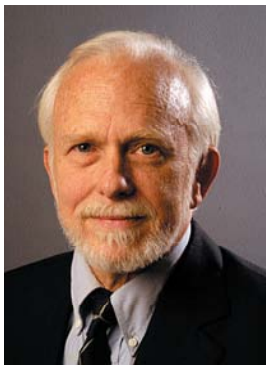
"We expect that the tool will have wide practical applications since it provides a quantifiable way to identify which network components should be best maintained based on actual usage and costs," says Nagurney. "The most critical network components should be the most protected since their removal will result in the greatest loss of network efficiency and have the greatest impact on the economy and society."

Nagurney and doctoral student, Zugang "Leo" Liu, have already completed a computer-based model of the electric power supply chain for New England which accurately predicts the demand market prices and captures the complex interactions among the various fuel and electric power markets. This will be used as a test-bed to identify the most important suppliers, power generators, transmission lines, and consumers of electric power in New England from a network efficiency standpoint. This work was funded by the National Science Foundation as part of the Management of Knowledge Intensive Dynamic Systems Program. Results appear in the paper, "*A Network Efficiency Measure for Congested Networks*," published in the August issue of Europhysics Letters. Additional papers are in press in Optimization Letters and the Journal of Global Optimization.

Learn more about UMass Amherst energy-related research through the campus's Advanced Energy Portal www.umass.edu/research/energy.

ADVANCING ENERGY RESEARCH

WIND BENEATH THEIR WINGS



Professor JAMES MANWELL, Mechanical and Industrial Engineering, has written the book on wind energy research. It's fitting that he and his colleagues in the campus's **Renewable Energy Research Lab** were part of a state-wide coalition that secured a highly competitive $2M grant from the US Department of Energy to help fund construction of a next generation wind turbine blade facility in Charlestown, MA that will enhance the state's leadership position in the burgeoning field of wind energy. Another $13M in grants and loans to finance construction and start-up costs of the facility will come from the Mass Technology Collaborative's Renewable Energy Trust.

The facility is being constructed on Boston Harbor and will test the strength and durability of wind turbine blades up to 230 feet long, something that isn't possible with current facilities. Construction is expected to be completed in 2009. The state will also spend $5 million to create an adjacent research lab to develop improved wind turbine blades and stronger composite blade materials - critical issues as turbines get larger and have to withstand more brutal conditions in growing offshore applications.

Wind energy is the nation's fastest-growing alternative energy source and the blade facility is seen as one in a series of steps Massachusetts has taken to help raise its profile as a hub for the clean energy industry. The facility will boost wind-related research at UMass Amherst, home of the nation's oldest and foremost wind energy education program. It's expected that the blade test facility will attract companies working on wind turbine design and manufacturing to the state.

Manwell, who was recently appointed to the International Council for Science Panel on Renewable Energy (ISPRE) will provide technical expertise that will guarantee a state of the art facility. Other UMass Amherst faculty members lending their expertise to the project are MIE professors Robert Hyers and Jon MacGowan.

"[The wind turbine blade testing facility] is another in a series of steps we have taken to help make Massachusetts a global center for clean energy technology,"

– Deval Patrick
Governor of Massachusetts

GOVERNOR DEVAL PATRICK RESPONDS TO THE NEWS BY U.S. SECRETARY OF ENERGY SAMUEL BODMAN (SECOND FROM RIGHT) THAT MASSACHUSETTS HAS BEEN CHOSEN AS THE SITE FOR A NATIONAL RENEWABLE ENERGY LABORATORY WIND TECHNOLOGY TESTING CENTER.

MA GOVERNOR'S OFFICE

UMA CREATIVE SERVICES\

ADVANCING ENERGY RESEARCH

THE POLICY OF ENERGY

SHAOWEI WANG

ERIN BAKER EXPLORES THE COSTS AND BENEFITS ASSOCIATED WITH INVESTING IN ALTERNATIVE ENERGIES

Professor ERIN BAKER, Industrial Engineering, is using innovative, cross-disciplinary methods to significantly contribute to the ongoing conversation about energy sources and their environmental impact. In 2006, Baker and her research colleagues from UMass Boston and the University of Maryland received a $347,000 grant from the U.S. Department of Energy to explore the costs and benefits associated with investing in alternative energies. The researchers applied analytic methods that are commonly applied to industry in order to look at solar power's potential role in the electricity sector through 2050.

Using the framework of a research and development portfolio in order to evaluate economic viability, Baker's team concluded that solar photovoltaics would have little impact on greenhouse gas emissions if complementary technologies, such as low-cost storage methods, are not simultaneously developed. They also found that experts disagree on the amount of investment needed to decrease the cost of solar technology and to make it more widely used. Baker has suggested that policy makers consider encouraging the manufacturing sector to invest in research that would lead to technological breakthroughs by providing subsidies, offering tax breaks, and supporting public/private collaborations.

Several publications, such as *Renewable Energy Access* and *Reliable Planet Newswire* have cited Baker's report in stories discussing the viability of solar energies. Baker is a member of the campus-based **Massachusetts Center for Renewable Energy Science and Technology; MassCREST** (see page 16).

Biofuel is considered an important means of reducing greenhouse gas emissions and increasing energy security by providing a viable alternative to fossil fuels.

CATALYZING RENEWABLE BIOFUELS

Chemistry professor SCOTT AUERBACH studies zeolites – nanoporous crystalline alumino-silicates with a rich variety of interesting properties and industrial applications. The National Science Foundation recently awarded Auerbach a $276,000 grant to study how zeolites can be used to produce renewable biofuels.

LISA KORPIEWSKI

SCOTT AUERBACH STUDIES ZEOLITES AND THEIR ROLE IN PRODUCING RENEWABLE BIOFUELS

Auerbach is investigating the development of new catalysts that produce fuels such as gasoline from sugars obtained from cellulosic biomass – plant wastes or plants which are grown specifically for fuel production. A challenging step in this process is an "addition reaction," where two molecules join in the right way to form a precursor to gasoline. This is the opposite of the chemistry that is presently used in crude oil refinement, in which acidic catalysts are used to "crack" big molecules into smaller ones. With this in mind, Auerbach has proposed the study of petroleum refinement catalysts (zeolites) suitably modified to make them basic, not acidic, so they will be effective in promoting addition reactions.

Zeolites are nanoporous solids, so the project involves an interesting nexus between chemistry, nanotechnology and energy research. Chemical Engineering professors Curt Conner and George Huber will take the predictions of Auerbach's calculations to fabricate and test new biofuel production catalysts. The team is also part of MassCREST (see page 16).

PARKASH GROUP

REDUCING HEAVY METAL EXPOSURE

Research underway by **Plant, Soil and Insect Sciences Professor OM PARKASH** is leading to breakthroughs in the global fight to reduce human exposure to toxic heavy metals.

Metals and metalloids such as mercury, lead, cadmium chromium, and arsenic adversely affect the health of millions of people worldwide. As an example, more than 400 million people are at risk of arsenic poisoning in Bangladesh and the West Bengal state of India due to high levels of the contaminant in drinking water and soil. Current physical remediation methods involving soil removal and burial are expensive, impractical on the scale that is needed, and environmentally destructive.

Enter Parkash's research on a technology that harnesses plants to extract pollutants from soil or water. The plants use their normal root uptake of nutrients to either concentrate pollutants in their cells or convert toxic pollutants to less toxic forms. The technique, called phytoremediation, is less costly and more environmentally friendly than physical remediation methods. His laboratory research is focused on developing non-food high biomass crop such as Crambe abyssinica, commonly known as Industrial Oil rapeseed, for phytoremediation and developing safer food crops such as rice for reduced uptake of arsenic and other toxic metals in the aboveground leafy biomass and seed grains. Parkesh's research has garnered the attention of the Massachusetts Technology Transfer Center (MTTC) which awarded him a 2007 grant to advance technologies associated with his work on engineered rice plants for enhanced resistance and decreased arsenic update.

BOOSTING WOMEN'S HEALTH, NATURALLY

We've all heard the "PMS" jokes – poking fun at the psychological and physical symptoms women experience prior to the onset of their monthly period. But for the 90 percent of pre-menopausal women who regularly experience these symptoms, it's no laughing matter.

While mild in most women, up to 20 percent experience symptoms that meet the clinical definition of premenstrual syndrome (PMS) and 5 percent to 8 percent experience a more extreme form called premenstrual dysphoric disorder (PMDD), which substantially interferes with normal life activities and interpersonal relationships.

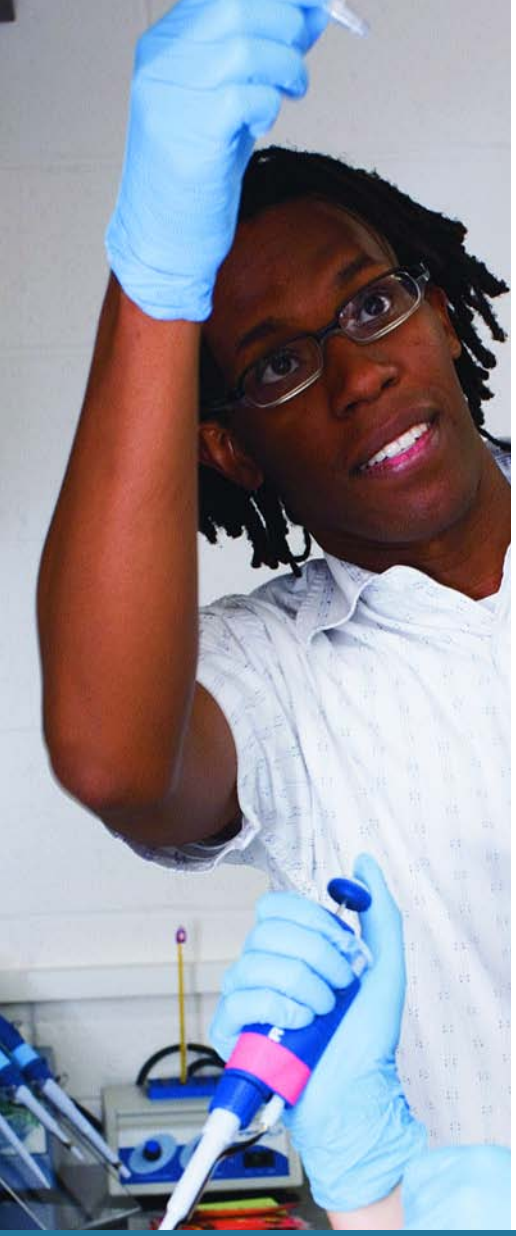
NAFIS AZARD

ELIZABETH BERTONE-JOHNSON STUDIES THE EFFECT VITAMIN D MAY HAVE ON PREMENSTRUAL SYNDROME

Research led by **Associate Professor ELIZABETH BERTONE-JOHNSON, Biostatistics and Epidemiology** suggests a high dietary intake of vitamin D and calcium may substantially reduce a woman's risk of developing PMS. Bertone-Johnson recently received $868,857 from the National Institutes of Health and Mental Health to further study the effect vitamin D may play in reducing a woman's likelihood of developing premenstrual syndrome.

Bertone-Johnson and her research team are studying the relationship between blood levels of these biochemical factors and risk of these disorders in the Nurses' Health Study II, an ongoing prospective study of more than 117,000 women. They will also assess whether several genetic factors may be involved in the development of PMS and PMDD.

"This research will contribute to a greater understanding of the role of biochemical and genetic factors in PMS and PMDD," says Bertone-Johnson. Identification of factors that affect incidence of PMS and PMDD will provide women increased opportunities for modifying their risk of the disorders with fewer drawbacks than pharmaceutical treatments.



TOWARDS SPINAL CORD REPAIR

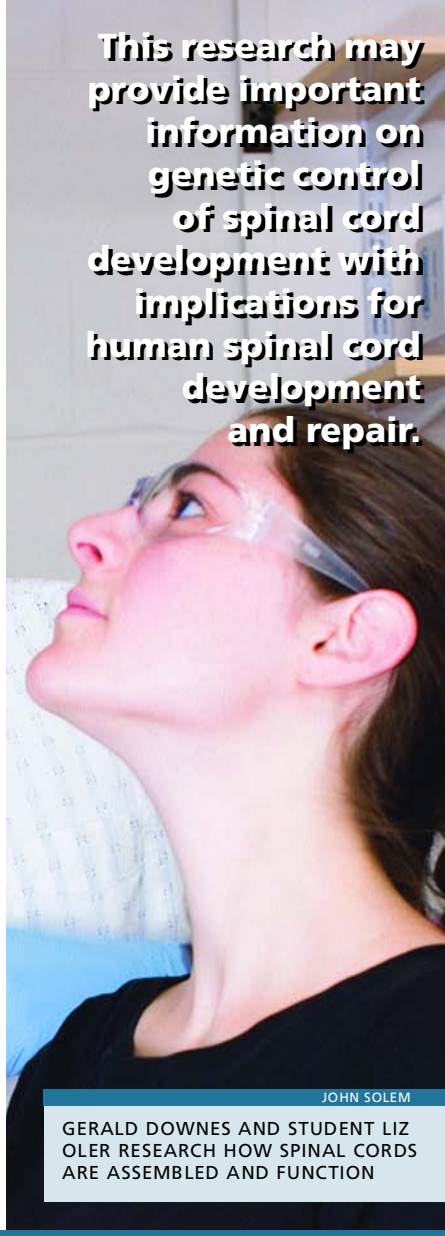
By studying embryonic zebrafish, **Assistant Professor of Biology GERALD DOWNES** hopes to bring new understanding to how spinal cords are assembled and how they function.

"To figure out how the spinal cord works, we've turned to a simpler system with fewer cells," says Downes. We anticipate that very similar genes are responsible for spinal cord development in humans and that the genes required for development may also be required for spinal cord repair after injury."

Downes is investigating the reason behind abnormal swimming behavior in different mutant strains of zebrafish. These fish perform 'accordion swimming' which suggests a spinal cord defect. Using DNA techniques to produce certain proteins in the spinal cord cells, Downes can determine whether the cells connect to the correct locations and if they are functioning normally. The next step is to determine the identity of these as yet unknown genes.

Downes was recently awarded a five-year, $792,000 grant from the National Institutes of Health to pursue this research, which may provide important information about spinal cord development and repair in humans.

This research may provide important information on genetic control of spinal cord development with implications for human spinal cord development and repair.



JOHN SOLEM

GERALD DOWNES AND STUDENT LIZ OLER RESEARCH HOW SPINAL CORDS ARE ASSEMBLED AND FUNCTION

IMPROVING HUMAN HEALTH

GERM WARFARE

WESLEY BLIXT

DAVID NYACHUBA IS DEVELOPING NEW METHODS TO DETECT THE PATHOGENS IN FOOD THAT CAUSE ILLNESS

Tiny organisms, such as Listeria monocytogenes if present in food, can make you very sick causing diseases like encephalitis and meningitis, especially in people with compromised immune systems. **Assistant Professor DAVID NYACHUBA, Nutrition,** would like you to know that these nasty little microbes can go into hiding when they are "injured" but not killed by the very things we do to keep them at bay, such as refrigeration.

"The danger is that injured Listeria may not show up in testing," notes Nyachuba, adding that it generally makes an appearance in ready-to-eat foods like processed meats, smoked fish and soft cheeses. He believes the same thing happens with other pathogens.

As a food safety specialist, Nyachuba's work focuses on new ways to detect even those microbes that have been injured and gone underground. In the wake of news headlines regarding contamination of everything from spinach to pet food, Nyachuba's research is timely and important given the globalization of the food supply and the increased centralization of food processing.

ENGAGING STUDENT RESEARCHERS

Whether hosting students from across the country in our summer research programs or offering opportunities to our own students through their academic disciplines, UMass Amherst successfully integrates research into the university experience. This enriches learning and contributes to the nation's knowledge economy.

EYE-OPENING TECHNOLOGY

KATHERINE REAGAN, double-major in computer systems engineering and computer science, is taking her research to the marketplace. Reagan and Electrical and Computer Engineering graduate student SUMANA MANNEM, have fabricated a prototype for a seeing-eye system that could benefit the 161 million people worldwide who suffer from visual impairment.

Under the direction of **Professor AURA GANZ, Electrical and Computer Engineering**, and with support from Ganz's $300,000 grant from the National Science Foundation, Reagan began research on how Radio Frequency Identification or "RFID" could empower supermarkets and other public places to communicate with the visually impaired.

The system, an electronic network developed using a Personal Digital Assistant (PDA) with an RFID reader, RFID tags, a Wi-Fi network, and a server allows users to learn more about product information such as name brand, price, nutritional value and ingredients. In the particular animated space envisioned by Reagan for the seeing-eye shopping system, every product in the supermarket would be tagged, bar-code style, with RFID tags. Since several chains already do this to manage inventory, the project leverages existing technology to develop a meaningful product that sees the bigger picture.

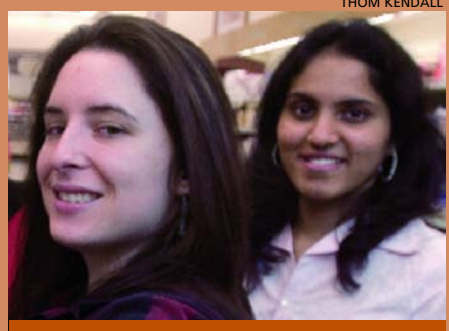
Reagan and Mannem have a good mentor in Ganz who has patented technologies and started businesses based on her own research. "My point of view has always been, 'How can we use technology to improve the lives of people?'" says Ganz. "What better cause for this technology than to make life easier for the visually impaired?"

THOM KENDALL

"Much of everyday life in the United States and other industrialized nations is the product of investments in research and in the education of scientists and engineers."

– New Foundations for Growth: The US Innovation System Today and Tomorrow.

THOM KENDALL



UNDER THE TUTELAGE OF PROFESSOR AURA GANZ (PHOTO ON LEFT)ENGINEERING STUDENTS KATHERINE REAGAN AND SUMANA MANNEM ARE TAKING THEIR RESEARCH TO THE MARKETPLACE.

UMass Amherst offers a number of opportunities for undergraduates from a variety of disciplines. They can participate in research during the academic year through internships, and during the summer in programs that are made possible through grants and private donations. More than 150 students participated in the following programs hosted on campus this past summer:

- **Center for Collaborative Adaptive Sensing of the Atmosphere Research Experience for Undergraduates**
- **Collaborative Biomedical Research Summer Student Scholar Program**
- **Collaborative Undergraduate Research in Energy (CURE)**
- **College of Engineering Summer Research Experience for Undergraduates**
- **Five-College Astronomy Undergraduate Internship Program**
- **Howard Hughes Medical Institute Undergraduate Science Program; Department of Biology**
- **Institute for Cellular Engineering Research Experience for Undergraduates**
- **Materials Research Science and Engineering Center (MRSEC) Research Experience for Undergraduates**
- **Nanoscale Science and Engineering Summer Undergraduate Research Experience (SURE)**
- **Northeast Alliance for Graduate Education and the Professoriate Summer Program for Undergraduate Research**
- **Summer Dialect Research Project for Undergraduates (SDRP); Center for the Study of African American Language**

REDUCING MEDICATION ERRORS

Nursing professor BETH HENNEMAN and her undergraduate students are working on a collaborative project designed to reduce unwanted drug errors for medical patients early in their care. Funded by a $40,000 grant from the American Society of Health System Pharmacists Research and Education Foundation, the students helped develop a program to assist nurses in quickly and accurately determining what medications a patient is taking as healthcare providers weigh treatment options. Initial trials of this program on students resulted in a nearly 20% improvement in accuracy of identifying patient medications. Implementation in the hospital setting is currently underway.

"Obtaining an accurate list of medications that a patient is taking prior to admission to the hospital is no easy task," says **EDWARD TESSIER, clinical pharmacist at Franklin Medical Center** in Greenfield, MA who along with Henneman leads the project. He says a number of factors, including the use of multiple health care providers and pharmacies, use of over-the-counter drugs, and limitations in electronic medical records, make reconciliation of medication lists complicated.

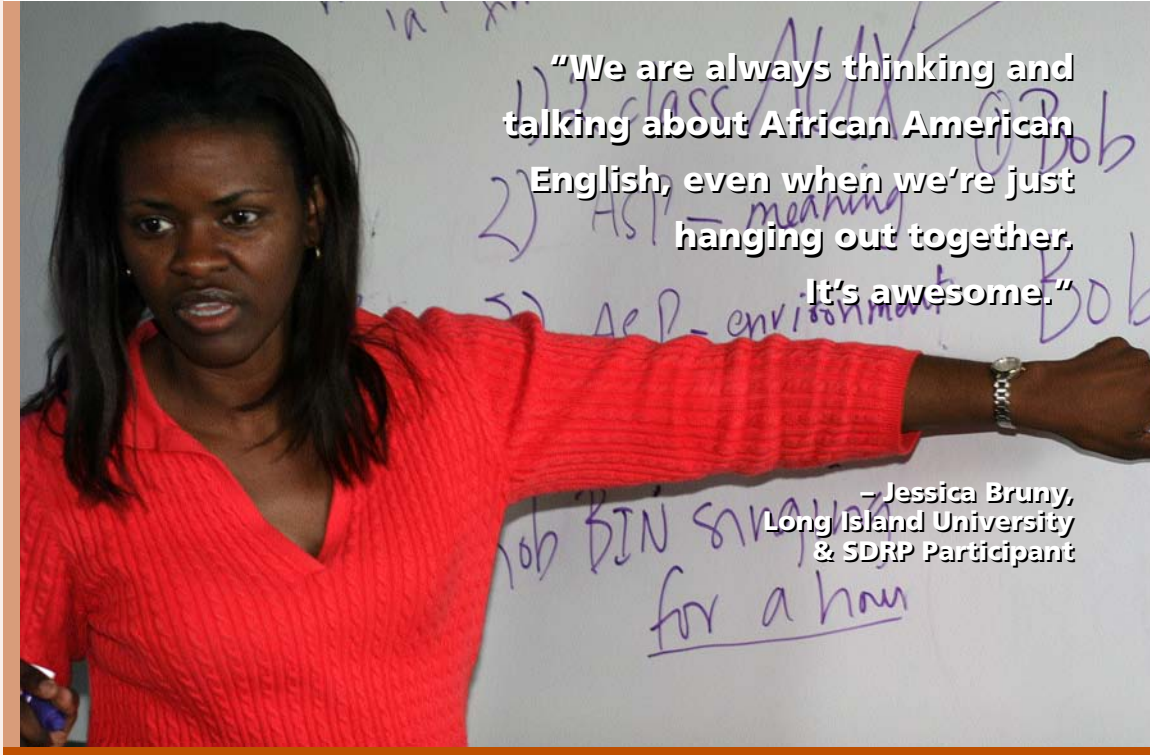

UMASS CREATIVE SERVICES

ELIZABETH HENNEMAN AND EDWARD TESSIER LEAD A COLLABORATIVE PROJECT THAT GIVES UNDERGRADUATE NURSING STUDENTS THE OPPORTUNITY TO WORK WITH BOTH ACADEMIC AND CLINICAL RESEARCHERS.

The research project, of which Baystate Medical Center in Springfield, MA is also a partner, gives UMass Amherst Nursing students an opportunity to work collaboratively with both academic and clinical researchers and has implications for future nursing curriculum.

SEPARATING MYTH FROM TRUTH...

Is African American English (AAE) just slang and language used in association with certain elements of hip hop culture? What implications does this linguistic variety have in educational, social and cultural realms? Twelve talented students from around the country came to campus this summer to explore these questions and other current issues in the study of AAE.



ENGAGING STUDENT RESEARCHERS

The Summer Dialect Research Project (SDRP) offered by the campus's new Center for the Study of African American Language (CSAAL) in the College of Humanities and Fine Arts is the first in a series of summer research experiences in linguistics for undergraduates with interest in language-related disciplines. One of the goals of the SDRP is to increase the number of students, particularly those from underrepresented minority groups, who conduct graduate research in these areas.

In addition to taking courses on the linguistic description of AAE designed to show that it is rule governed and not slang, students gained research experience by gathering primary data, analyzing adult and child AAE language samples, and helping to characterize the differences between AAE and mainstream English. During one class session on language and the blues, students worked with Afro-American Studies professor Steven Tracy in deciphering passages and meanings in a Muddy Waters song.

Linguistics Professor LISA GREEN (pictured above) directed the SDRP, with participating faculty and other scholars from UMass Amherst, Smith College, Texas State, and the University of North Carolina, Chapel Hill.

ONE PHONEME AT A TIME!

BARBARA PEARSON

UNDERGRADUATE STUDENTS FROM ACROSS THE NATION STUDIED THE EDUCATIONAL, SOCIETAL AND CULTURAL IMPLICATIONS OF AFRICAN AMERICAN ENGLISH IN THE CAMPUS'S FIRST SUMMER DIALECT RESEARCH PROJECT FOR UNDERGRADUATES.

CONNECTING WITH THE COMMONWEALTH

A recent study done through the UMass Amherst Office of Outreach revealed that there are more than 1,000 campus-led projects underway, impacting 280 communities across the Commonwealth. In FY07, the state sponsored nearly $16 million in campus research, up from $8.8 million in FY06.

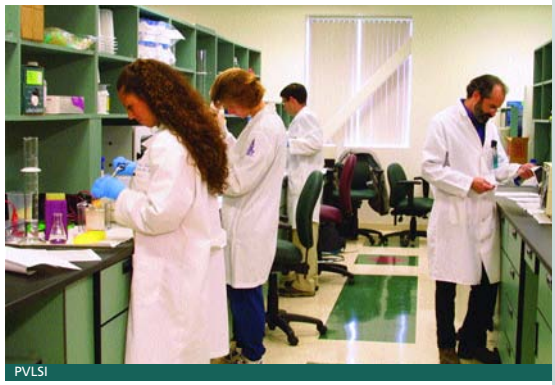
The campus is also responding to Governor Deval Patrick's leadership related to Life Sciences and Clean Energy research. With more than 300 faculty members participating in Life Sciences research and more than 70 conducting research related to clean and renewable energy, the campus is poised to keep the Commonwealth nationally and globally competitive in these vital industries. For example, a UMass system-wide Clean Energy Working Group, chaired by Vice Provost for Research Paul Kostecki and with representation from the other UMass campuses, is working with the state administration, legislature and industry to indentify and understand the potential and opportunities for clean energy research discoveries and workforce development.

STRATEGIC LIFE SCIENCE ALLIANCE

BioMedical Research Models, Inc. (BRM), of Worcester and Springfield appreciates its neighbors. The company won its bid for an unprecedented $4.9 million federal contract from the NIH to create a national center in diabetes research thanks in part to collaboration with the Springfield-based **Pioneer Valley Life Sciences Institute** (PVLSI). A joint project of Baystate Medical Center in Springfield and UMass Amherst, PVLSI aims to improve human health by developing creative new approaches for the diagnosis and treatment of disease.

BRM, which leases space in the Institute on Main Street in the city's North End, submitted the bid to the National Institutes of Diabetes, Digestive and Kidney Diseases (NIDDK) in conjunction with the PVLSI. The new center being established under the contract will test compounds that can keep those diagnosed with Type 1 diabetes from reaching the stage of the disease where they rely on external insulin. **ELLEN BEMBEN, president of the nonprofit Regional Technology Corp.** in Springfield, said the deal lends credibility to regional efforts to promote life science research in Western Massachusetts.

"The presence of PVLSI made the contract possible," says **BRM president DENNIS L. GUBERSKI,** a Chicopee native and UMass Amherst alumnus. "Without the infrastructure of the PVLSI, which gives us access to [specialized] scientific equipment, this contract wouldn't have been possible. It's a good strategic alliance." The alliance and the NIDDK grant was also instrumental in securing funding from the Immune Tolerance Network, an international research collaborative which is funding preclinical trials at BRM that have the potential to be long term, multi-million dollar contracts.


PVLSI

BIOLOGY PROFESSOR LARRY SCHWARTZ (FAR RIGHT) IS THE SCIENCE DIRECTOR OF THE PIONEER VALLEY LIFE SCIENCES INSTITUTE. IN THIS ROLE HE LEADS THE INSTITUTE'S ORGANIZATIONAL DEVELOPMENT AS WELL AS ITS SCIENTIFIC FOCUS.

"Without the infrastructure of the Pioneer Valley Life Sciences Institute, which gives us access to [specialized] scientific equipment, this contract wouldn't have been possible."

- Dennis L. Guberski
President,
BioMedical
Research Models

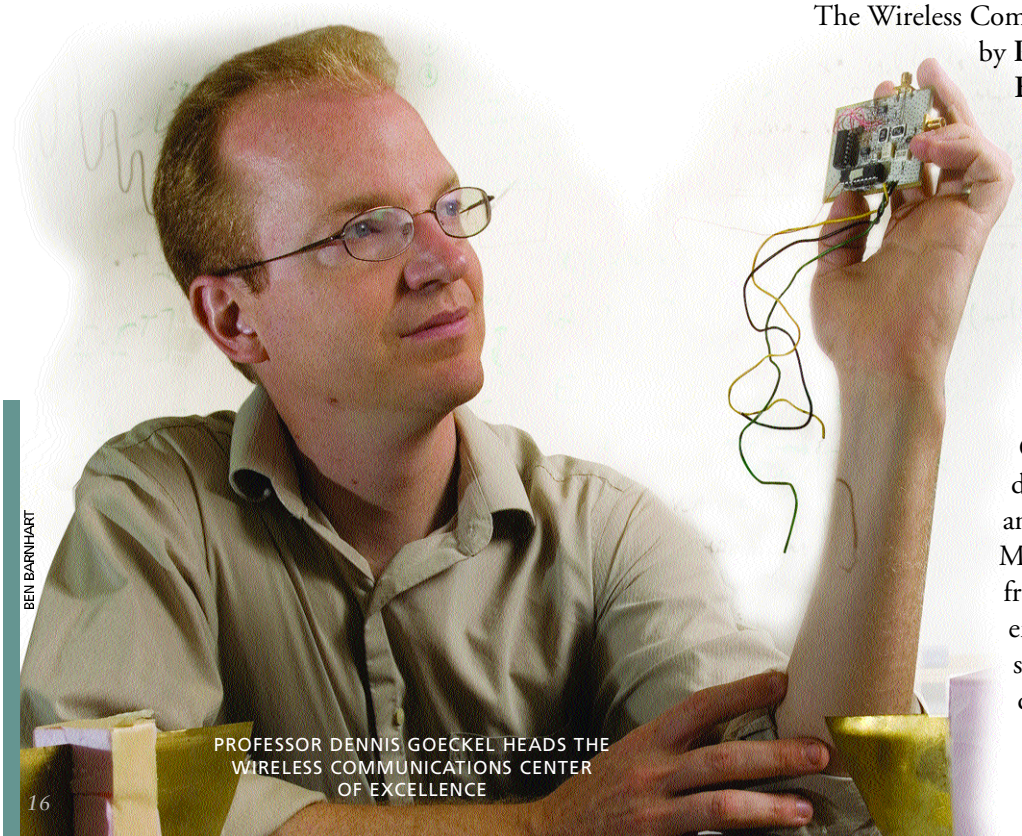
TECHNOLOGY-BASED ECONOMIC DEVELOPMENT

Campus initiatives in renewable energy, wireless technologies and the life sciences are poised to compete for large federal programs and translate leading-edge research into marketable technologies and techniques. With assistance from the UMass President's S&T Initiatives Fund, the campus will fuel business development and job creation in the Commonwealth.

Developing renewable energy technologies and enhancing the performance of solar cells, chemical fuel cells and batteries, and biomass-based fuels (such as ethanol) are the goals of the **Massachusetts Center for Renewable Energy Science and Technology** (MassCREST). Led by **Professors BRYAN COUGHLIN, Polymer Science and Engineering** and **S. "THAI" THAYUMANAVAN, Chemistry**, the Center brings together world-class expertise in soft materials, nanotechnology, and microbiology. Through MassCREST and other large-scale research programs in wind energy, microbial fuel cells, and energy efficiency, the campus expects to play a prominent role in the Commonwealth's effort to reduce the cost of energy, increase supply, and become a global center for the renewable energy technology industry.

ON THE HORIZON... 2008 UMass President's S&T Initiative Awards

- **UMass NanoMed Institute (Amherst/Lowell /Worcester) - Professor T.J. MOUNTZIARIS, Electrical and Computer Engineering**
- **Massachusetts Center for Networked Sensing in Challenged Environments (Amherst/Dartmouth/ Lowell/Woods Hole Oceanographic Institute) - Associate Professors BRIAN LEVINE and PRASHANT SHENOY, Computer Science**
- **UMass Amherst Wireless Center for Excellence - Associate Professor DENNIS GOECKEL, Electrical and Computer Engineering**
- **University Collaborative for Intelligent Transportation Systems (Amherst/Boston/ Dartmouth/Lowell) - Professor JOHN COLLURA, Civil and Industrial Engineering**
- **UMass Institute for Stem Cell Research and Regenerative Medicine (Amherst/Worcester) - Dean GEORGE LANGFORD, Natural Sciences and Math; Professor SAM BLACK, Vet and Animal Sciences; Vice Provost for Research, PAUL KOSTECKI**



BEN BARNHART

PROFESSOR DENNIS GOECKEL HEADS THE WIRELESS COMMUNICATIONS CENTER OF EXCELLENCE

The Wireless Communications Center of Excellence, led by **Professor DENNIS GOECKEL, Electrical and Computer Engineering,** is using S&T initiative funds to implement a broad research program designed to meet new technical challenges in wireless communication. The Center will promote collaborative research among academic, industry and government partners with the goal of bringing economic gains to the Commonwealth through the development of new wireless capabilities and technical innovations that Massachusetts companies can benefit from. Areas of application include emergency preparedness, national security, biosensing and healthcare delivery, education, and entertainment.

HELPING MASSACHUSETTS FARMERS COMPETE

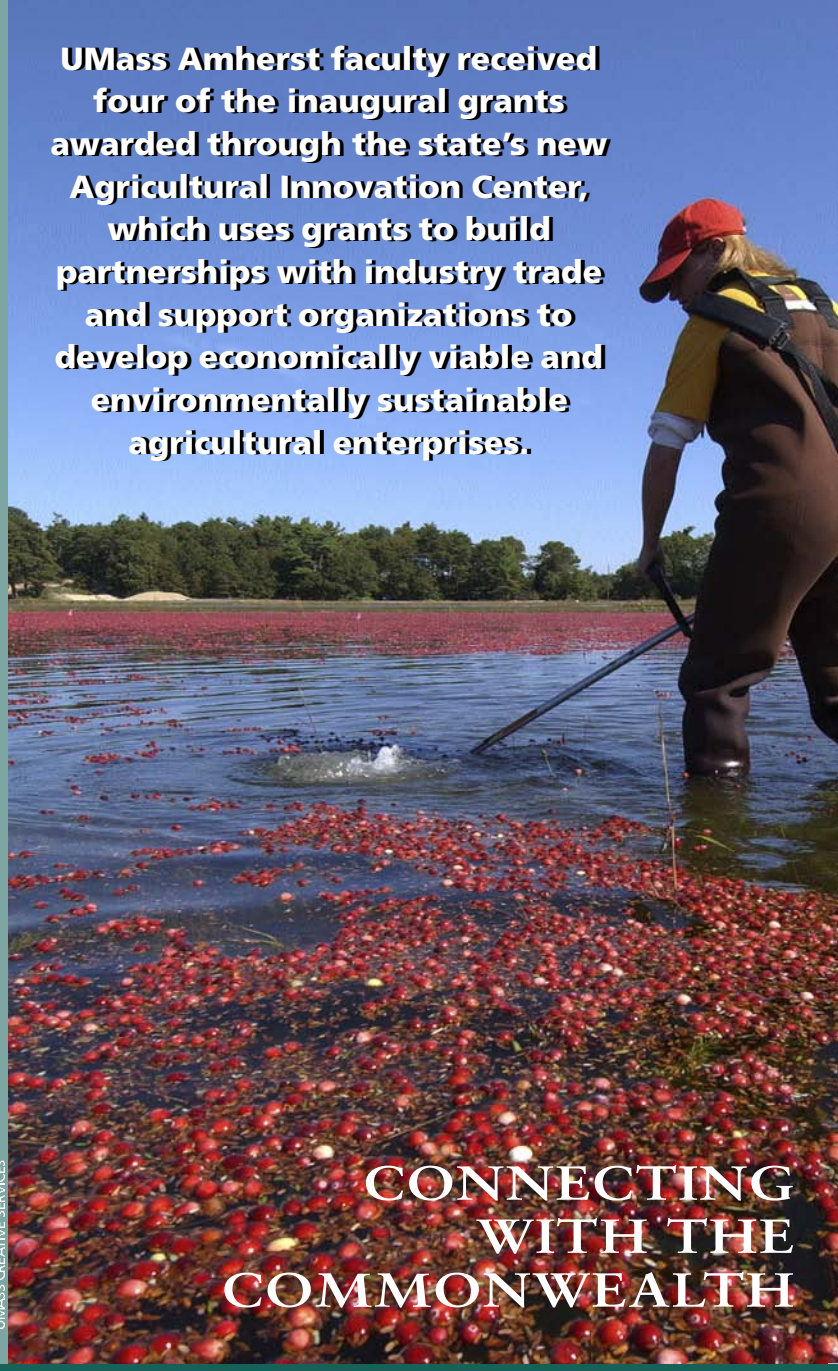
Researchers at UMass Amherst are supporting the long-term viability of Massachusetts agriculture by helping the state's agricultural businesses become more economically and environmentally sound. Armed with $481,500 in grants from the newly-launched state Agricultural Innovation Center, faculty members in the Plant, Soil and Insect Sciences department are exploring ways to help New England farmers compete in an increasingly tight market.

The campus was awarded the most grants (4 out of 10) of all first-round recipients and captured about 18% of the $1.5 M that was released from the Massachusetts Department of Agricultural Resources for this new grant program.

At the **Cranberry Station**, a UMass research and extension facility in East Wareham, MA, **ANNE AVERILL** is using her grant to help local cranberry farmers by providing sustainable pollination solutions and will investigate whether the die-off of honeybees in various parts of the country are having an impact on New England cranberry farming practices. She's exploring pollination alternatives that might counteract a future catastrophic loss in the honeybee population that is essential to successful cranberry crops.

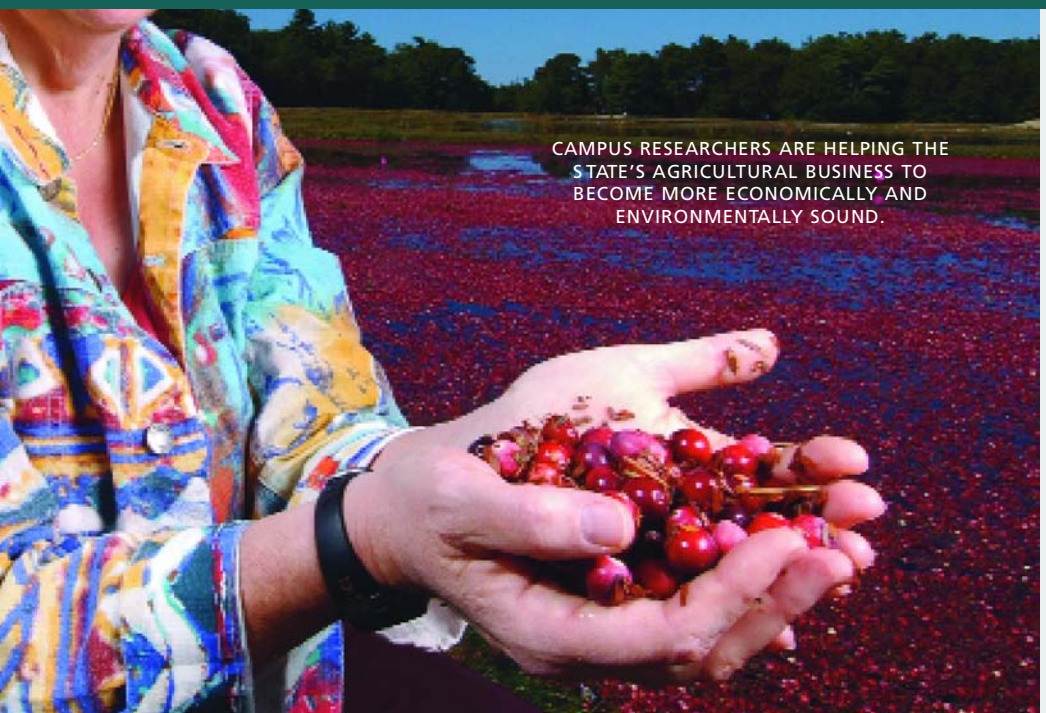
In an attempt to serve an increasing interest in grape growing in New England, **DUANE GREENE** is using his Agricultural Innovation grant to create a demonstration small-scale farm **wine, cider and juice production** facility that will allow growers to test what works before starting their own production plants.

UMass Amherst faculty received four of the inaugural grants awarded through the state's new Agricultural Innovation Center, which uses grants to build partnerships with industry trade and support organizations to develop economically viable and environmentally sustainable agricultural enterprises.



UMASS CREATIVE SERVICES

CONNECTING WITH THE COMMONWEALTH

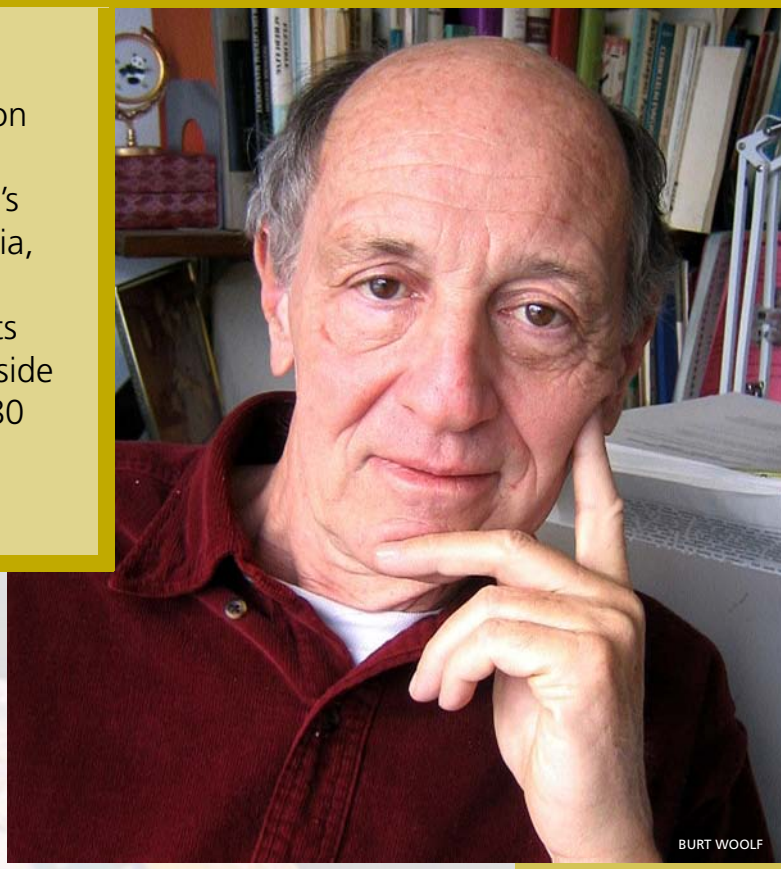


CAMPUS RESEARCHERS ARE HELPING THE STATE'S AGRICULTURAL BUSINESS TO BECOME MORE ECONOMICALLY AND ENVIRONMENTALLY SOUND.

STEPHEN HERBERT is using his funding to help **livestock and dairy farmers** develop management strategies to improve grain quality and increase production so that New England farmers won't have to buy grain from the Midwest. The results are cost savings and greater efficiency in Massachusetts dairy and livestock production. He also received a grant for work in integrated pasture management and is working as part of a team studying how improved tools and management practices can lead to high quality pastures for livestock foraging.

IMPACTING THE WORLD

UMass Amherst faculty members conducted research, gave invited lectures, and worked with communities on all seven continents during FY07. Research activities range from astronomy and climate change to women's health, and occur in diverse locations such as Indonesia, Madagascar, Afghanistan and Brazil. In addition, the campus has formal exchange and research agreements with 102 universities and colleges in 36 countries outside of the U.S. As one measure of the campus's impact, 80 UMass Amherst faculty members have been Fulbright Scholars in 49 nations over the past 30 years.



BURT WOOLF

EMPOWERING APPROACHES TO EDUCATION

For almost 40 years, faculty members and students in the **Center for International Education** (CIE) have been designing and implementing educational programs both in the United States and abroad that address the critical educational needs of the communities they serve. With nearly $11 million in funding over the past 5 years from the U.S. Agency for International Development (USAID) alone, CIE has established alternative and empowering educational programs in areas of need such as Malawi, Uganda, Guatemala, India, Southern Sudan and Afghanistan.

Recently, USAID awarded $7.8 million to CIE to help develop institutions of secondary teacher training in Afghanistan. Called the **Afghanistan Higher Education Project,** partners in this national consortium are working with 16 Afghan universities and four-year teacher training institutes to develop both their institutional capacity and the professional skills of the over 500 faculty members working in education in those institutions.

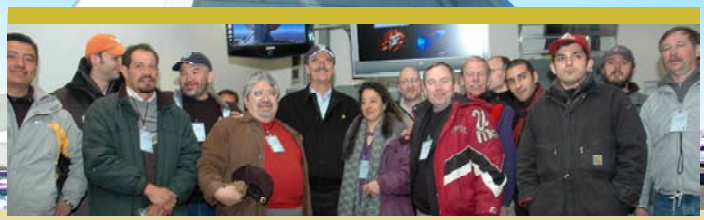
DAVID EVANS

MEMBERS OF THE AFGHAN FACULTY OF EDUCATION STUDY ON CAMPUS AS PART OF THE CENTER FOR INTERNATIONAL EDUCATION'S HIGHER EDUCATION PROJECT.

The CIE is part of the Department of Education Policy, Research and Administration (EPRA) in the School of Education and is directed by Professor David R. Evans (pictured above). CIE is closely integrated with the campus's graduate program in International Education which provides mid-career professionals with a curriculum that balances theory and practice in the real world of development education. "CIE's impact on development education results from our projects and the nearly 600 graduates of the program who work in international education," says Evans. "The graduates form an active international network of practitioners and policy-makers many of whom are in leadership positions around the world."

Today CIE graduates form an international network of education practitioners and policy-makers, many of whom are in leadership positions around the world.

PHOTOS: LMT PROJECT



ASTRONOMY PROFESSOR PETER SCHLOERB (7TH FROM RIGHT) CELEBRATES THE INAUGURATION OF THE LARGE MILLIMETER TELESCOPE WITH THEN MEXICAN PRESIDENT VICENTE FOX (CENTER) AND OTHER DIGNITARIES AND SCIENTISTS.

With a base like a launching pad and an antenna the size of a big Ferris wheel, the telescope will be able to pick up electromagnetic radiation known as millimeter waves emitted 13 billion years ago, when the first stars burst into existence. - Reuters

IMPACTING THE WORLD

ASTRONOMICAL PARTNERSHIP

Cross-border relations are reaching new heights with the installment of a high tech telescope atop the 15,030 foot summit of the Volcàn Sierra Negra in the Mexican state of Puebla. UMass Amherst is an integral part of this groundbreaking international scientific partnership between the U.S. and Mexico to develop and construct the world's largest millimeter wave telescope. When completed in 2008-2009 the Large Millimeter Telescope (LMT) will allow astronomers to see farther into space than they ever have before.

The LMT project, the largest scientific collaboration that Mexico has undertaken with any other country, will help astronomers to better understand the physical process of cosmic structure formation and its evolutionary history throughout the Universe. More specifically the LMT has the capability to investigate subjects as diverse as the makeup of comets and planetary atmospheres, the formation of extra-solar planets and the birth and evolution of stars.

The Mexican Instituto Nacional de Astrofisica Optica y Electrònica is leading the effort in conjunction with **Professors PETER SCHLOERB** and **WILLIAM IRVINE** from the **Department of Astronomy** and the **Vice Provost for Research** on the UMass Amherst campus. Campus researchers are overseeing the design and implementation of novel telescope control systems, millimeter-wave optics design, and the development of state-of-the-art millimeter wavelength detectors and cameras for the telescope.

The LMT project, which emphasizes student training as well as the development of new technology and basic astronomical research, will also reap benefits to local communities in both Mexico and Massachusetts. The campus's Natural Resources Conservation and Anthropology Departments are supporting a reforestation project on land nearby the construction site. And, an educational outreach program about the project for Hispanic middle and high school students from Western Massachusetts is being developed. It aims to attract talented students to the campus by offering opportunities to work on the LMT project and in other laboratories.

DRILLING FOR ANSWERS ON CLIMATE CHANGE

THE CAMP USED BY SCIENTISTS INCLUDING JULIE BRIGHAM-GRETTE (BELOW) IS VISIBLE ON THE SOUTHERN SHORE OF LAKE EL'GYGYTGYN IN SIBERIA.

JULIE BRIGHAM-GRETTE

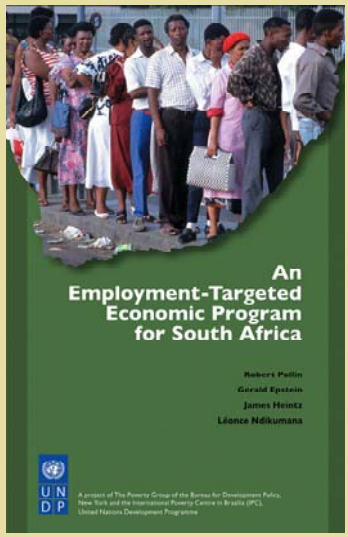
UMass Amherst geoscientists have the world covered when it comes to drilling for answers on climate change.

At the top of the world, **JULIE BRIGHAM-GRETTE, Geosciences,** is leading a team of international scientists in a polar drilling expedition to Siberian Lake El'gygytgyn to collect deep cores of accumulated sediment – cylindrical columns of dense muck – that should provide the most detailed narrative of the past Arctic climate to date. Funded by a $4.5 million grant from the National Science Foundation Office of Polar Programs, Brigham-Grette joins scientists from around the world who study the Earth system of the past to shed light on current and future climate change. The total funding for this international project is just over $9 million and comes from the governments of the United States, Germany, Russia, Canada and the International Continental Drilling Program.

At the other end of the world, Brigham-Grette's Geosciences colleague **ROBERT DECONTO** is also mining the past for clues to climate change. A member of the **Antarctic Geological Drilling (ANDRILL) Program**, DeConto heads the modeling effort of this multinational research team that has been drilling in the Antarctic for physical evidence of how climate change has affected that polar region. This past year, the ANDRILL team reached record depths into the accumulated deposits that make up the sea floor below the Ross Ice Shelf in the McMurdo Sound region. The layered core that was withdrawn from the drill hole represents deposits laid down over perhaps 5 million years. Preliminary analysis of the core reveals a more dynamic Antarctic ice sheet than was previously believed which points to the possibility of a significant response of the Antarctic environment to global warming.

HELPING SOUTH AFRICA'S ECONOMY

The people of South Africa and the African National Congress-led government have made extraordinary social and economic advances since ending apartheid and beginning the transition to democracy in 1994. But the country still faces severe problems of mass unemployment – conservative estimates put the figure at 26.5%. The ANC-led government has committed to cutting the unemployment rate in half by 2014, to roughly 13 percent.



Professors ROBERT POLLIN, GERALD EPSTEIN, JAMES HEINTZ, and LEONCE NDIKUMANA of the Political Economy Research Institute (PERI) and the Economics Department at UMass Amherst have worked under commission with the United Nations Development Program to help the South African government develop strategies to achieve this goal. Their work is documented in a new book, *An Employment-Targeted Economic Program for South Africa*. Their recommendations are designed to produce major reductions in unemployment and poverty, promote a general spreading of economic well-being, and to achieve these ends in a manner that is sustainable over a longer-term framework.

PERI promotes human and ecological well-being through original research. Since its founding in 1998, the Institute has become a leading source of research and policy initiatives on issues of globalization, unemployment, financial market instability, central bank policy, living wages and decent work, and the economics of peace, development, and the environment.

Political Economists at UMass Amherst are developing strategies to help the South African government cut the country's high unemployment rate of 26.5% in half by 2014.

SPONSORED ACTIVITIES

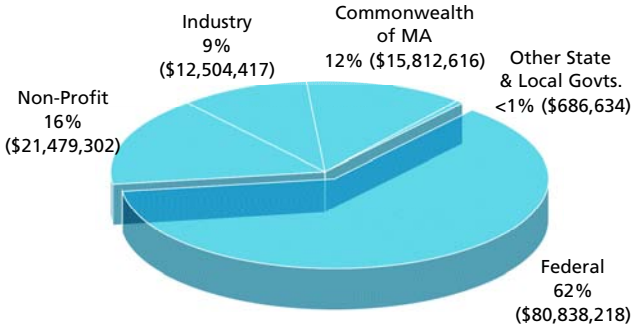
FISCAL YEAR 2007 WAS A RECORD-BREAKER FOR SPONSORED RESEARCH AT UMASS AMHERST. The campus posted $131 million in research awards, growing the research enterprise by 13%. This growth reflects the outstanding quality that defines UMass Amherst. It is especially impressive given the many young investigators who sought initial awards this year and the intense competition that exists for federal funds.

Federal research accounted for nearly 62% of the campus's sponsored research awards with the majority of that coming from the National Science Foundation (NSF). Of particular note in federal awards was a nearly doubling of funds from the Department of Defense.

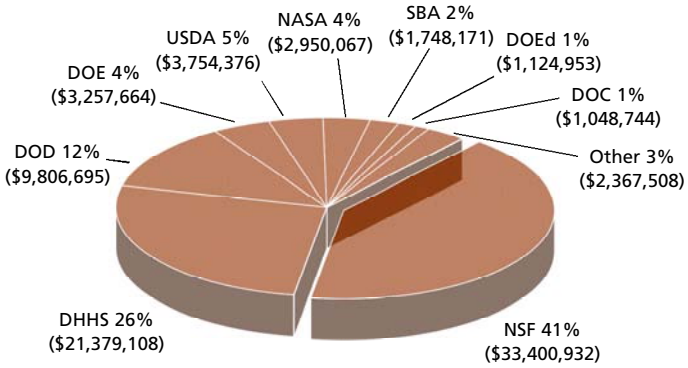
Awards from the Commonwealth increased considerably this year as well. The campus was awarded nearly $16 million in state-sponsored research, nearly doubling the previous year amount. The most significant increase came from the Massachusetts Technology Collaborative which sponsored $4.75 million in awards this year. Industry-sponsored awards were also up – to more than $13 million, an increase of 9%. The campus's steady growth in industry-sponsored research reflects a commitment to engaging industry partners in research that helps them stay competitive. For the complete FY07 Sponsored Research Report, go to www.umass.edu/research.

Proposals Submitted:	Proposal Dollars:	Awards:	Award Dollars:	Research Expenditures:
1,845	$219,344,104	1,136	$131,321,187	$119,271,554

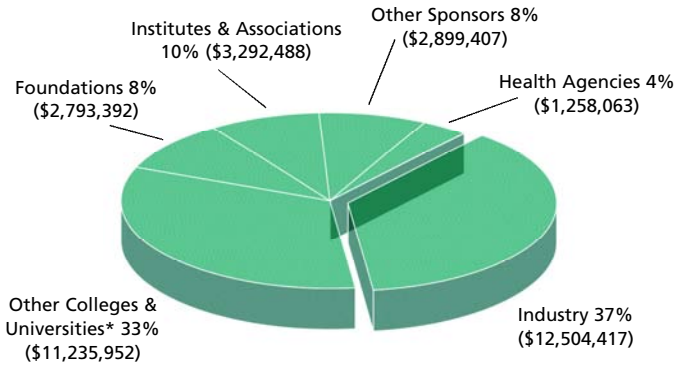
Distribution of Awarded Dollars by Sponsor Category
Total Awards: $131,321,187



Distribution of Award Dollars Accepted from Federal Agencies - Total Awards: $80,845,088

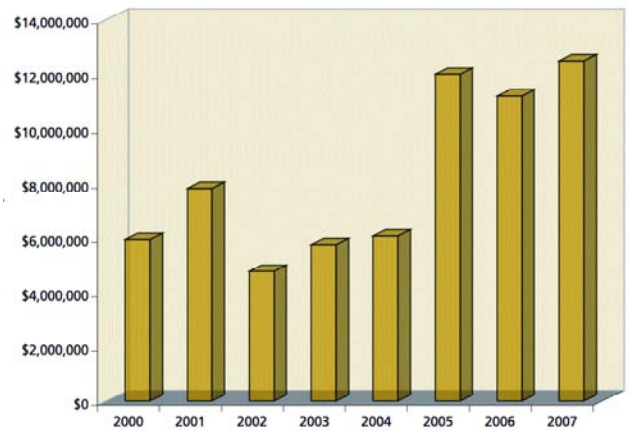


Distribution of Award Dollars Accepted from the Private Sector - Total Awards: $33,983,719



**A significant portion of these awards are prime federal funds*

Trends in Industry-sponsored Research Awards



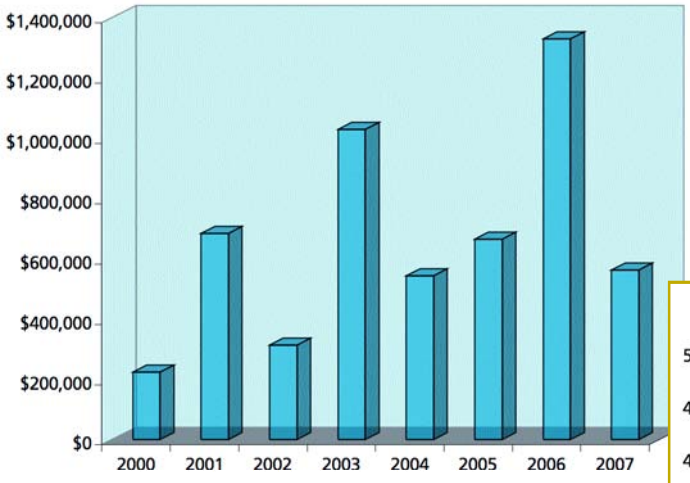
TECHNOLOGY TRANSFER

AS THE FLAGSHIP CAMPUS OF THE STATE'S PUBLIC UNIVERSITY, UMASS AMHERST STRIVES TO ACHIEVE EXCELLENCE IN A BROAD RANGE OF RESEARCH AREAS AND TO TRANSFER THE RESULTS OF THAT WORK INTO THE MARKETPLACE. The Office of **Commercial Ventures and Intellectual Property** (CVIP) is responsible for technology transfer on the Amherst campus, including the identification, protection and marketing of technology created by campus researchers.

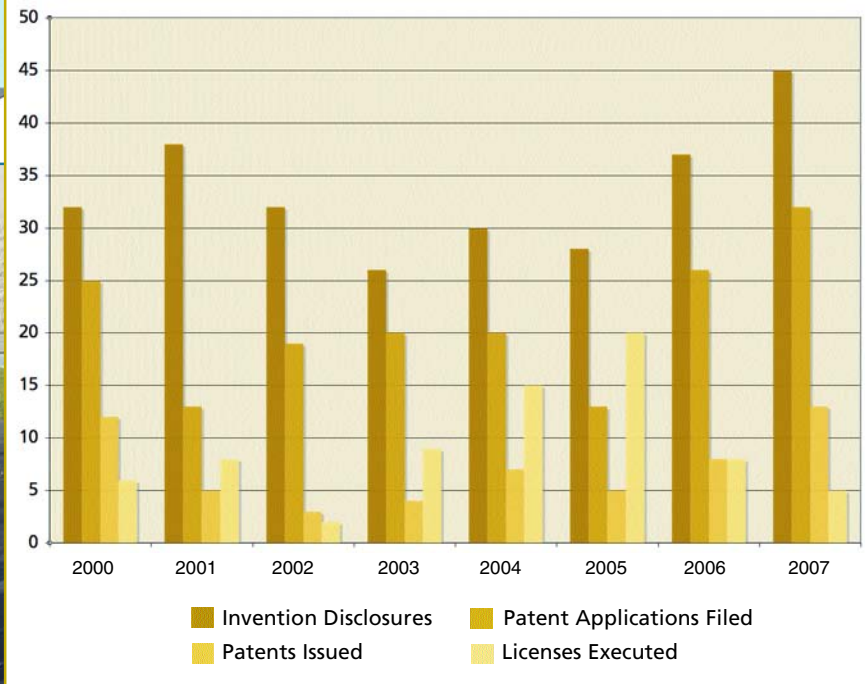
In FY07, CVIP logged a record 45 invention disclosures from its faculty, staff and students. Inventors at UMass Amherst filed 32 U.S. patent applications and were awarded 13 new U.S. patents (see Patent Recognition Awards, page 25). Five new licenses were negotiated, and collectively, UMass Amherst's technologies produced more than $600,000 in license income this year. The campus has also begun to track the sponsored research resulting from this licensing activity. This year sponsored research agreements between the campus and companies that license its technologies totaled $879,000.

The campus is particularly pleased to announce the formation of a new company, SunEthanol, based on a breakthrough scientific discovery by Microbiology professor Susan Leschine (see page 23). This new Amherst-based biofuels technology company, which will focus on ethanol production from biomass, has secured its first round of funding from several venture capital funds and other investors.

Trends in License Revenues



Trends in Disclosures, Patents Filed and Issued, Licenses Executed



RESEARCH BY SUSAN LESCHINE ON THE "Q" MICROBE THAT EFFICIENTLY CONVERTS PLANT MATTER TO ETHANOL IS THE BASIS FOR THE NEW AMHERST BASED BIOFUELS COMPANY SUNETHANOL.

LISA CARDINAL

CAMPUS RESEARCH FUELS SUNETHANOL

It is widely believed that ethanol has the potential to reduce U.S. dependence on fossil fuels while reducing greenhouse gas emissions. But there exists concern that large-scale ethanol production will require massive amounts of sugar derived from corn or sugar cane plus water and fertilizer. Corn and sugar alone will not allow the ethanol industry to achieve the DOE goal of replacing 30% of our nation's transportation fuel.

SunEthanol was formed in 2006 to commercialize a breakthrough discovery with the potential to achieve **Consolidated Bio Processing** (CBP), which would allow ethanol to be produced from the cellulose existing in virtually all biomass (plant life). This discovery traces back to 1998, when **UMass Amherst professor of Microbiology SUSAN LESCHINE** and **Research Assistant THOMAS WARNICK** found a novel micro-organism in soil samples collected near the Quabbin Reservoir. Now known as *Clostridium Phytofermentans*, or more familiarly, as the "Q-microbe", this remarkable bug enables CBP of ethanol from a wide variety of plant sources without the use of excessive heat and expensive enzymes. Leschine and Warnick have filed a patent application for ethanol production from biomass using the Q-microbe.

SunEthanol is led by a team of seasoned entrepreneurs partnered with VeraSun Energy, a leading producer of corn ethanol fuel based in South Dakota. The company is backed by a group of investors including VeraSun, Battery Ventures, AST Capital, LongRiver Ventures and three local angel investors.

"The development of a CBP solution has long been the goal of the biofuels industry, and SunEthanol has proven that their microbiological process has unique capabilities to meet the industry's objectives."

- Jason Matlof, Partner, Battery Ventures

THE SUNETHANOL TEAM: FRONT ROW (L-R): JEFF HAUSTHOR, DIRECTOR, R&D; JOHN FABEL, DIRECTOR OF NEW TECHNOLOGY DEVELOPMENT; SUSAN LESCHINE, FOUNDER AND CHIEF SCIENTIST; JEF SHARP, PRESIDENT AND CEO; JOHN GORHAM, MARKETING DIRECTOR. BACK ROW (L-R): GREG LATOUF, RESEARCHER; STEPHAN ROGERS, COO; JOHN KILBANE, SENIOR SCIENTIST.

LISA CARDINAL

UMass Commercialization Grants

UMASS SYSTEM TECHNOLOGY DEVELOPMENT GRANTS

The UMass System Commercial Ventures and Intellectual Property (CVIP) Technology Development Fund was established by the President's Office in 2004 to provide UMass researchers with supplemental funding to advance previously disclosed University technologies towards commercialization.

2007 AWARDS - Amherst Recipients

ERIC DECKER, JULIAN MCCLEMENTS, JOCHEN WEISS (Food Science), New Technology for Encapsulation of Emulsified Lipids in Food Beverages

S. "THAI" THAYUMANAVAN (Chemistry), Functionalized Nanoporous Polymer Membranes for Biosensors

MASSACHUSETTS TECHNOLOGY TRANSFER CENTER GRANTS

The statewide Massachusetts Technology Transfer Center (MTTC) enables new levels of collaborating among research universities, the venture community, and industry. The grant program is designed to fund the advancement and assessment of promising new technologies.

2007 AWARDS - Amherst Recipients

OM PARKASH (Plant, Soil and Insect Science) Engineering Rice Plants for Enhanced Resistance and Decreased Arsenic Uptake

OWL EXTENDS LICENSE WITH CENGAGE LEARNING

The Online Web-based Learning (OWL) project, driven by UMass Amherst's **Center for Educational Software Development, Department of Chemistry and Department of Computer Science,** has extended its existing licensing agreement with Cengage Learning. With OWL technology, Cengage will now provide users at over 300 universities and colleges with an on-line learning environment offering homework, tutorials and testing resources in five different chemistry disciplines. It is expected that these products will be delivered to over 100,000 users in the next academic year.

Cengage delivers highly customized learning solutions for colleges, universities, professors, students, reference centers, government agencies, corporations and professionals around the world. These solutions are delivered through specialized content, applications and services that foster academic excellence and professional development, as well as provide measurable learning outcomes to its customers. Cengage Learning's mission is to shape the future of global learning by delivering consistently better learning solutions for learners, instructors and institutions.

CVIP Patent Recognition Awards

The CVIP Patent Recognition Award program sponsored by the Vice Provost for Research and the campus Director of Commercial Ventures and Intellectual Property (CVIP) recognizes both recent campus inventors who have been granted U.S. patents and faculty members who have impressive records in patenting technology throughout their careers.

PATENTS ISSUED 2006

THOMAS BOYLE (Plant, Soil and Insect Science)
PP 16,678 - Boltonia plant named `Masbolimket`

JAMES WATKINS (Polymer Science and Engineering)
USP 6,984,584 - Contamination suppression in chemical fluid deposition

STEVEN MALKIN and ROBERT GAO (Mechanical and Industrial Engineering)
USP 6,985,791 - Grinding wheel system

PATRICIA BIANCONI (Chemistry)
USP 6,989,428 - Methods of preparing polysilynes

JAMES WATKINS (Polymer Science and Engineering)
USP 6,992,018 - Chemical fluid deposition for the formation of metal and metal alloy films on patterned and unpatterned substrates

HAIM GUNNER and WILLIAM TORELLO (Plant, Soil and Insect Science), MING COLER (graduate student) USP 6,995,007 - Antifungal bacterium ATCC PTA-4838

THOMAS RUSSELL (Polymer Science and Engineering) USP 7,014,786 - Methods and apparatus for forming submicron patterns on films

LLOYD SEMPREVIVO (Veterinary and Animal Science) USP 7,063,848 - Lipoglycan compositions and methods of treating parasitic infections

KARL JAKUS (Mechanical and Industrial Engineering) USP 7,077,887 - Low pressure impact separator for separation, classification and collection of ultra-fine particles

WEI-BO GONG and CHRISTOPHER HOLLOT (Electrical and Computer Engineering), DONALD TOWSLEY (Computer Science), YOSSI CHAIT (Mechanical and Industrial Engineering), USP 7,085,236 - Active queue management for differentiated services

ROBERT GAO (Mechanical and Industrial Engineering) USP 7,104,139 - System and method for load sensing using piezoelectric effect

D. VENKATARAMAN (Chemistry) USP 7,112,697 - Methods for formation of aryl-sulfur and aryl-selenium compounds using copper(I) catalysts

RICHARD VACHET (Chemistry), JONATHAN WILSON (graduate student) USP 7,141,784 - Multiplexed tandem mass spectrometry

PATENT AWARDEES SHARE THE SPOTLIGHT AT THE ANNUAL RESEARCH RECOGNITION DINNER WITH VICE PROVOST FOR RESEARCH PAUL KOSTECKI, (LEFT), CVIP DIRECTOR NICK DECRISTOFARO (RIGHT) AND FORMER CHANCELLOR JOHN LOMBARDI (SECOND FROM RIGHT).

ARMSTRONG FUND FOR SCIENCE

"John and Elizabeth Armstrong are generous supporters of UMass Amherst Research. Their continued support of the campus through programs like the Armstrong Fund for Science demonstrates their confidence in UMass Amherst and their commitment to research."

- Paul Kostecki, Vice Provost for Research

The campus has established a new fund to advance innovative research at UMass Amherst thanks to the generosity of donors **JOHN AND ELIZABETH ARMSTRONG**. The Armstrong Fund for Science is a competitive grant program designed to encourage faculty to pursue research that has a significant likelihood of major science or engineering impact. Launched in 2007, the Armstrongs established the endowment with the belief that major scientific advances in society can be achieved by supporting researchers with bold vision, documented credentials, and a passion for results.

Inaugural year awards reflect UMass Amherst's growing capacity in the Life Sciences. Assistant Professor Janice Telfer, Veterinary and Animal Science, received a two year grant to investigate adult stem cells responsible for forming blood and other cells in the immune system. Assistant Professor Harry Bermudez, Polymer Science and Engineering, received a one year grant for his project exploring the modification of tumor cells to avoid immune system responses.

The Armstrongs are active in the UMass Amherst research community. Through John's membership on the College of Engineering's Dean's Advisory Council, he and Elizabeth established a professional development professorship. The Armstrong Professorship supports a junior engineering faculty who is at the beginning of his or her career and has demonstrated substantial achievement and great promise in a specific area of teaching and research. The Armstrongs have also endowed a scholarship in engineering geared towards undergraduate research. Private donations, such as the type the Armstrongs make, greatly expand opportunities for our faculty and students.

John Armstrong has a long and distinguished career as a researcher and innovator for IBM Corporation. In the 30 years Armstrong worked for IBM, he held the positions of Director of Research, Vice President for Science and Technology, and member of the Corporate Management Board. He is the author or co-author of more than 60 papers on nuclear resonance, nonlinear optics, photon statistics of lasers, the management of research in industry, and science and technology policy issues. John Armstrong has served as a presidential appointee as a member of the National Science Board; is a member of the National Academy of Engineering; is a former chair of the Governing Board of the American Institute of Physics; a former University of Massachusetts trustee and has served as chair of the Mass Insight Science and Technology Roadmap Committee. Armstrong has a B.A in physics and a Ph.D. in applied physics from Harvard University.

Elizabeth Armstrong is Secretary for the Five College Learning in Retirement Program, an active member for the Dickinson Homestead educational organization, and she co-chaired the Alexis de Tocqueville Society of the Hampshire County United Way. She has an A.B. in mathematics from Radcliffe College. Both John and Elizabeth received the Distinguished Alumni Award from the University of Massachusetts Amherst in April, 2004.

INAUGURAL ARMSTRONG FUND AWARDEES JANICE TELFER AND HARRY BERMUDEZ (CENTER) STAND WITH (L-R): PROVOST CHARLENA SEYMOUR, VICE PROVOST FOR RESEARCH PAUL KOSTECKI, ELIZABETH AND JOHN ARMSTRONG

MICHAEL ZIDE

Research Leadership in Action Program
UMASS AMHERST
OFFICE OF RESEARCH

FALL '06 RLA GRANT RECIPIENTS

PEGGI CLOUSTON, Natural Resources Conservation: "The Wood Structures Symposium"

JANE FOUNTAIN, Center for Public Policy and Administration: "Emergent Technologies and Public Policy Workshop on Nanotechnology"

GEORGE LANGFORD, Natural Sciences and Mathematics: "National Consortium of Science and Engineering Deans"

ROD WARNICK and DAVID BOJANIC, Hospitality & Tourism Management: "Research and Scholarship Applications for Club Managers"

ELIZABETH DUMONT, Biology; IAN GROSSE, Mechanical & Industrial Engineering: "Finite Analysis of Biological Systems"

SPRING '07 RLA GRANT RECIPIENTS

SONIA E. ALVAREZ, Political Science: "Interrogating the Civil Society Agenda"

DAVID BUCHANAN and LISA WEXLER, Public Health: "Post-colonial Prospects for Indigenous Circumpolar Peoples"

WAYNE BURLESON, Electrical and Computer Engineering: "Integrated Circuits and Systems Science Contract Review"

SARINA J. ERGAS, Civil and Environmental Engineering: "2008 North American Membrane Research Conference"

MASSIMO V. FISCHETTI, Electrical and Computer Engineering: "12th International Workshop on Computational Electronics"

RESEARCH LEADERSHIP IN ACTION

The **Research Leadership in Action** (RLA) program was launched in 2005 to support faculty who demonstrate leadership in their fields. This competitive grant program from the Office of Research supports the development of sponsored activities through the hosting of high-profile annual events providing opportunities for collaboration with external partners. All internal funds must be matched with new sources of revenue. In FY07, ten RLA grants totaling nearly $100K were awarded to faculty from across campus and matched with external funds.

As an example of what can be done with RLA support, the campus's **Nanoscience and Society Research Group,** headed by **PROFESSOR JANE FOUNTAIN, Political Science and Public Policy,** used their RLA grant to host an international workshop to explore the societal and policy implications of emerging nanoscale technologies with an emphasis on the role of university innovation and commercialization. "With RLA program funding, we were able to capitalize on several important themes that emerged from our one-day workshop by exploring them in more depth during a roundtable discussion held the following morning," says Fountain. "This informal and in-depth discussion provided fertile ground for indentifying potential partnerships and projects."

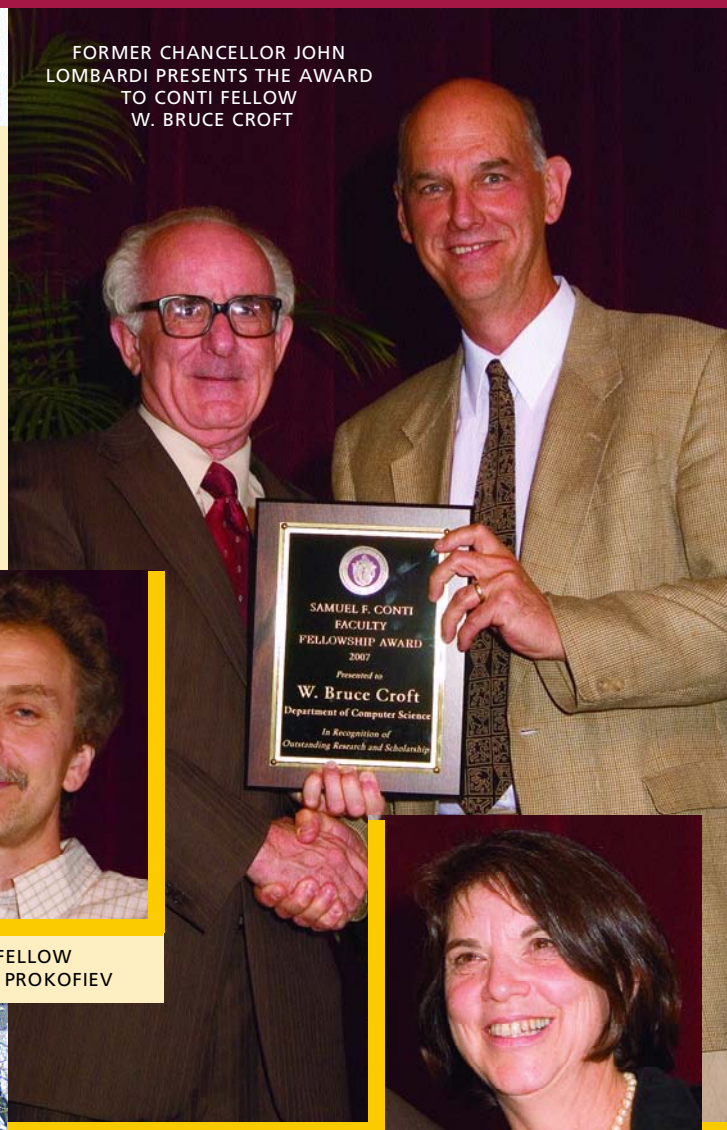
"With RLA Program funding, we were able to capitalize on several important themes that emerged from our one-day workshop by exploring them in more depth during a roundtable dialogue held the following morning. This informal and in-depth discussion provided fertile ground for identifying potential partnerships and projects."

– Jane Fountain

INTERNAL GRANTS

Samuel F. Conti Fellowships

The Samuel F. Conti Faculty Fellowships is a co-investment program of the Deans and the Vice Provost for Research which honors faculty from across the campus for outstanding accomplishments and potential for continued excellence in research and scholarly or creative activity. Conti Fellows are honored annually at the Research Recognition Dinner each spring. These Fellows, nominated by their peers, receive a cash award and a year's leave of absence to concentrate on their work. The campus has supported Conti Fellows since 1981 and the list of past recipients is a who's who of outstanding UMass Amherst faculty.



FORMER CHANCELLOR JOHN LOMBARDI PRESENTS THE AWARD TO CONTI FELLOW W. BRUCE CROFT

CONTI FELLOW NIKOLAY V. PROKOFIEV

CONTI FELLOW NAOMI GERSTEL

2007 SAMUEL F. CONTI FACULTY FELLOWS

W. BRUCE CROFT
(Computer Science)

NAOMI GERSTEL
(Sociology)

NIKOLAY V. PROKOFIEV
(Physics)

Public Service Endowment Grant (PSEG)

The Public Service Endowment Grant is intended to enhance the public service mission of the University. The grant program supports special projects that deliver public services through collaborative activities that engage the campus with the community.

2007 PSEG RECIPIENTS

ROBERT MALOY
Education – TECS; 4MALITY (4th Grade Massachusetts Comprehensive Assessment System Active Learning Intelligent Tutoring System)
Co-PIs: Sharon Edwards, Ruth-Ellen Verock-O'Loughlin, Education

ERIN BAKER
Mechanical & Industrial Engineering; Decision Support for the Hitchcock Center (Amherst, MA) Sustainable Building Demonstration Project

Faculty Research/ Healey Endowment Grants

Offered under the Office of the Vice Provost for Research with matching support from Deans and Departments, this internal grant program enhances the development of research and creative activities on campus. This list of awardees and their grants give a glimpse into the breadth of cutting-edge research at UMass Amherst.

2007 FRG/HEALEY RECIPIENTS

ERIC BERLIN, Music & Dance: "Premieres - New Music for Trumpet"

HARRY BERMUDEZ, Polymer Science & Engineering; "Dynamic Interfaces to Control Cell Motility"

DAVID BOUTT, Geosciences; "Influence of anthropogenic stream-stage fluctuations on groundwater-surfacewater interactions"

JOHN BURAND, Plant, Soil, & Insect Science; "Differential Hz-2V Viral Gene Expression in Tissues of Infected Helicoverpa zea Insects"

QIAN-YONG CHEN, Math; "A New Basis for Spectral (Element) Methods"

MICHELLE DACOSTA, Plant, Soil, & Insect Science; "Physiological Responses Associated with Low Temperature Tolerance for Perennial Ryegrass"

MATTHEW DAVIDSON, Psychology; "The Effects of Physical Activity on Cognitive Abilities across Development"

JANE DEGENHARDT, English: "Embodying Islam: 'Turning Turk' and Christian Resistance on the Early Modern Stage"

ALINE GUBRIUM, Public Health: "Narratives on Culture and Health by Women on Depo-Provera"

HIROMI GUNSHIN, Nutrition: "Molecular Approaches to Understanding Intestinal Heme Iron Absorption in Mice"

ROBERT B. HALLOCK, Physics: "Investigation of Possible 'Supersolid' Behavior in Solid 4He"

RUTH JENNISON, English: "The Zukofsky Era: Modernity, Margins and the Avant-Garde"

SHONA MACDONALD, Art: "Topomnesia"

YOUNG MIN MOON, Art/Art History: "Contaminated Abstraction"

MARGARET PIERCE, Education – SDPPS: "When It Just Doesn't Add Up: Examining The Manifestation Of Math Difficulty Among Fifth And Sixth Graders With Learning Disabilities"

SALLY POWERS, Psychology: "Pilot Study Of A New Method Of Assessing Long-Term Functioning Of Hypothalamic-Pituitary-Adrenal Axis (Hpa) Functioning"

LISA SCOTT, Psychology: "An Examination of the Neural Correlates of Visual Perceptual Narrowing"

ELISABETH SELKIRK, Linguistics: "Intonation in Black and White Varieties of American English"

LYNMARIE THOMPSON, Chemistry: "Mechanisms of Transmembrane Transport: ATP Binding and Hydrolysis by the E. coli Methionine Transporter"

MELISSA TROESTER, Public Health: "TP53-dependent Gene Expression Responses to Environmental Toxicants"

LISA WEXLER, Public Health: "Using Photovoice To Investigate Cultural Resilience In The Lives Of Inupiat Young People: A Pilot And Feasibility Study"

QIAN YU, Geosciences: "Estimating Carbon Flux From Terrestrial Landscape To Coastal Water Using Remote Sensing Technology And Watershed Modeling"

Awards for Outstanding Accomplishments in Research and Creative Activity

ESTABLISHED by Provost and Senior Vice Chancellor for Academic Affairs in 2005, the Awards for Outstanding Accomplishments in Research and Creative Activity are given to faculty members in recognition of their achievements and current campus initiatives that bring national and international renown to UMass Amherst. Awardees are nominated by their peers.

2007 RECIPIENTS

JOHN J. CLEMENT, Professor of Teacher Education and Curriculum Studies
ERIC A. DECKER, Fergus Clydesdale Endowed Professor of Food Science
WALTER DENNY, Professor of Art
NANCY FOLBRE, Professor of Economics
PATTY S. FREEDSON, Professor of Kinesiology
JEFFREY W. HOLMES, Professor of Music and Dance
SABINA MURRAY, Associate Professor of English
JAMES J. WATKINS, Professor of Polymer Science and Engineering

(SEATED L-R): SABINA MURRAY, NANCY FOLBRE, WALTER DENNY, PATTY FREEDSON

(STANDING L-R): PROVOST CHARLENA SEYMORE, JEFFREY HOLMES, JAMES WATKINS, ERIC DECKER, JOHN CLEMENT AND CHANCELLOR THOMAS W. COLE, JR.

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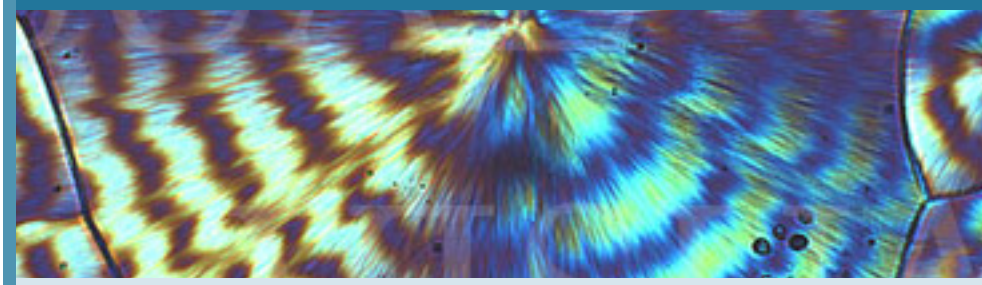

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