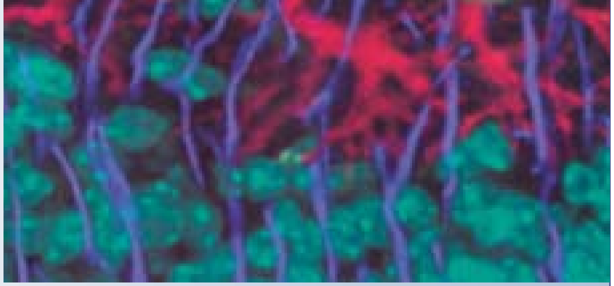
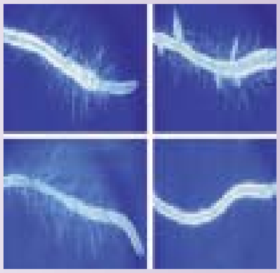


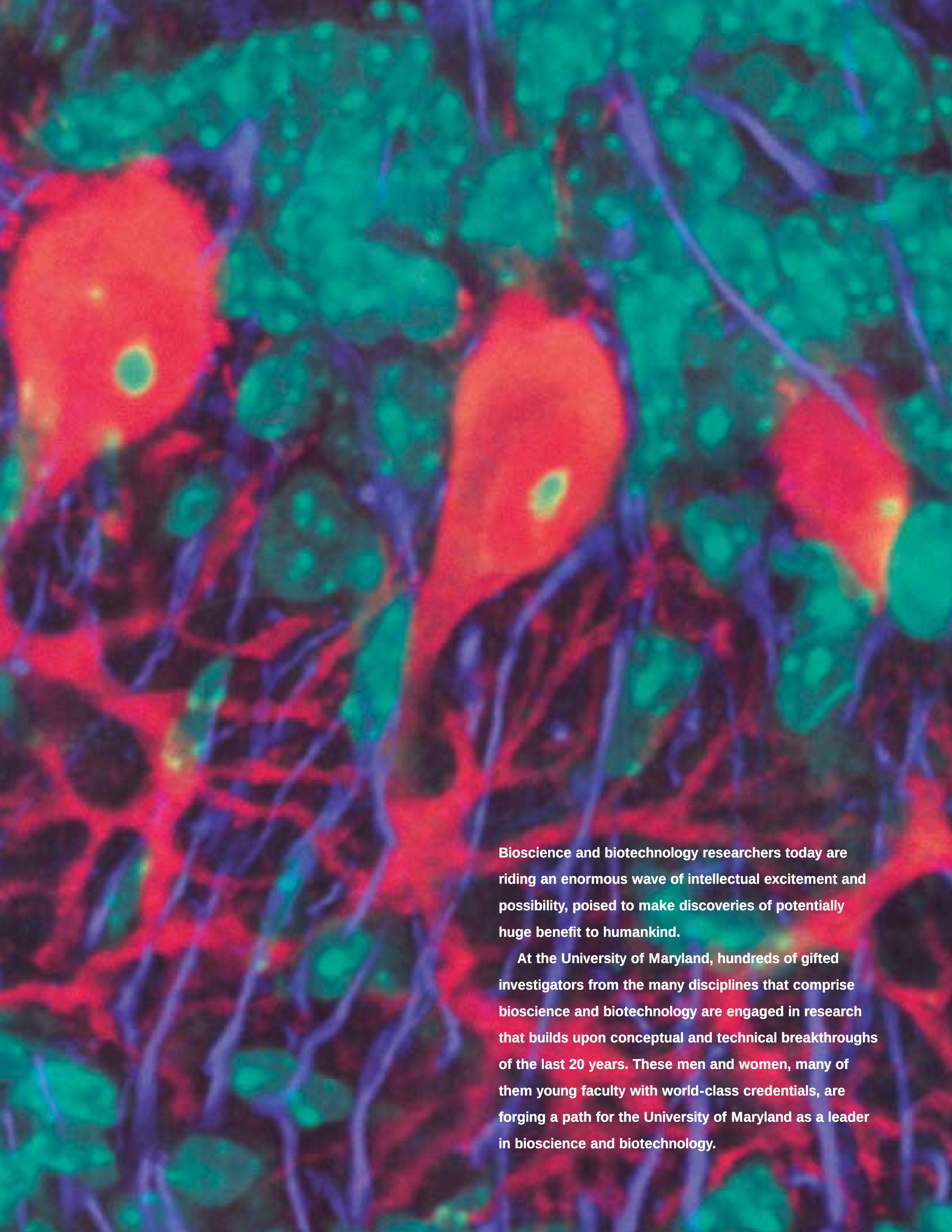
Biosciences @ Maryland



UNIVERSITY OF MARYLAND

“Because strength in the biosciences is essential to the future of the university and the future of the state, I have made excellence in the biosciences my top academic priority. … There will be no great research university in the coming decades that is not excellent in the biosciences. There will be no state that can lead in the biotech industry without the resource of a major research university with world-class leadership in biosciences.”

C. D. MOTE, JR., PRESIDENT
University of Maryland
Testimony to the Maryland General Assembly
March 2002



Bioscience and biotechnology researchers today are riding an enormous wave of intellectual excitement and possibility, poised to make discoveries of potentially huge benefit to humankind.

At the University of Maryland, hundreds of gifted investigators from the many disciplines that comprise bioscience and biotechnology are engaged in research that builds upon conceptual and technical breakthroughs of the last 20 years. These men and women, many of them young faculty with world-class credentials, are forging a path for the University of Maryland as a leader in bioscience and biotechnology.

We are living in extraordinary times.

Sweeping advances in genomics, information technology and instrumentation have set the stage for researchers to address some of nature's most fundamental questions: How do new species originate? What molecular and cellular mechanisms enable plants, animals and microbes to adapt to their environment? How are evolutionary and ecological interactions affected by human activities? How will knowledge gained from sequencing the human genome help us to understand and therefore cure disease? How can these advances help us to preserve and improve our environment, our health and our food supply?

Here at Maryland, investigators are gaining insight into these profound questions. Their laboratories are complex, lively places, inhabited by faculty, students—graduates and undergraduates—post-doctoral fellows and skilled technicians. Team members from a dozen academic disciplines collaborate with scientists from labs down the hallway or around the world. By working together, sharing knowledge and expertise, we are beginning to unveil the monumental complexity of the simplest things.

Maryland's undergraduate programs integrate research at every level. The university's commitment to include undergraduates both feeds and is fed by the skyrocketing level of talent at Maryland. Many of our undergraduates undoubtedly will lead their profession in the decades to come. "So smart it's scary" is the way one researcher described the undergraduate working in his immunology lab. Maryland faculty strive to involve undergraduate, as well as master- and doctoral-level, students in their laboratories, and to integrate what students learn in their classrooms with what they see and do in the lab. Faculty members in the College of Life Sciences are constantly reworking the undergraduate curriculum to incorporate new advances in our understanding of biological systems and new approaches to research. New buildings are being constructed and older buildings renovated to provide modern classrooms and laboratories for training undergraduates. Research internship programs provide many opportunities for undergraduates to work on research projects in laboratories of faculty members, federal agencies and the corporate sector. The university's success in training undergraduates led recently to the Howard Hughes Medical Institute honoring us with a third grant—this one for $1.8 million—to support undergraduate programs in the biological sciences. Our undergraduates also regularly win major national scholarships—for example, the Barry M. Goldwater and Jack Kent Cooke Scholarships.

At the University of Maryland, crucial new collaborations between bioscience researchers and students and Maryland's burgeoning biotech sector are developing. Spread across a large portion of the state, the biotech industry has shown remarkable growth over the last decade. Some 300 firms now employ almost 12,000 workers, and Maryland has become one of the nation's most important bioscience/biotech clusters. This rapidly developing industry challenges the University of Maryland to meet its scientific, academic and work force needs.

Molecular and genetic studies of surface (top) and cave-dwelling (bottom) Mexican tetra carried out by William Jeffery have identified the primary role of the lens as the central organizer of eye development.

RESCUING EYES

Most biological research begins with the intense scrutiny of something small: a gene, a protein, a phenomenon about which you can hypothesize. When the biologist chooses the right small thing to study, he or she may reveal an entire universe.

So you may describe the work of developmental biologist William Jeffery, professor and chair of the Department of Biology. Jeffery, trained as a molecular biologist, studies the evolution of development. The Mexican tetra, a small fish common in the Southwest and Mexico, serves as a model system for asking fundamental questions that apply to many species. Seeking to discover why the eyes of cave-dwelling tetra arrest development and degenerate, Jeffery and his team study this fish from genetic, cellular, molecular and organismal perspectives.

Jeffery's team studies one tetra type that lives in surface streams and lakes and possesses sight, and several other forms that normally live in dark caves and are blind—apparently in response to their environment. By transplanting eye lenses from sighted fish into sightless ones and vice versa, the team has discovered that the lens is the central organizer of eye development in fish and apparently in mammals. In sighted fish several proteins in the lens send signals that prevent cell death (apoptosis) in the retina and elsewhere. These findings have been greeted with great interest by researchers studying cataracts in the human eye at the National Institutes of Health and elsewhere.

The researcher studies something small, but the significance radiates in a large circle.

Sarah Tishkoff combines extensive field work and detailed genomic analysis of African populations to study fundamental questions in human evolution and disease resistance.

TRACING OUR EVOLUTION

Sarah Tishkoff, assistant professor of biology, is a one-person collaboration, combining the skills of a Yale-trained geneticist with the talents of an anthropologist, an archeologist and a historian. Winner of a prestigious David and Lucile Packard Foundation Career Award in Science and Engineering in addition to a Burroughs Wellcome Fund Career Award in the Biomedical Sciences, Tishkoff exhibits a passion for social science that shapes her work as a geneticist. Her big-picture approach, combined with painstaking science, led her to discover new and convincing genomic evidence that *Homo sapiens* did indeed originate in Africa—helping to settle one of science's most persistent debates.

Tishkoff came to this conclusion after extensive field work in Africa, where she compared the DNA of members of more than 18 sub-Saharan African populations with that of 30 non-African populations. She discovered that the Africans had the highest DNA diversity and that the DNA of other groups was clearly derived from the DNA of Africans. Recently she has begun to trace the flow of human populations out of Africa and to reconstruct more recent migration events across Africa.

Another of Tishkoff's major interests is the evolution of infectious disease—beginning with malaria, which kills more people than any other ailment. For this work Tishkoff combined genetics with archeology and ancient history, turning to ancient texts and to anthropological data to date the appearance of malaria in different parts of the world. She discovered that genetic mutations giving humans natural resistance to malaria emerged in diverse human populations soon after the disease itself first appeared. Based on her work, it appears that a genetic response to infectious disease is part of our genetic heritage. A better understanding of naturally occurring genetic resistance may lead to more effective treatments or vaccines for fighting infectious disease.

The more scientists know, the more they are able to perceive what they do not know.

This fuller understanding of nature's complexity encourages them to build interactions with colleagues in related fields.

At Maryland, proximity also encourages scientific interaction. The university's wealth of talent enables bioscientists to connect with other researchers on campus who work in related fields. Biologists, physicists, chemists, mathematicians, computer scientists, linguists and engineers routinely collaborate. Close institutional connections among the College of Life Sciences, the College of Agriculture and National Resources, the College of Computer, Mathematical and Physical Sciences and the A. James Clark School of Engineering facilitate conversation and collaboration.

Innovative programs foster the ethos of collaboration by training undergraduate and graduate students alike to approach scientific work from a multidisciplinary perspective. Some examples include:

• The interdisciplinary Department of Entomology, jointly supported by the College of Life Sciences and the College of Agriculture and Natural Resources, is ranked nationally among the top 10.

• In recognition of the increasing importance of mathematical analysis and modeling, a Center for Bioinformatics and Computational Biology has been created by the College of Life Sciences and the College of Computer, Mathematical and Physical Sciences.

• The A. James Clark School of Engineering, in collaboration with the College of Life Sciences and other colleges, is launching a graduate program in bioengineering.

• A double degree program sponsored by the College of Life Sciences and the College of Education prepares students for the crucial work of teaching biology and chemistry in grades K–12.

• Joint initiatives in biotechnology and entrepreneurship are on the drawing board. These programs will harness talent from the College of Life Sciences, the Smith School of Business and the School of Public Affairs.

• For almost 40 years, the Maryland Water Resources Research Center—a joint initiative of the A. James Clark School of Engineering, the College of Agriculture and Natural Resources and the College of Life Sciences—has been resolving water resource problems, training water scientists and engineers, and educating the public.

• The Center for Neuroscience is a joint endeavor between the College of Behavioral and Social Sciences and the College of Life Sciences to provide seed money for neuroscience research. These grants are used for assistance in collecting pilot data to be used for the preparation of large-scale, cross-disciplinary research in the neurosciences.

UNDERSTANDING PLANT GENOMICS

Maryland's plant science team—led by professors of cell biology and molecular genetics Heven Sze, Elisabeth Gantt (a member of the National Academy of Sciences) and others—is a front runner in the race to comprehend the genes that control growth, development and adaptation of plants. The National Science Foundation has chosen Sze to receive a four-year grant as part of an initiative to determine, by 2010, the function of all 26,000 genes in a common, easily grown weed called *Arabidopsis thaliana.* Last year, associate professors Stephen Mount and Caren Chang received a grant from the same program.

This is pioneering work. Although the *Arabidopsis* genome, like the human genome, has been sequenced, scientists do not know the function of most of the genes. The benefit of the work at Maryland will spill over to researchers studying plants such as rice and corn and is expected, in the long run, to help scientists improve agricultural output.

The Maryland team has long been recognized for the quality of its plant research. Sze studies transporters, proteins that function like little shunts—nanomachines—controlling how plants take up inorganic nutrients such as calcium, distribute them from root to leaf, then shut down to prevent too much from being absorbed. Plant biologists believe transporters may someday be genetically altered to help plants flourish in soil that is less than ideal, to increase nutrients such as calcium in foods and to remove toxic heavy metals from soil that has been environmentally despoiled.

Heven Sze and her team study the function of Arabidopsis thaliana genes. Shown here are the plant itself (left), root hairs from wild type and mutant Arabidopsis plants (top right) and Arabidopsis mutants stunted in growth relative to the wild type (bottom right).

Victor Muñoz seeks to characterize the structure-folding relationships of proteins that underlie normal protein function, as well as the folding errors seen in diseases such as Parkinson's, Alzheimer's and cystic fibrosis.

UNTANGLING THE COMPLEXITIES OF PROTEINS

Why does a talented young investigator doing seminal work in a hot field choose to build his career at the University of Maryland?

Assistant Professor of Chemistry and Biochemistry Victor Muñoz came to Maryland after four years as a post-doctoral fellow at the National Institutes of Health. He chose Maryland's offer, which included startup funds to establish his lab, because of the quality of other Maryland researchers. Muñoz himself is a rising star who has received two highly coveted national awards—a David and Lucile Packard Foundation Faculty Fellow award and a Searle Faculty Scholar award—since joining the faculty.

Muñoz studies protein folding. In recent years, scientists have learned that within our cells proteins constantly fold and unfold. When this process goes awry, a tangle of protein can form. These aggregates are permanent and lethal. In the brain, they cause Alzheimer's disease. They also play a role in Parkinson's disease, cystic fibrosis, type II diabetes, Huntington's disease, "mad cow" disease and many other disorders.

Muñoz approaches folding in two ways: He studies it in a test tube, and he creates computer models that replicate the folding process. His major university collaborators, professors of chemistry and biochemistry George Lorimer and Devarajan Thirumalai, have overlapping interests: Lorimer, a member of the National Academy of Sciences, focuses on *in vitro* folding, while Thirumalai, a theoretician, uses computer modeling. It was the opportunity to work closely with these world-class investigators whose interests so closely match his that clinched the Maryland deal for Muñoz.

The proximity of the federal government is an enormous benefit to the growth of bioscience and biotechnology at Maryland.

The state of Maryland possesses the nation's highest concentration of federal bioscience research and development facilities. The National Institutes of Health, the Food and Drug Administration, the National Institute of Standards and Technology, the Goddard Space Flight Center, the Smithsonian Institution and the Beltsville Agricultural Research Center provide Maryland faculty, graduate students and post-doctoral fellows with important opportunities to collaborate, not to mention providing billions of dollars annually in coveted federal research dollars.

The following is a partial list of the University of Maryland collaborations with federal labs and agencies:

• The Comparative and Evolutionary Biology of Hearing graduate and post-doctoral training program is a collaboration between our Neuroscience and Cognitive Science Program and the National Institute on Deafness and Other Communication Disorders.

• An NIH training grant underwrites a graduate and post-doctoral training program in virology at the University of Maryland, University of Maryland Biotechnology Institute, the National Institutes of Health and the Beltsville Agricultural Research Center.

• Maryland biologists are collaborating with the Smithsonian Institution, studying systematics—the evolution of relationships of species.

• With the Food and Drug Administration, Maryland has developed the Joint Institute for Food Safety and Applied Nutrition, which will work with the FDA's Center for Food Safety and Applied Nutrition. This multimillion dollar private/public partnership, located adjacent to the College Park campus, is charged with determining how science can ensure the safety of the nation's food supply.

• Our Materials Research Science and Engineering Center, which is joint with the College of Computer, Mathematical and Physical Sciences, and the A. James Clark School of Engineering, funded by an NSF grant supporting material science and surface chemistry research, is helping us to build strength in nanotechnology.

DECODING THE MYSTERIES OF SPEECH

If you want to understand how modern science and technology is beginning to address one of nature's most complex questions—how we hear and comprehend speech—take a look at David Poeppel's Cognitive Neuroscience of Language Lab.

An assistant professor of linguistics and biology, the MIT-trained Poeppel runs one of the most intensely multidisciplinary efforts on campus. His team members are pioneers in the use and development of an important new brain imaging technology called magneto encepholography (MEG), which operates faster and registers more information than older imaging techniques.

The multimillion-dollar MEG machine tracks brain activity in the human cortex in real time. Test subjects lie on MEG's narrow bed, their heads cushioned in a liquid helium halo containing 160 detectors, and listen to an array of sounds as MEG records their responses.

It has taken an army of graduate students and faculty collaborations to launch the MEG initiative. They include electrical engineers with know-how in signal processing; computer scientists specializing in data storage; physicists to build the machine; psychologists to design experiments; cognitive scientists to create computational models; biologists specializing in hearing; linguists; a speech specialist; and neurophysiologists.

The goal of all their labor is to figure out how the human brain processes and interprets speech. What tricks does it use? Can these tricks be incorporated into machines that recognize speech?

Poeppel and his team are pioneers. Only about a dozen MEG machines are in use in the United States. Their work, of course, is of tremendous interest to other researchers, including investigators at the National Institute on Deafness and Other Communication Disorders, with whom the team collaborates.

C*atherine Fenselau's expertise in proteomics and mass spectrometry contributes to an understanding of diverse scientific problems—from drug resistance in cancerous cells to identification of biological pathogens in the environment.*

D*avid Poeppel and his multi-disciplinary team use advanced brain imaging technology to discover how the human brain processes and interprets speech.*

UNLEASHING THE POWER OF PROTEOMICS

It's hard to imagine a laboratory that better illustrates the real-world importance of basic research than that of Professor of Chemistry and Biochemistry Catherine Fenselau. Fenselau, an analytic chemist with broad scientific interests, supervises two research teams.

One team, funded by the National Cancer Institute, studies how cancer cells become drug resistant. The other team, funded by the Department of Defense, is part of a multisite project that has created a portable machine to detect lethal bacteria, such as smallpox, in the environment.

What ties these two quite different efforts together is Fenselau's expertise in mass spectrometry, the most sensitive method for detecting a broad range of chemical substances, and her leadership in proteomics, an emerging methodology that employs mass spectrometry to analyze tens of thousands of proteins simultaneously.

Fenselau's cancer team uses mass spectrometry and proteomics to study the role of specific proteins in the development of drug resistance. Working with a parent line of breast cancer cells, plus three sub-lines that are resistant to different drugs, she and her colleagues are beginning to discern which changes in protein patterns are common to all three and which changes are specific to particular cells. The cancer team is collaborating with medical researchers at the University of Maryland Cancer Center, who hope to translate Fenselau's finding into new drugs that cancer cells are less able to resist.

The work of Fenselau's other team is also paying off: The portable mass spectrometer they helped develop to detect dangerous pathogens in the environment will soon be commercially developed and marketed. A proteomics-based algorithm identifies the pathogens based on proteins detected in their mass spectra. Following the events of 9/11, the need for this type of identification could not be greater. The device team, in the meantime, has already begun working on an improved model.

Maryland is committed to teaching, reaching out to the community and leading.

In 2000, the University of Maryland convinced Yale-educated physical biochemist Norma Allewell to leave her post at Harvard University, where she served as associate vice president for sponsored programs and technology transfer, to become dean of the College of Life Sciences. Dean Allewell's career-long commitment to students and teaching, as well as world-class research, and her leadership ability are helping to reshape the college and to strengthen its many relationships with colleagues across campus.

Under her aegis, intellectual and bureaucratic barriers are giving way, enabling researchers from diverse disciplines to address new multidisciplinary challenges, including biodiversity, bioinformatics and computational biology, cellular and evolutionary developmental biology, nanoscience, neuroscience, pathogenesis and immunology, plant molecular genetics and molecular biophysics.

Efforts to upgrade the curriculum, forge collaborative relationships and improve the physical plant go hand in hand with the arrival of an ever-more-accomplished student body and with unprecedented efforts to reach out to the community at large. Of special import are initiatives that seek to recruit talented undergraduate and graduate students representing the region's richly diverse population.

MENTORING STUDENTS TO SUCCEED

A great mentor doesn't waste time on syrupy speeches. She focuses on what's real: helping students to develop the skills it takes to succeed, delivering the support required for high school students—those who have grown up without advantages, might have attended mediocre high schools and were perhaps weighted by family problems—to thrive at Maryland's increasingly rigorous College of Life Sciences.

In three decades at Maryland, Associate Professor of Entomology Earlene Armstrong has taken hundreds of students under her wing. Most have gone on to forge careers in medicine and science and to lead happy, productive lives.

The same can-do spirit that pervades Armstrong's mentoring fuels the Prefreshman Academic Enrichment Program she directs in the summer, preparing incoming students for college-level math. The program, which began in 1995, is greatly enhancing student success. Among the first group that participated, 80 percent have now graduated.

Armstrong's students say she is like an on-campus mother, offering food, emotional sustenance and the ability to show young people how to achieve their goals. As in a family, Armstrong enlists the oldest to help the youngest. Upperclassmen work with younger students, and those who have graduated help seniors with résumés, job advice and more.

Armstrong's passion for young people and science also takes her into the public schools, where her "bug talks" are a big hit. In the summer, she runs a science "bug camp" on the University of Maryland, College Park, campus.

Recognizing her tremendous contribution, the National Science Foundation chose Armstrong as one of 10 national recipients of the 2001 Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring. The award is given to those who promote the participation of women, minorities and persons with disabilities in science, mathematics and engineering. Not surprisingly, a committee of her former students nominated Armstrong for the honor.

Earlene Armstrong enjoys taking college students under her wing and introducing fascinated youngsters to the world of insects.

Gerald Wilkinson and Sara Via launched the Center for Biodiversity, devoted to studying the origins and maintenance of biodiversity.

BREAKING DOWN BARRIERS FOR BIODIVERSITY

How receptive to new ideas is a research university? Are innovations welcome? Or are they buried and forgotten? The answers to these questions tell a great deal about where an institution is today and where it is going.

When Professor Sara Via and her colleague Professor Gerald Wilkinson developed the idea that the university could play a key role in the study of the origins and maintenance of biodiversity, they received strong support from Dean Norma Allewell and Provost William Destler. Thus the Center for Biodiversity was born in April 2002. Via now directs the center.

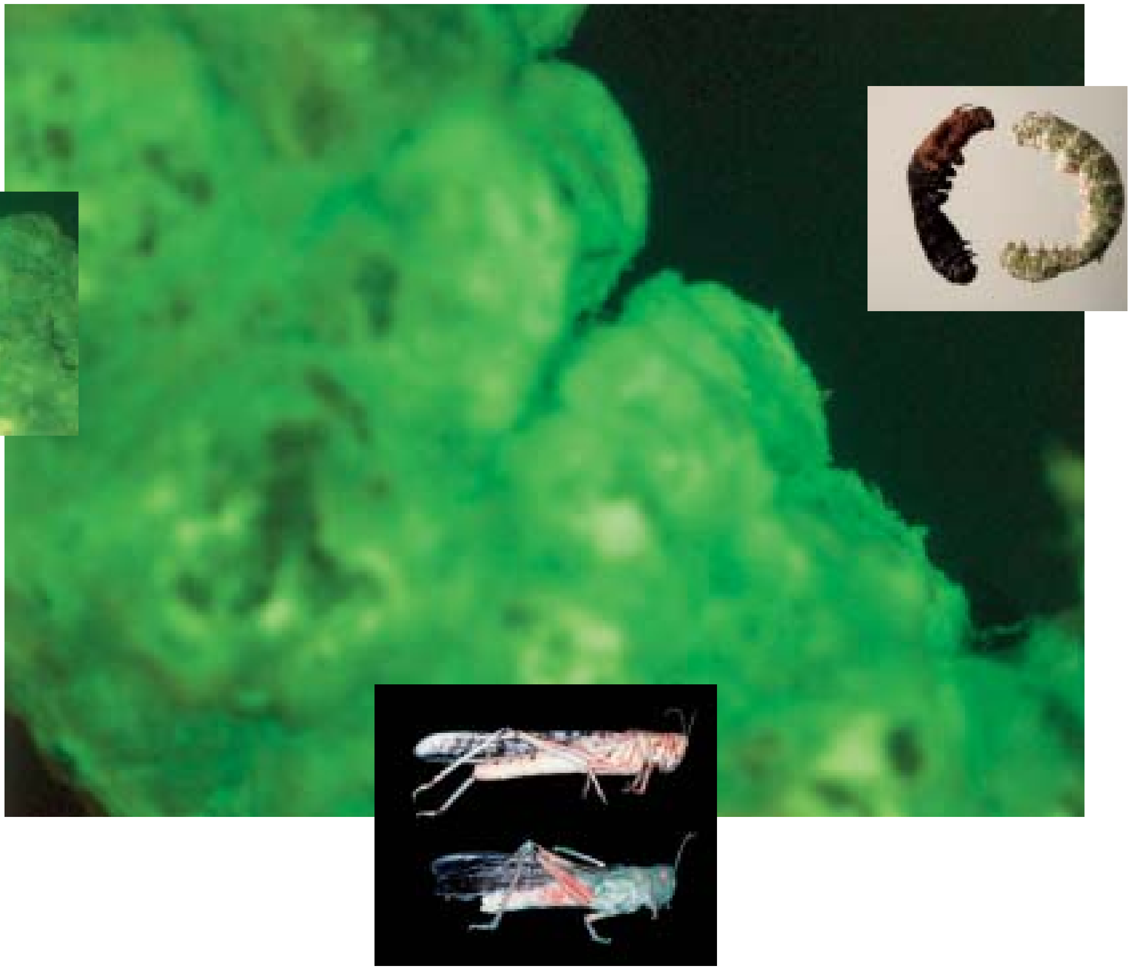
In addition to her current research on the genetic and ecological factors that lead to the formation of new species, Via has a history of interest in applications of evolutionary biology to real-world problems caused by human actions. She has studied how insect pests come to resist virtually every type of control agriculturalists can devise. She has also mentored an undergraduate honors group that tackled the growing problem of how resistant superbacteria evolve when antibiotics are overused.

Via and Wilkinson proposed the Center for Biodiversity from a shared sense of urgency about the increasing impact of humans on the natural world. Via, who shares a joint appointment in biology and entomology, is an evolutionary geneticist; Wilkinson, of the Department of Biology, studies the genetic basis of behavior. Both are highly regarded investigators. They believe that marked increases in the success of management strategies will result from enhanced interactions between the university scientists who study the ecological and evolutionary factors influencing biodiversity, and the specialists in government and nonprofit organizations charged with mitigating human impacts.

The Center for Biodiversity attempts to break down the walls between these two groups and to integrate basic research with applied issues. The center institutionalizes relationships between students in several stellar graduate programs: Ph.D. students in the Behavior, Ecology, Evolution and Systematics (BEES) and Entomology programs, and master's level students in the Sustainable Development and Conservation Biology (CONS) program. The goal is to bring about what's called a "paradigm shift"—to change the way researchers think about applications and to change the way front-line professionals think about biodiversity to increase both the group's pertinence and effectiveness. Nothing could be more important.

Bioscience and biotechnology at the University of Maryland are coming of age at a propitious moment.

The ongoing surge of achievement and opportunity in these fields carries awesome potential to improve the quality of human life, to ameliorate our environment, and to prevent and to cure ailments that ravage our species, including HIV and other infectious diseases, cancer, genetic birth defects, diabetes and Alzheimer's disease. Our understanding of the importance of our mission and our realization of all that may be accomplished fires our enthusiasm as we strive for excellence.



FIGHTING INSECT PESTS—NATURALLY

Ray St. Leger epitomizes the joyfulness and sense of intellectual play with which many fine scientists approach their work. Visiting him, you enter his amazing universe: a sci-fi realm where green-glowing fungi are locked in mortal combat with plant-eating bugs, the fate of the world resting between them.

Remarkably, the fate of the world—or at least the ability of our species to feed itself without further polluting our soil and water—may well reside, at least in part, in the confrontation between genetically altered fungi and the pests that prey on human crops.

A professor of entomology, St. Leger does basic and applied research on the genomic structure of several varieties of ancient, microscopic fungi that kill insects. Some of these have airborne spores that attack flying insects, while others coat the roots of plants. When bugs attack these roots, the pathogenic fungi grow into them and they die. St. Leger has found that these fungi provide a very convenient model system to study basic problems of pathogen genetics and evolution with results that are applicable to fungi with animal and plant hosts. He has learned how to genetically alter fungi's structure, seeking ways to make them even more lethal to insects. He has also added a gene that encodes a fluorescent protein that makes these invisible creatures glow green; once these fungi are visible, scientists can track them and follow their progress through insect pest populations.

This technique of controlling insect infestations by using an insect's natural enemies is an important component of integrated pest management. It is far more palatable to consumers than conventional farming practices because it greatly reduces the use of toxic chemical pesticides.

One of the biocontrol schemes based on St. Leger's work is targeted against the coffee borer beetle, a pest that damages coffee bean plants. This plan will soon be field tested in Colombia.

Main photo and top left: The head and body segments of a caterpillar killed and occupied by a fungus containing a green fluorescent protein gene from a jellyfish. Tagging the fungus enables Ray St. Leger to follow the fate of engineered fungi in the field. Upper right: Caterpillars killed by a natural pathogen (right) and a genetically engineered version (left), which kills more quickly by turning the insect's own immune system against itself. Bottom right: The top insect is uninfected; the bottom insect has been killed by the "green muscle" strain of fungus used to control locusts in Africa. Ray St. Leger is engineering this fungus to enhance its killing power.

It is rare in science that the numbers come up 100 percent: that none of the mice sicken or die despite being injected with blockbuster doses of infectious agents. It is rare that a cure—an outright cure—appears to have been discovered for a lethal syndrome. But this unlikely occurrence is precisely what has taken place in the laboratory of David Mosser, an immunologist who studies the immune response to infection.

Mosser, a professor of cell biology and molecular genetics, does basic research on macrophages, one class of the white blood cells that fight infection. As part of his work, he studies cytokines (small proteins made by macrophages) that control inflammation. The body requires cytokines. But when macrophages produce too many, an exaggerated inflammatory response occurs, which can lead to massive organ failure. An estimated half million people a year die from this syndrome, known as septic shock.

In their lab, Mosser and his team identified two cytokines—one switches on the inflammatory response, and the other turns it off. They then devised a chessboard strategy for shutting off the overproducing inflammatory cytokine. In laboratory tests with infected mice that under normal conditions would have died from septic shock, they were able in all cases to shut down the inflammatory response and prevent sepsis from occurring.

The goal, of course, is to use the information from these studies to save human lives. Mosser is patenting his anti-autoimmune strategy. A number of pharmaceutical companies with the resources to conduct clinical trials on human patients are eager to purchase the patent. If the trials are successful, the technique will be developed into a marketable drug.

In the meantime, Mosser's exciting work controlling destructive autoimmune responses continues. These efforts hold out promise for those studying a range of autoimmune diseases, including rheumatoid arthritis, insulin-dependent diabetes and lupus.

A *strategy that David Mosser and his team developed to prevent sepsis from occurring in infected mice holds out promise for treating a range of autoimmune diseases.*

The College of Life Sciences needs your help in implementing our plan for the future.

A major objective of the college is increasing its endowment in order to ensure that the biosciences achieve their full potential at the University of Maryland. Endowed funds enable research institutions to comfortably weather all exigencies. Fundraising priorities include:

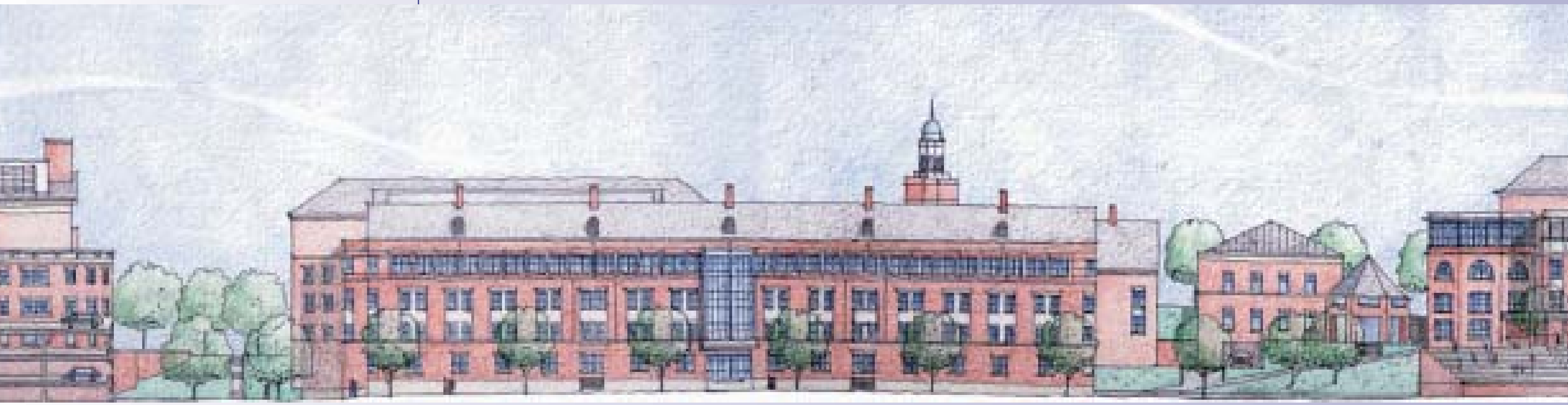
- Creating endowed professorships and chairs to allow for hiring and retention of world-class faculty
- Increasing funds for undergraduate and graduate scholarships and fellowships
- Obtaining supplementary funding for a new $62 million Biosciences Research Facility and and a new Chemistry Teaching Wing
- Renovating existing buildings and facilities

For more information on making a gift to benefit the College of Life Sciences, please contact the college's Development Office at 301.405.0205.

BUILDING OUR FUTURE

Projects such as the Atrium, shown here (right), and the new Chemistry Teaching Wing are made possible in part by endowed funds. Through a generous planned gift, Anita Frazer contributed $500,000 to name the Atrium for her late husband, a distinguished chemistry professor, G. Forrest Woods.

The college has begun the architectural design process for a $62 million Biosciences Research Building (below) to be built adjacent to the existing Biology-Psychology Building. The new building will include research laboratories and supporting spaces for about 30 faculty members whose research programs focus on cellular and molecular approaches to contemporary problems in biology. A significant portion of the 69,000 net assignable square feet will house new faculty. The structure will be the first campus facility to be built to the specifications of the state of Maryland guidelines on "green" design and construction. Groundbreaking is anticipated in May 2004, and completion is anticipated in May 2006.



“The biotechnology industry has rapidly become one of Maryland’s most important economic assets. Biotechnology, by its very nature, is a collaborative endeavor built upon advances made by researchers from many disciplines. As the state’s flagship university, the University of Maryland, College Park, has a critical scientific role to play in this collaborative mix, together with the private sector and state and federal agencies. Maryland’s biotechnology industry benefits from the large number of graduates in the biological sciences that the university produces, from its technology transfer activities and from collaborative research efforts with university scientists.”

WAYNE T. HOCKMEYER, PH.D.
Chairman and Chief Executive Officer
MedImmune, Inc.

UNIVERSITY OF MARYLAND

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