

Subsidence and flooding in New Orleans

Roy Dokka, the Fruehan Family Professor of Civil & Environmental Engineering and director of LSU's Center for Geoinformatics, co-authored an article in the journal *Nature* on new subsidence data of New Orleans and how subsidence played a role in failure of some levees during Hurricane Katrina. Satellite data showed that parts of New Orleans underwent rapid subsidence in the three years before Hurricane Katrina struck in August 2005.

Nature's barriers to business

With only 52 percent of Orleans Parish entrepreneurs indicating they were optimistic about the future of their business in the New Orleans area, an interdisciplinary research team from LSU and Tulane received a NSF grant to study how post-Hurricane Katrina economic geographies affected New Orleans business owners' decisions on whether or when to reopen.

The team includes Nina Lam, a professor in LSU's Department of Geography & Anthropology; Kelley Pace, a professor of finance at LSU's Ourso College of Business and director of the LSU Real Estate Research Institute; and Richard Campanella, a geographer at Tulane's Center for Bioenvironmental Research. The LSU Public Policy Research Lab conducted the survey of 937 returned Orleans Parish business owners, who were asked to rate a series of problems considered barriers to success in a post-Katrina environment.

Preserving the historical record

In an effort that began almost immediately after Katrina struck, librarians in LSU Libraries' Special Collections division, led by Associate Dean Faye Phillips, saved rare books, photographs, albums, cassettes, and other media from hurricane damage. From New Orleans' Notre Dame Seminary alone, 700 volumes were re-located to Hill Memorial Library, home to the Special Collections division on the LSU campus. Though some books were simply being held for safe keeping, many were damaged.

A new source of computing power goes online

The LSU Center for Computation & Technology demonstrated the first-ever use of the Louisiana Optical Network Initiative (LONI) in late September 2005. Researchers showcased a new high-definition simulation technology that will help scientists to better predict hurricanes and other natural disasters. The conferencing technology allows LSU researchers to manipulate their simulations with other researchers from across the world in real-time.

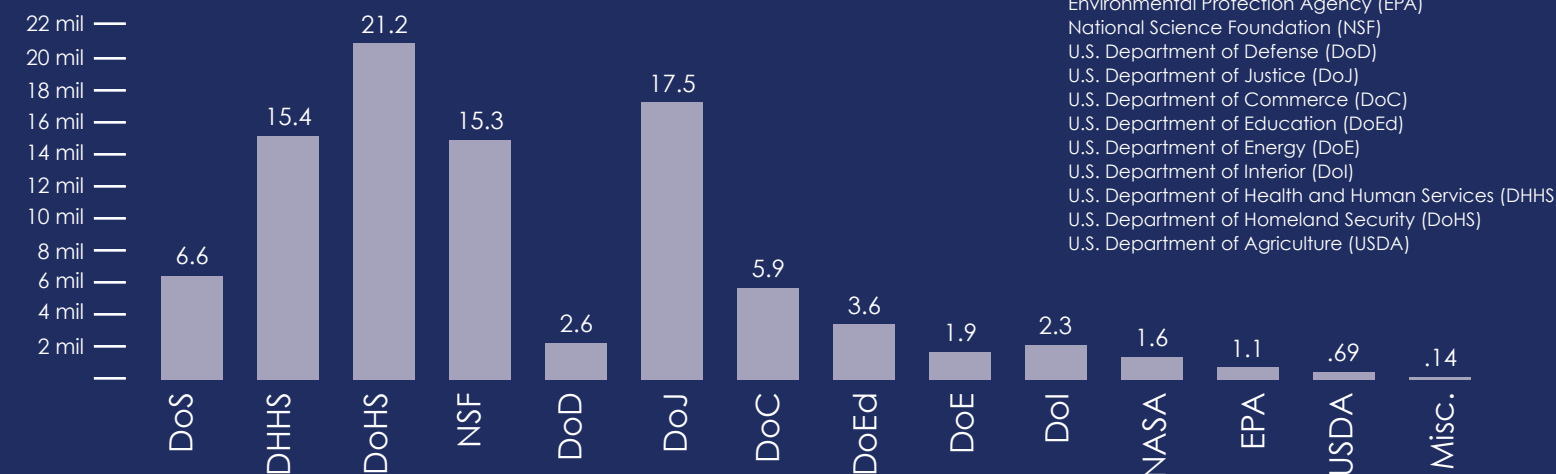
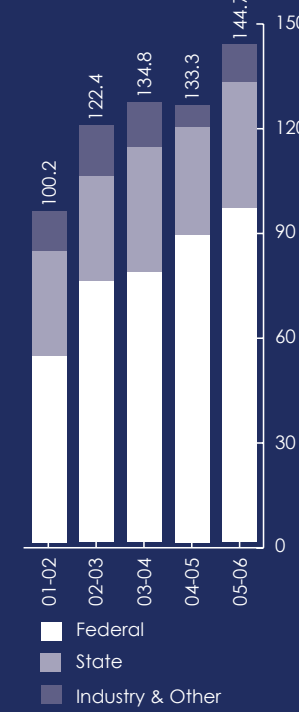
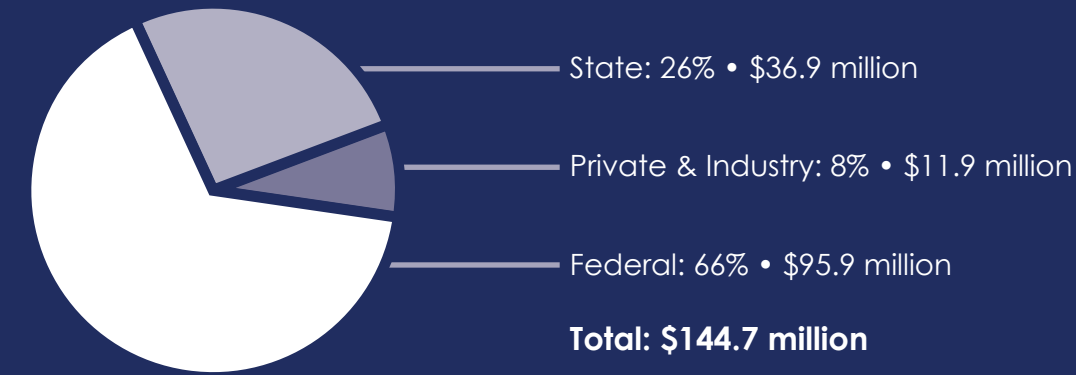
Expanding energy resources

As concerns increased about the world's energy supply and gas prices remained high, LSU's Center for Energy Studies continued to expand its energy research and programs. The 2006 Alternative Energy Conference, which was sponsored by the center, addressed issues surrounding future transportation fuels, energy efficient building, state policies for energy and land use, and renewable natural energy sources. Another meeting, the Post-Hurricane Utility Conference, focused on questions of disaster cost recovery and the effect of hurricanes on the state's energy infrastructure.

The Center for Energy Studies' Research & Development Division affected energy policy in Louisiana by filing requests for information from the Louisiana Legislature on proposed bills. Some efforts focused on promoting alternative fuels to gasoline such as ethanol and biodiesel, hoping to drive fuel costs down for consumers. Other information requests focused on environmental clean-up, motor fuel tax estimates for parishes, wind farms, and pipeline property evaluations. By sharing their findings, researchers at the center can have a positive impact on policy affecting the management and preservation of Louisiana energy resources and environments.



EXTERNAL FUNDING SOURCES, FY 2005-2006



U.S. Department of State (DoS)
 Environmental Protection Agency (EPA)
 National Science Foundation (NSF)
 U.S. Department of Defense (DoD)
 U.S. Department of Justice (DoJ)
 U.S. Department of Commerce (DoC)
 U.S. Department of Education (DoEd)
 U.S. Department of Energy (DoE)
 U.S. Department of Interior (DoI)
 U.S. Department of Health and Human Services (DHHS)
 U.S. Department of Homeland Security (DoHS)
 U.S. Department of Agriculture (USDA)

Intellectual Property

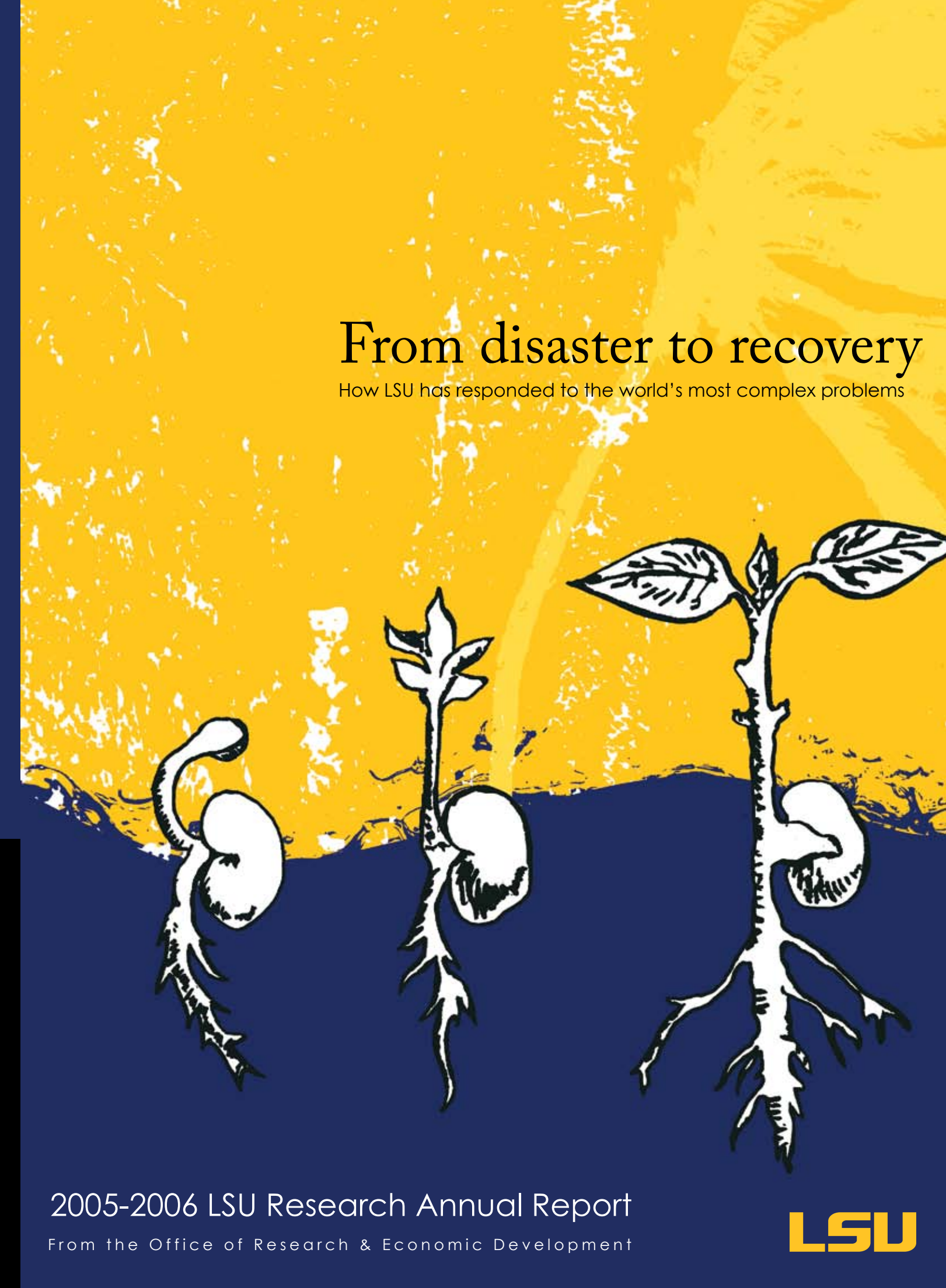
FY 2006 (July 1, 2005 – June 30, 2006)
 Issued Patents – 6 Issued Copyrights – 0 Gross Income Generated – \$213,649.81

Title:	IDDQ Testing of CMOS Mixed-Signal Integrated Circuits	Title:	Coupled Polymerase Chain Reaction-Restriction Digestion-Ligase Detection Reaction Process
Inventors:	Ashok Srivastava	Inventors:	Robert Hammer, Francis Barany, Joseph Day, Donald Bergstrom, P. Post
Date Issued:	08/16/05	Date Issued:	03/21/06
Title:	Mechanical Seal Having A Double-Tier Matting Ring	Title:	Enhancing Maturation of Oocytes in Bivalves
Inventors:	Michael M. Khonsari, Anoop Kumar Somanchi	Inventors:	John W. Lynn
Date Issued:	09/13/05	Date Issued:	03/21/06
Title:	Detection of Nucleic Acid Sequence Differences using the Ligase Detection Reaction with Addressable Arrays	Title:	Seal Assembly for Machinery Housing
Inventors:	Robert Hammer, F. Barany, G. Barany, N. Gerry, N. Witowski, J. Day	Inventors:	Kevin W. Kelly, Lyndon Scott Stephens
Date Issued:	10/27/05	Date Issued:	06/27/2006

www.lsu.edu/intellectual_property

From disaster to recovery

How LSU has responded to the world's most complex problems



2005-2006 LSU Research Annual Report

From the Office of Research & Economic Development

LSU



MANAGING DISASTER

The world was dismayed by the devastation wrought by the 2005 hurricane season. Not only did the United States witness the costliest natural disaster in its modern history, but the rebuilding effort will no doubt be one of the largest. Last year, LSU investigators were at the forefront of research on the human, material, economic, and cultural impacts of natural disasters.

Investigating and promoting preparedness and recovery

Researchers from the LSU Hurricane Center investigated and continue to investigate a wide range of engineering, environmental, geographic, social, and cultural concerns in the wake of Hurricanes Katrina and Rita. Appointed by State of Louisiana officials, Director Marc Levitan and Deputy Director Ivor van Heerden led the Hurricane Center staff in conducting the forensic investigation of the Hurricane Katrina levee failures. Van Heerden led Team Louisiana, a group of engineers and coastal scientists that conducted analysis of the storm surge levels, levee construction, and levee failure mechanisms.

Levitan and a group of researchers conducted a National Science Foundation-funded study that first allowed them to collect detailed data, such as demographics, water depth and location, on as many individual fatalities as possible. This data will allow for the development of better flood fatality models, which are extremely valuable to emergency planners and public health officials. The second task of the project allowed them to survey short- and medium-span bridges that performed poorly during both Hurricane Katrina and Hurricane Ivan, which struck the Gulf Coast in 2004. The data collected will allow better design and rehabilitation of more reliable coastal bridges.

The center also unveiled an early-2006 study, which focused on the Mississippi Gulf Coast. The study showed that if Mississippi had stricter building codes and construction practices, the state would save an estimated \$3.1 billion in economic losses while sparing nearly 20,000 buildings from Category 3 hurricane destruction due to extreme winds and wind-driven rain. Due to Hurricane Katrina, Mississippi had 231 deaths, 65,000 buildings destroyed or severely damaged, and \$45-billion in damages.

A Message from the Vice Chancellor

Last fall, Louisiana State University was faced with taking on an unprecedented role for a university: providing immediate healthcare and emergency relief to those affected by Hurricanes Katrina and Rita. Just as they came to the aid of those affected in the aftermaths of these storms, LSU faculty, staff, and students launched new investigations and continued existing research in the engineering, environmental, geographic, social, and cultural impacts of the natural disasters our world can face. No doubt, you've read about the inspiring work LSU researchers are conducting in the New York Times, Washington Post, Times Picayune, or Baton Rouge's very own Advocate.

Throughout the 2005-2006 fiscal year, LSU investigators also distinguished themselves in a variety of other disciplines. From keeping an eye on rising gasoline prices to studying the unique depths of the Gulf of Mexico, researchers at Louisiana's flagship institution are advancing knowledge and understanding to better the human state. With the LSU Flagship Agenda in full swing and a recent reorganization of LSU's research operations, the University is poised now better than ever to have a stronger, more lasting impact on Louisiana and the world.

Brooks Keel
Vice Chancellor for Research & Economic Development

Combating diabetes

For her groundbreaking diabetes research, LSU Professor of Biological Sciences Jacqueline Stephens was awarded the 2005 Lilly Scientific Achievement Award by the North American Society for the Study of Obesity. Stephens has been hard at work battling Type II diabetes associated with obesity for many years. Supported by funding from the National Institutes of Health and the American Diabetes Association, Stephens' research focuses on proteins found in fat cells. In particular, Stephens and fellow researchers are monitoring a particular type of protein, a master regulator that controls what proteins are expressed and fat cell formation: STAT5A. Stephens is investigating the role of STAT5A under conditions where insulin levels vary such as in diabetic fat cells versus that of normal, healthy fat cells. Through these trials, she has observed that STAT5A is a key regulator of adipocyte (fat cell) function and may be important in the insulin response. For more information, visit www.biology.lsu.edu/webfac/jstephens.

Let them eat Prozac

Exploring the influence of the pharmaceutical industry on the academic community and issues of public safety, renowned psychiatrist and anti-depressant expert David Healy presented "Shaping the Intimate: The Influence of the Pharmaceutical Industry on the Experience of the Everyday Nerves" as part of the LSU Chancellor's Distinguished Lectureship Series.

Healy is well-known for such critical examinations of the commercial side of pharmaceutical companies and his concern that academics are often pressured to present medications marketed by these companies in a positive light, despite negative findings as to their effectiveness. The most well-known of Healy's thirteen books, "Let Them Eat Prozac: The Unhealthy Relationship Between the Pharmaceutical Industry and Depression," studies the controversial aspects of the pharmaceutical industry and the history of many anti-depressant medications.

The birth of genes

The groundbreaking work of Mark Batzer, the George C. Kent professor of biological sciences, and his research team was featured on the cover of the May 23, 2006, issue of the Proceedings of the National Academy of Sciences. Batzer's paper revealed insight into the formation of new genes and provided a glimpse of our evolutionary history by reporting the birth of a new gene in the primate lineage leading to humans.

The study detailed the evolutionary process that resulted in the emergence of the SEIMAR gene 40 to 58 million years ago. Scientists have studied other methods of genetic innovation, but little has been understood about the way new genes are formed through fusion of a preexisting gene and coding material from other genetic elements. The work not only provides insight into the conditions required for a successful gene fusion, but it also suggests a mechanism by which the circuitry underlying complex regulatory networks may be rapidly established. For more information, visit www.batzerlab.lsu.edu.

Enhancing research and graduate student training

LSU and seven other Louisiana institutions received a prestigious IDEa Networks of Biomedical Research Excellence (INBRE) grant from the National Institutes of Health. Totalling \$16.9 million over a five-year period, the grant allows LSU and the LSU Health Sciences Center to be primary research partners that will provide infrastructure and mentoring expertise for faculty researchers at Southern University, LSU-Shreveport, Louisiana Tech University, and the University of Louisiana at Monroe. The goal of the project is to establish computation and communication networks and "people" networks in order to enhance biomedical research in the state.

LSU was also chosen by the NSF to receive a \$3 million grant for Integrative Graduate Education and Research Traineeships (IGERT), one of only 20 institutions chosen from 550 applications submitted from across the nation. The IGERT program offers training to doctoral-level graduate students in order to provide them with "the interdisciplinary background and the technical, professional and personal skills needed to address the global questions of the future." LSU's program focuses on computational fluid dynamics, bringing together engineers and biological, physical, and computational scientists.

Reducing traffic congestion

Most drivers know the disruptive effects of a congested and chaotic commute. Sudipta Sarangi, an assistant professor in LSU's Department of Economics, began working on solutions to calm drivers' nerves. He led a team of engineers and economists to minimize the tragedy of commons—a phenomenon that states when many in a community use a resource that no one owns, such as a public highway, the resource becomes overused. In Sarangi's project, traffic is the result.

Sarangi and his team examined the various decisions drivers must make when attempting to reach a destination. Without having to spend more public money on more roadways, they are hoping to develop several final solutions to alter the routes drivers can take. Solutions like dynamic toll prices, which are higher during peak driving times, and highway space inventory, which requires drivers to pay for a reserved driving space for certain times of the day, are just a sample of the solutions Sarangi and his team are working on to alleviate traffic congestion. For more information, visit www.bus.lsu.edu/economics.

Design for the Future

To better prepare their students for the demands of the real world, LSU's Department of Interior Design has taken a new outlook on their curriculum. After attending a three-day seminar hosted by the industry's leading designer of workplaces, Steelcase, Inc., LSU design faculty found out exactly what their curriculum needed. To initiate modifications, the department partnered with Steelcase in the hope that their students can learn key design skills needed for entering the workforce. One skill that Steelcase began instilling in design students was how to effectively observe people. As a key component to this design firm, observation methods along with effective and efficient space utilization are the most beneficial skills that these design students can master.

As Steelcase wishes to pass on its knowledge to this new generation of designers, the company also yearns to gain knowledge about this generation, called the millennial generation. Ultimately, this synergistic relationship between the Department of Interior Design and Steelcase, Inc. will provide valuable knowledge for both parties, more skills for students to tackle the demands of the real world, and allow Steelcase to learn about its new, soon-to-be clientele, the millennial generation. For more information, visit www.design.lsu.edu/interiordesign.htm.

The social fabric under stress

After being torn from their city, the displaced residents of New Orleans depended on many other communities across the U.S. to provide them a temporary home, inundating social services agencies and stressing communities. To examine the effects of displacement with particular interest in crime, a group of LSU researchers from the Schools of Human Ecology, Mass Communication and Social Work and the Departments of Accounting, Geography, History, Political Science, Psychology and Sociology formed the Crime and Policy Evaluation Research (CAPER) group.

Since its formation, the group has received grants from the NSF, the Metanexus Institute and the Louisiana Board of Regents to study issues related to crime, law and public policy. According to the group's studies and surveys, about one half of all Baton Rouge households took in hurricane evacuees and fear of crime increased during the population influx as it did during the serial killer era two years prior, but are returning to baseline levels. For more information, visit www.lsu.edu/capergroup.

Diversity matters in nature

A landmark study published in the January 27, 2006 issue of Science found that nature encourages diversity among trees. LSU Assistant Professor of Biological Sciences Kyle Harms was a principal collaborator on the study, which was conducted by 33 ecologists from 12 countries. An analysis of seven tropical forest plots around the world revealed that if a species was common in one part of a plot and rare in another, its death rate was higher where it was common. Researchers found that these effects are strong enough to increase local tree species diversity as trees age in all seven of the studied forests.

The study will guide further detailed investigations of the processes by which forest diversity is maintained and raises new questions and lines of research for ecologists and forest managers to pursue. For more information, visit www.biology.lsu.edu/webfac/kharms.

What lies beneath

The continental slope in the Gulf of Mexico, off the coast of Louisiana, is one of the most unique in the world. The blend of oil and gas seeps, silt, and sediment deposited by the Mississippi River makes the slope home to unique animal communities—communities that exist without sunlight. Harry Roberts, director of LSU's Coastal Studies Institute and Boyd Professor of marine geology and geophysics/sedimentology, and Bob Carney, professor of coastal ecology, spent one month below the surface to get closer to these communities.

Using Alvin, the submersible best known for exploring the wreckage of the Titanic, Roberts and Carney dove some 3,000 meters to examine the bacteria, tube worms, mussels, shrimp, crabs, fish, snails, and starfish that live in the most geologically complicated slope in the world. Along with advancing science, the results of this research could also aid the oil and gas industry, as well as the Minerals Management Service, which gives the oil industry permission to drill and lay pipelines on the Gulf floor. For more information, visit www.sc&e.lsu.edu.

Thinking globally

Last year, LSU launched an initiative to expose faculty and students to the educational system, business practices, and culture of China. The initiative gave birth to the LSU Modern Chinese Business and Culture Program. Groups of students were on board for a two-week study tour to explore Chinese business practices, as well as its unique culture, language, commerce, and arts.

Through the program, LSU hopes to play an integral role in US-China cultural and academic exchanges, relations, and economic growth. Future students will be better equipped to be global leaders and thinkers.

Studying the Atlantic's history and culture

Through a six-part lecture series last fall, William Boelhower, the Robert Thomas and Rita Wehta Adams Professor of English, introduced his vision of Atlantic studies to the LSU community. Boelhower's aim is to work closely with faculty from other departments on research projects and teaching assignments focused in Atlantic studies. Areas such as geography, cartography, history, anthropology, cultural studies, and languages will all be part of the interdisciplinary program. LSU's Department of English and Boelhower are working with many faculty across campus toward developing an interdisciplinary humanities curriculum in Atlantic studies.

The art of torture

Growing up near the border of Northern Ireland, LSU Assistant Professor of Art Malcolm McClay is no stranger to seeing the effects of conflict and war. In an effort to make people more aware of the horrors of torture, McClay collaborated with LSU Assistant Professor of Computer Science Brygg Ulmer to create a unique art exhibit called "Dog Tail Wars."

McClay and Ulmer created a kinetic sculpture of human forms, which resembled cocoons and hung from the ceiling. The forms were connected to a computer that is logged on to a Google site that searches the Internet for the word "torture." Driven by live content from 4500 news feeds of Google News, the forms inflated and jumped every time the word "torture" appeared in a news story. The art form brings visitors one step closer to understanding torture, a practice that has wielded its ugly head across many parts and times of the world. For more information, visit www.design.lsu.edu/artfac28.htm.

Advancing theoretical physics and quantum technologies

Last year, the Louisiana Board of Regents gave final approval for the creation of the Hearne Institute of Theoretical Physics at LSU. The institute supports and promotes basic interdisciplinary research in theoretical gravitational physics and the maturation of quantum technologies. Endowed by LSU alumnus Horace Hearne Jr., the institute brings together faculty from the Departments of Physics and Astronomy, Electrical Engineering, and Computer Science. Potential projects of the institute will range from developing quantum computers, which could be used by the National Security Administration to read covert communications of terrorists and drug dealers, and working with gravitational wave interferometers.

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