LSU College of Science

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E-NEWS

NEWS/EVENTS

LSU Professor Receives Grant for Childhood Cancer Research

A $500,000 research grant funded by the Department of Defense has been awarded to Wayne Newhauser, Charles M. Smith Chair of Medical Physics and professor of physics and astronomy. This two-year research project will investigate ways to improve the outcomes of childhood cancer survivors. "We have developed a method for predicting the risk of long-term side effects in children treated with radiation," Newhauser said. He will collaborate with colleagues from Northern Illinois University.

The research will focus on personalizing children's cancer treatment and care after the treatment has ended. A team of researchers from Mary Bird Perkins Cancer Center, LSU, the University of Texas MD Anderson Cancer Center and other research institutions will perform computer simulation and clinical trials to develop an evidence base to guide clinical and policy decision making.

More

LSU, CAMD and APS Co-Host 2012 IPAC Conference

The International Particle Accelerator Conference took place at the Morial Convention Center in New Orleans on May 20-25. This was the first IPAC to be held in the United States. IPAC'12 was sponsored by the Institute of Electrical and Electronics Engineers (IEEE), Nuclear and Plasma Sciences Society and the American Physical Society Division of Physics of Beams, and hosted by LSU through its synchroton light facility CAMD. A total of 1,160 people attended the conference, including students, supported students, industry exhibitors and delegates.

The conference provided accelerator scientists, engineers, students and industrial vendors the opportunity to meet and interact in a cheerful envrironment, encouraging the exchange of information and ideas across the broad spectrum of accelerator science and technology. The Morial Convention Center was the perfect venue, while the historic city of New Orleans offered all the necessary infrastructure to cater to delegates from all over the world.

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The Louisiana Fishes Exhibit is Now On Display

Hold your breath, and get ready to dive into the new Fishes exhibit at LSU's Museum of Natural Science. The exhibit, *Making a Big Splash with Louisiana Fishes,* is now on display and concentrates on fishes found in the Gulf of Mexico and the Mississippi River. The exhibit also presents the research being conducted worldwide by LSU fish scientists. Curator of Fishes Prosanta Chakrabarty and Curator of Paleontology Sophie Warny recieved a $120,000 teaching grant from the Lousisiana Board of Regents to develop the exhibit.

The Fishes Exhibit offers many features and activities, including: bioluminiscence in the deep sea, historical biogeography, flip panels on local ecosystems, four ecosystem models, a Gondwana map and a fascinating video about the fishes and the waters they live in. A number of online resources and activities to be used in ichthyology and evolution-related university classes as well as K-12 classrooms accompany the exhibit. More

ALUMNI

Jesús A. Fernández, who graduated fall 2011 with a Ph.D. in biological sciences, recently received the 2012 Wilks Award from the Southwestern Association of Naturalists for his presentation *Comparative Biogeography of the Arid Lands of Central Mexico.*

Ashley Pagnotta, who recently completed her Ph.D. in physics at LSU, worked with Professor Bradley Shaefer to solve the question of what produces thermonuclear, or Type Ia, supernovae. Their research was featured in *Nature*, one of the most prestigious scientific journals in the world. Pagnotta just accepted a post-doctoral fellowship to work at the American Museum of Natural History in New York City. More

KUDOS

Prosanta Chakrabarty, curator of fishes at the LSU Museum of Natural Science, discovered a fish in 2011 that became one of the top ten species of that year. The Louisiana Pancake Batfish, also known as *Halieutichthys intermedius*, is now being featured in the top ten species exhibit at the Museo Nacional de Ciencias Naturales in Madrid.

Michael E. Hellberg, associate professor and chair of biological sciences, recently particpated in a National Science Foundation panel to reveiw and evaluate proposals submitted to the Ocean Sciences Research Section as part of the merit selection process to determine awards.

COMINGS AND GOINGS

College of Science Names New Chemistry Chair

Luigi Marzilli, William White Tison Professor of Chemistry, has been appointed as the new chair of the chemistry department, beginning July 1. Marzilli will be replacing **Andrew Maverick**, who has held the chairmen position for six and half years. More

ALUMNI & DEVELOPMENT HIGHLIGHTS

Pioneering Research Collaborations

LSU Alumni Work Together with NASA to Study Bacteria in Space

Distinguished College of Science Alumna Cheryl Nickerson and Mark Ott have embarked on a ground-breaking research collaboration to examine what happens to superbugs in space to find potential cures for infectious diseases on Earth.

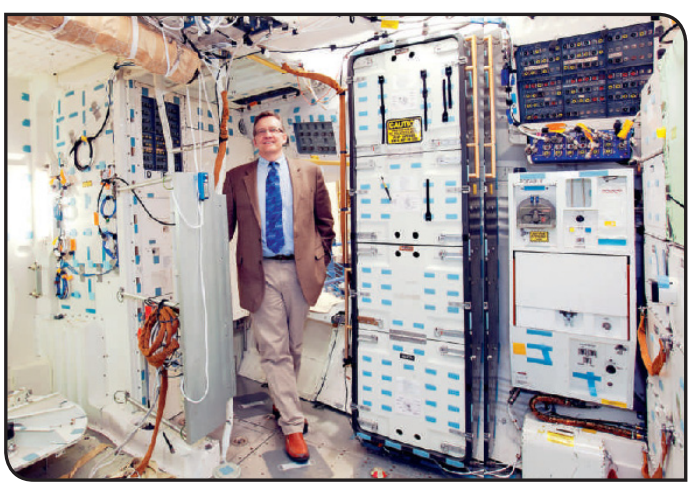
It all started about 20 years ago when Cheryl Nickerson met Mark Ott while working on her Ph.D. at LSU. Ott, who had a background in chemical engineering, taught Nickerson how to think mechanically and mathematically, while she taught him about genes and bacteria. Their paths separated when Ott took a position at NASA's Johnson Space Center in Houston, Texas, where he monitors bacterial contamination in the air and water of the Shuttle and Space Station. Meanwhile, Nickerson developed an interest in disease-causing bacteria, particularly salmonella.

Nickerson and Ott's paths eventually crossed in May 1998 during a phone conversation. Ott mentioned that space travel weakens astronauts' immune systems, while Nickerson knew this was only half of the equation. No one knew whether infectious bacteria would change in space too, and though an astronaut's defenses may be compromised, what happens to their attackers? Throughout history, many have flown bacteria into space. Aboard these crafts, bacteria were found to grow more quickly and become more resistant to antibiotics, but no one had tested their virulence - the ability to cause disease. Nickerson immediatley saw the potential and asked Ott, "When can we fly an experiment in space? We have to test this!"

Ott began introducing Nickerson to his colleagues at NASA, while Nickerson started building a case for sending bacteria into space by working out if they become more virulent in microgravity. You cannot switch off gravity on Earth, therefore Ott and Nickerson did the next best thing - they placed salmonella in special vats called rotating-wall vessels (RWVs). The rapid spinning walls subject cells to conditions akin to freefall. The bacteria changed dramatically, becoming tougher to kill and more virulent. By 2002, Nickerson aquired the evidence to prove that there was a need for actual experiments in true microgravity.

In September 2006, astronaut Heidemaria Stefanshyn-Piper submerged millions of *Salmonella typhimurium* into a nourishing liquid aboard the *Atlantis*. Back on Earth, Nickerson compared these microbes to counterparts that had been treated the same way in gravity-normal Orlando. The results were remarkable. The bacteria from the Shuttle had become more virulent. They killed half of the infected mice at a third of the dose and in five fewer days than those on Earth.

When Nickerson analysed the genomes of her space-faring salmonella, she found that their disease-causing abilities were triggered by changes in the activity of 167 genes. Key to these changes is a protein called Hfq, a master switch that governs the network of active genes. Nickerson also found that Hfq becomes far less active in space-faring salmonella. As a result, some of the genes it controls are switched off while others are switched on, including those involved in forming biofilms and responding to harsh environments. Nickerson confirmed the importance of Hfq by going back to the RWVs and lacing them with mutant salmonella that lacked this essential protein. Sure enough, the bacteria without Hfq never developed the hardiness and virulence common to normal ones.



Nickerson is very excited about Hfq, for it lords over the genes of a wide variety of living things and has changed very little though the course of evolution. Nickerson will soon publish evidence that Hfq controls the virulence of two other infectious microbes in space. "The evolutionary conserved master switch gives us a target to look at," Nickerson says. Drugs or vaccines that hit Hfq could acty as weapons against many infectious diseases.

During the Apollo missions, 50% of astronauts became ill during flight or on return. After the missions, NASA created strict screening to prevent astronauts from picking up infections. "We do an excruciating amount of monitoring of the crew environment," Ott explained. Despite intense cleaning, Ott still found dirty globules of water floating in the Mir space station, harbouring fungi, bacteria, mites, and parasites. The astronauts also have thorough check-ups, spending tens days in quarantine before flying. The procedures prevent fresh infections and any major threats, but they do nothing about the many microbes hidden in our bodies whose cells outnumber our own ten times over. "There are no sterile humans. Where ever we go, they go," Nickerson revealed.

Dr. Nickerson received her Ph.D. in Microbiology from LSU in 1994. Dr. Ott received his MBA in Business Administration from LSU in 1989 and his Ph.D. in Microbiology in 1998.

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