

Museum Quarterly

LSU Museum of Natural Science

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Museum of Natural Science Director and Curators

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Letter from the Director...

2009: A Good Year

Although 2009 was a grim year for the economy, it was a great year for the Museum. Let me count the ways.

Awards and honors abounded. Curator of Mammals **Mark Hafner** was voted a Fellow of the AAAS, and he received a "Dean's Commendation for Excellence in Teaching." Curator of Birds **Van Remsen** received the LSU Foundation Distinguished Faculty Teaching Award. Graduate student **Gustavo Bravo** received an Outstanding Student Presentation Award at the annual meeting of the American Ornithologists' Union. (LSU students have won this award four years in a row.)



Curator of Education **Sophie Warny** was elected to the board of the American Association of Stratigraphic Palynologists. Grad student **James Maley** received the T. Vinton Holmes Award and **HC Lim** received the Outstanding International Student Award from the LSU Department of Biological Sciences. Grad student **César Sanchez** received the Virginia L. Mouw Ornithology Award and **Luciano Naka** the Outstanding Graduate Student Award from the Museum of Natural Science.

Six students graduated. **Travis Atwood**, M.S. Geology & Geophysics; **Amber Gates**, M.S. Biological Sciences; **Curt Burney**, Ph.D. Biological Sciences; **Brian O'Shea**, Ph.D. Biological Sciences; **Thomas Valqui**, Ph.D. Biological Sciences; and **Michael Williams**, Ph.D. Geology & Geophysics.

Lots of grants were garnered. Curator of Genetic Resources **Robb Brumfield** received a \$750,000 NSF grant for the "comparative phylogeography of species with cross-Andes distributions". Robb also received an NSF grant with Biological Sciences professor Bryan Carstens for \$225,000. Grad student **Andrés Cuervo** received a prestigious NSF Dissertation Improvement Grant of \$15,000 for "a large-scale, multilocus, coalescent-based analysis of ecological zonation and population differentiation in Andean birds," as well as smaller grants from the AMNH's Chapman Fund and the Society for Integrative and Comparative Biology. Grad student **David Anderson** was instrumental in obtaining \$300,000 grant from Empresa Proprietaria de la Red Eléctrica for the conservation of the Honduran Emerald (*Amazilia luciae*) in Santa Barbara, Honduras. And grad student **Dency Gawin** obtained a \$192,000 fellowship from the Malaysian government to support her Ph.D. studies at LSU.

On the publication and public relations front, we were also on fire. Museum staff and students published some 50 articles in 2009 (see the list inside). Among these was **Sophie Warny's** cover article in *Geology*. **David Anderson** was featured on the cover of *Audubon* magazine (Nickens, T. E. 2009. "Where dreams come true." *Audubon* March 2009: 72-79). And **Van Remsen** and others were featured in the outstanding Louisiana Public Broadcasting special, "A Summer of Birds", about John James Audubon.

Now, if 2010 can also be as good...

Fred Sheldon



Fred Sheldon, museum director, with the museum's bird collection. Photo by Eddy Perez.

Sheldon Attempts to Preserve, Acquire Knowledge as Curator

Article by Catie Vogels, *LSU Reveille*

and grant writing, said her biggest accomplishment as a curator was discovering seven new species and a genus of dinoflagellates from sediment samples in Morocco.

"As a scientist, it is your dream to discover something," **Warny** said. "Each time you look at a new project, it's like a mystery."

Curators of the LSU Museum of Natural Science train graduate students and conduct research on their areas of expertise as well as accumulate specimens for the museum's vast collections.

As an ornithology curator, **Sheldon** is the overseer of the top bird collection in the nation and the head of the program that has discovered more new birds in the last 30 years than anyone else in the world.

"Stuff is happening here," **Sheldon** said. "It's an exciting adventure. Without it, I wouldn't know what to do with my life. Although this is a museum, the most active part of my job is the same as the mission of the museum: to acquire, preserve and research the specimen in the collections to generate new knowledge."

A large part of working as a curator for the museum is training graduate students and some dedicated undergraduate students to be professors and to perform research, **Sheldon** said.

"We make them go out in the field and do a 19th century exploratory adventure, usually to the tropics of Borneo," **Sheldon** said. "They collect animals and specimens in the field, return to Louisiana State University and perform 21st century cutting-edge molecular genetics. They do everything they have to do for a museum, but they know everything to be an up-to-date researcher."

Sheldon also manages the day-to-day operations of the museum, a component of the Louisiana Museum of Natural History, but he said his favorite part of being a curator is getting to be outdoors on the expeditions for species. "We're exposed to tons of diseases and dangers on our adventures," **Sheldon** said. "We travel, but we don't stay in the fancy hotels and stay on the beach. It's nice though. We get to see the sights, the natural sights. It's beautiful out there."

He didn't know he wanted to be an ornithology curator his whole life, **Sheldon** said. He never knew he could make a living out of his bird watching habit.

"It just kind of happened," **Sheldon** said. "I'm not like a lot of people that grew up collecting plants, animals and bugs. I never knew I could make a career out of it."

Frederick Sheldon, the LSU Museum of Natural Science museum director, opened a drawer to find a black-hooded oriole among three rows of brightly colored birds whose feet were tagged with miniscule handwriting.

"We don't have much space here at the museum for our collections," said **Sheldon**, genetic resources and ornithology curator. "We make do with what we have. There is so much the visitors of this museum don't see beyond the exhibits."

Sheldon said most museum visitors are children on field trips or families on school vacations.

"Although my favorite exhibit is the bird collection, most people come to see the original Mike the Tiger," **Sheldon** said.

Located at 119 Foster Hall, the majority of the museum's exhibits are dioramas created in the 1950s, **Sheldon** said.

The newest exhibit, "Experience Antarctica," was the first new exhibit in 50 years and was begun by **Sophie Warny**, museum palynology and education curator.

Warny said she created the Antarctica exhibit from a research project funded by a National Science Foundation grant.

"You'd better love your job as a curator," **Warny** said, "it's a lot of hours and a lot of grant writing and services to the University, in addition to the research and the education of undergraduate and graduate students." "To be able to manage such a demanding job, and still be a good mother to your children requires quite a bit of organization," she added.

Warny, no stranger to hard work, difficult research

LSU Museum of Natural Science to Play Major Role in Creation of “Genome Zoo”

By Ashley Berthelot

In the most comprehensive study of animal evolution ever attempted, an international consortium of scientists plan to assemble a genomic zoo – a collection of DNA sequences for 10,000 vertebrate species, approximately one for every vertebrate genus. And thanks to its Museum of Natural Science, or MNS, and its collection of genetic resources, LSU is poised to play a major role in this record-breaking project.

The “Genome 10K Project,” launched in April 2009 at a three-day meeting at the University of California, Santa Cruz, has the goal of gathering specimens of thousands of animals from zoos, museums and university collections throughout the world and then sequencing the entire genome of each species to reveal its complete genetic heritage. Because LSU’s Museum of Natural Science is home to the largest collection of vertebrate tissue samples in the world, it will be responsible for providing up to half of the samples necessary to complete the massive research undertaking.

“Our vertebrate collection, the largest of its kind in the world, is the crown jewel of the Museum of Natural Science,” said **Fred Sheldon**, MNS curator and participant in the Genome 10K project. “We already act as a sort of international genetic library, lending our samples across the world as part of our contribution to the scientific community. That such an impressive, ambitious research project is relying so heavily on LSU is just one more reason why folks in Louisiana should be proud of their flagship university.”

Calling themselves the Genome 10K Community of Scientists, or G10KCOS, the group outlined its proposal to sequence 10,000 to 15,000 vertebrate genomes

in a paper published in the Nov. 5 issue of the “Journal of Heredity.”

Participants expect the Genome 10K Project to create a foundation for understanding the genetic basis of recent and rapid adaptive changes within vertebrate species and between closely related species. The results can help conservation efforts by enabling scientists to predict how species will respond to climate change, pollution, emerging diseases, and invasive competitors.

The consortium agreed to a set of guidelines for sample collection, including the types and volumes of tissues, recommendations for preservation and documentation, and adherence to national and international statutes regulating the collection, use, and transport of biological specimens. Where possible, specimens for each species include both males and females and reflect geographic diversity or diversity within localized populations.

Because the evolution of species living today involved ancient genetic changes still preserved in their DNA, the Genome 10K project can help uncover answers to longstanding questions about the history of evolution. Having full genomes at hand will enable detailed studies of base-by-base evolutionary changes throughout the genome.

The project was conceived by the paper’s three lead authors: David Haussler, professor of biomolecular engineering at UC Santa Cruz; Stephen J. O’Brien, chief of the Laboratory of Genomic Diversity at the National Cancer Institute; and Oliver A. Ryder, director of genetics at the San Diego Zoo’s Institute for Conservation Research and adjunct professor of biology at UC San Diego.



A sample of the museum’s bird collection. Photo by Eddy Perez.

In addition to lead authors and LSU's **Sheldon**, other coauthors of the paper who also served as committee chairs include F. Keith Barker of the University of Minnesota; Michele Clamp of the Broad Institute of MIT and Harvard; Andrew J. Crawford of Universidad de los Andes, Bogotá, Colombia; Robert Hanner of the Biodiversity Institute of Ontario, University of Guelph; Olivier Hanotte of the University of Nottingham; Warren E. Johnson of the National Cancer Institute, Laboratory of Genomic Diversity; former LSU professor Jimmy A. McGuire of the Museum of Vertebrate Zoology, University of California, Berkeley; Webb Miller

of Pennsylvania State University; Robert W. Murphy of the Royal Ontario Museum, Toronto; William J. Murphy of Texas A&M University; Barry Sinervo of UC Santa Cruz; Byrappa Venkatesh of the Institute of Molecular and Cell Biology, Singapore; and Edward O. Wiley of the Natural History Museum and Biodiversity Research Center, University of Kansas.

For more information about the Genome 10K project, visit <http://genome10k.soe.ucsc.edu/>.



Museum's collection of genetic resources, largest of its kind, expected to provide approximately half of the specimens for project. Photo by Eddy Perez.

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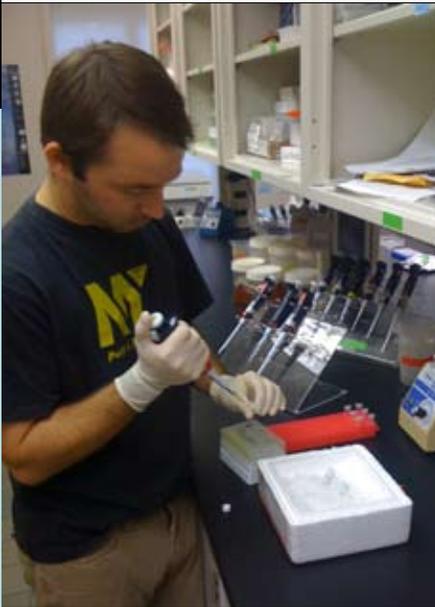




LSU to Aid ‘Genome Zoo’

Program to use LSU MNS’s massive tissue collection

Article by Jordan Blum, *The Advocate*



John McCormack
working in the lab.
Photo by **Dr. Robb Brumfield.**

LSU is expected to provide much of the DNA and tissue specimens for a new international project to assemble a “genome zoo” of 10,000 vertebrate species.

The nearly 70-scientist team published its “Genome 10K Project” proposal today in the *Journal of Heredity*, an academic periodical published by Oxford University in the United Kingdom.

Genome 10K is planned as an ambitious follow-up to the highly publicized Human Genome Project completed in 2003 that identified and sequenced the more than 20,000 genes in human DNA.

“If you know the DNA sequences for all these animals, you can know a huge amount about their genome pathways ... and evolutionary history,” said **Fred Sheldon**, director of the LSU Museum of Natural Science and curator of genetic resources.

Practical ramifications could range from wildlife and ecological preservation improvements to the better understanding of human diseases through animal evolution, **Sheldon** said.

The project began in April out of the University of California at Santa Cruz and quickly involved a number of biological scientists and computer scientists worldwide.

“The only other thing they were missing was the animals,” **Sheldon** said.

And that is where LSU came in. “LSU has the world’s largest collection of wild vertebrate tissues,” **Sheldon** said.

The LSU Museum of Natural Science in Foster Hall houses about 200,000 tissue samples from 100,000 animals and nearly 6,000 species, **Sheldon** said. The collection began more than 30 years ago.

So, hypothetically, LSU could provide the tissues for about half of the Genome 10K animals, he said.

LSU’s collection specifically offers huge amounts of bird, reptile and amphibian tissue samples, he said.

“This is a pretty big, high-profile project for us,” **Sheldon** said. “It’ll be the biggest, one-time project we’ve done.”

UC-Santa Cruz, where the project originated, is touting Genome 10K as the “most comprehensive study of animal evolution ever attempted.”

David Haussler, a lead researcher and UC-Santa Cruz professor of biomolecular engineering, said in a university release that technology has advanced to the point that genome sequencing now can produce much more data much faster than with the Human Genome Project.

“For the first time, we have a chance to really see evolution in action, caught in the act of changing whole genomes,” Haussler said.

All of this will lead toward a much better understanding of how humans evolved as well, he said.

Sheldon said it may be five years before the Genome 10K is moving at full steam because some of the “third generation” DNA sequencing technology is still in development.

Instead of just providing massive fragments of data that must be tediously pieced together, **Sheldon** said, the newer technology will produce DNA sequences in their nearly whole forms.

Although there is a 10,000-species goal, Haussler said in the UC-Santa Cruz release, preliminary meetings have indicated that closer to 16,000 animal species could have their DNA sequences completed by the end of the project.



LSU Ichthyologist Lands Major Grant to Study Fish Family History

Also discovers two new species of angler fishes native to Louisiana

By Ashley Berthelot

Photo credit: Eddy Perez

Prosanta Chakrabarty has been curator of ichthyology, or fishes, at the LSU Museum of Natural Science for a little more than one year, and he's already landed two major catches: a large grant from the National Science Foundation, or NSF, and the discovery of two new species of fish found in Louisiana.

The two new species were discovered when **Chakrabarty** and a Taiwanese colleague, Hsuan-ching "Hans" Ho, were looking through jars of batfish collected from the Gulf of Mexico.

"We realized that what was thought to be one widespread variable species was in fact three species," he said. On his first opportunity to do so, **Chakrabarty** jumped on a research vessel trawling off the coast of Louisiana and managed to collect fresh specimens of the new species he is describing. "Most people in Louisiana probably don't know that there are new species of fish right here in our state," he said.

The grant, titled "Reconstructing Heroini (Teleostei: Cichlidae) – Of Heroes, Convicts, Angels and Red Devils," gives **Chakrabarty** approximately

\$520,000 from the NSF and will fund his ambitious and ongoing efforts to untangle and update the complex genetic heritage of heroine cichlid fishes. It also has the potential for supporting the discovery of additional new species.

"Getting a grant this large that focuses on taxonomy is very unusual – it's kind of a dying art," said **Chakrabarty**. "The funds will help me to do a great deal of taxonomic work, as well as hire post-doctoral students and train workers from some of the areas I collect specimens from."

Cichlids are some of the most popular recreational and aquarium fishes in the world. With more than 2,000 species of cichlids, most carrying unique names like the Jack Dempsey and the Red Devil, they attract a near cult following. They also possess an unusual degree of intelligence. That, paired with the fact that cichlids have the longest period of parental care, keeping watch over offspring until adulthood, makes people feel more attached to these fish than many other families.

“Going back and changing names for fish as popular as these is no easy matter,” said **Chakrabarty**. “Renaming some of these is going to cause me a lot of grief. It’s like changing a long-standing tradition to some people – to them, it’s just better left alone.”

But a better understanding of this fish family could translate to a better understanding of the planet we live on, and perhaps, even of our own human history.

“Cichlids have been around since all the Southern Hemisphere continents were one,” said **Chakrabarty**. “Understanding their current distribution gives us a better idea of how Earth history has changed over millions of years.” For instance, Cuba was once two islands, and the island of Hispaniola was three separate landmasses. “You can still see fossils from the ocean floor on the highest peaks of mountains there.”

Geography plays an interesting role in the life of cichlids, which are primarily freshwater fish, though many species of the family appear exotic, more like saltwater species.

“Freshwater is rare in the world. That’s hard for most people to comprehend,” said **Chakrabarty**. “If the world’s water supply fills a bathtub, a scooped handful would be all the freshwater available. However, out of the 25,000 named species of fish described, around half of them are freshwater, so it produces incredible diversity.”

But because geography places insurmountable limitations on freshwater fish – in other words, most freshwater species cannot live in saltwater, so they are restricted to the landmass on which their native lake or water supply calls home – it helps researchers identify species.

“We can tell that the species of blind cave fish we discovered in Madagascar are related to the blind cave fish we find in Australia,” said **Chakrabarty**. “They all originated from the same place, and because they’re freshwater, we know they didn’t simply



Curator of Fishes, **Prosanta Chakrabarty**.

swim across the ocean. It’s basically direct proof that those two landmasses were connected at some point in history.”

In addition to supporting this exhaustive taxonomic work, the NSF grant funds student workers, from high schoolers to undergraduates, graduate students, and post-doctoral researchers. **Chakrabarty** plans to identify and train a few Latin American students from areas where he typically collects specimens, as well, in order to train them in the United States and send them back home with the tools necessary for scientific study. **Chakrabarty** said that local people often recognize species that scientists don’t even know about, so by nature they are very good natural historians. Further training, he said, adds to the global scientific collective, because these Latin American countries are awash with biological diversity.

“We want to teach people about their own native fishes. We collect with locals, so we want to bring some students back to learn microscopy, molecular work, and other complex skills, to add value to the education they already have,” said **Chakrabarty**. “You can’t recognize diversity without being familiar with your own.”



A specimen from the museum’s ichthyology collection.



Another specimen from the ichthyology collection.

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Special Saturdays at the MNS



Louisiana Archaeology

The LSU Museum of Natural Science Education Office held one of its Special Saturday events on November 21, 2009. The special guests were **Dr. Rob Mann**, Ph.D. Southeast Regional Archaeologist and **Dr. Rebecca Saunders**, Curator of Archaeology. **Dr. Mann** and **Dr. Saunders** told the young scholars about the customs of Louisiana's people. The participants learned to use real Native American pump drills and created art using original Native American pottery patterns.



Glowing Fishes

Another Special Saturday event was held by the LSU Museum of Natural Science Education Office on December 5, 2009. The special guest was **Dr. Prosanta Chakrabarty**, Curator of Ichthyology. **Dr. Chakrabarty** showed the young scholars amazing creatures that have developed the ability to use chemicals within their bodies to produce light; through a process known as bioluminescence. The participants made their own glowing creatures using Styrofoam and lanterns.

One of MNS's Own Honored with the rank of "Fellow" by the American Association for the Advancement of Science!



Curator of Mammals, Dr. Mark Hafner.

Mark Hafner was one of eight LSU researchers honored by the AAAS. He is LSU's newest AAAS Fellow for the field of co-evolutionary biology. He also received a "Dean's Commendation for Excellence in Teaching."

Congratulations to Mark on all of his outstanding accomplishments!

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If you would like to include items in the next issue of *Museum Quarterly* please send information, articles and photographs to the Museum Education Office c/o Mary McNeely, public relations intern. Articles about research, study or any other items of interest are encouraged. Information may be submitted as completed articles with jpeg pictures in attachments, or in list form to be put into article. Simply email your material to mmcnee1@lsu.edu or mail to:

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