

# 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...

I was very pleased to learn that later this Spring, LSU will be presenting former MNS Director Dr. John P. O'Neill with an award recognizing his distinguished career at LSU. John's contributions to ornithology and conservation are known worldwide. He was the founder and leader of the Museum's field research program in Peru, and without his initial stimulus and his long-term success at procuring funds from both public and private sources, the LSU ornithology program would not have the international prestige it has today. John was instrumental in launching our ornithological field program in South America in the 1960s. John has published many dozens of scientific papers, mainly on the taxonomy and distribution of birds of Peru, as well as the milestone book, *The Birds of Peru* (Princeton U. Press, 2007), which was instigated, co-authored, and co-illustrated by John, and which represents the culmination of his 40+ years of fieldwork and the research of others made possible by him. John is a living legend, an explorer, a natural historian, a giant in the field of ornithology, and an award-winning wildlife painter.



John P. O'Neill, painting in his studio

As you read through this issue of the *Museum Quarterly* I think you will be struck by how much the Museum has grown and prospered over the years, all the while upholding biological research collections as the centerpiece of how we do science. The Museum is now conducting general collecting expeditions all over the globe, with projects going in the Democratic Republic of Congo, Papua New Guinea, Borneo, Brazil, and, of course, Louisiana. We are training students in collections-based research and they are bringing these skills with them to prestigious postdocs and faculty positions.

I am thankful not only for John O'Neill's contributions, but for all of the MNS curators, staff, students, friends, supporters, and LSU administrators over the years who recognized how crucial biological collections and the '-ologies' are to science. Science is thriving at the MNS. Check out the publication list on page 24 of this issue and you'll see what I mean.

Robb Brumfield

# Adventures in Mammalogy: An expedition to Africa's Albertine Rift

by Terry Demos

Beginning in October of last year I led a two-month collecting expedition for small mammals in the montane rainforests of the Albertine Rift in eastern Democratic Republic of Congo (DRC). This was the first extensive fieldwork carried out on African mammals by LSU MNS and was a unique opportunity to expand the breadth of the MNS collections in a biologically underexplored part of the world. The collections from this trip contributed to several ongoing projects and collaborations in the Esselstyn Lab that seek to increase our understanding of the biogeography and evolutionary history of African mammals, uncover evolutionary relationships in the most species-rich genus of mammals – *Crocidura*, and most fundamentally, provide additional baseline molecular, taxonomic and ecological data on the fauna of a highly threatened and mega-diverse biological hotspot.

My interest in east African mammal diversity began during my PhD research at the City University of New York where my focus was on the comparative phylogeography and historical biogeography of rodents and shrews in the Albertine Rift and Kenyan Highlands. When the opportunity to work at LSU, where biodiversity surveys, cut-

ting edge evolutionary research and “old-fashioned” basic taxonomic work are priorities, I jumped at the chance.

**Jake Esselstyn** (MNS mammal curator) and I decided to focus our efforts on the still hardly explored lower montane forests of the western DRC Albertine Rift. In particular we wanted to obtain shrews from previously uncollected regions and habitats along the ecological gradient that extends from the Congo River Basin lowland rainforest to the west into the montane forests in the east. These mountains and the valley dividing them hold 4 of the 5 African Great Lakes and make up the Albertine Rift. The Albertine Rift extends

for 1200 km along the eastern edge of the Congo Basin from Uganda and DRC in the north to northern Zambia in the south. The rift is literally the result of the African continent pulling itself apart over millions of years and is the only substantial continental rift zone of its kind in the world. It is understandable that the region has seen little biodiversity exploration compared to equivalent regions such as the Andean highlands, given the protracted civil wars



**Above:** Crossing the Kalundu River, where we captured the Giant Otter Shrew  
**Top:** Itombwe Mountains





CRSN-Lwiro mammal museum

and terrible violence that the region has seen. It is only recently that extensive fieldwork has been possible and even now this takes detailed advance planning in close collaboration with Congolese colleagues. Nevertheless, the lure of the region for a biologist who wants to understand how species are formed, maintained, and co-exist is obvious. A recent global survey of 288 biodiversity hotspots reported the Albertine Rift to be the most species rich per unit area for mammals in the world (Mazel *et al.* 2014).

My journey began with a flight to Rwanda (no airlines currently fly to eastern DRC) followed by an 8-hour drive to the Centre de Recherche en Sciences Naturelles (CRSN) – Lwiro, DRC where I met co-team leader Dr. Prince Kaleme, Head of Mammalogy. CRSN, where I was based, is a sprawling scientific research center built by the Belgians in the 1930’s on the shores of Lake Kivu and which has miraculously survived completely intact through the civil wars. Dr. Kaleme is one of a very few new generation DRC PhDs trained as organismal biologists. Before starting on our expedition, we spent 2 weeks on logistics in-

cluding obtaining supplies and additional equipment, and gathering a team for our first trip to the Itombwe Massif 200 km south of CRSN.

The Itombwe Massif is a montane region of about 8000 km<sup>2</sup> containing some of the last viable populations of eastern lowland gorillas (*Gorilla beringei graueri*) in DRC and was recently declared a Conservation Reserve. The region remained essentially biologically unexplored until about 15 years ago. Our team consisted of Prince, Jacques Mwanga – CRSN Mammals Collection Manager, two mammal assistants from CRSN, Chance – an ornithology student at CRSN who would be collecting birds, Ngera – an entomologist funded by a German researcher, and 7



Left to Right - Ngere, Jacques and Prince at the prepping table

various field assistants, cooks, and rangers from the village of Mwenga at the edge of the reserve. Finally after bargaining over a price, we gathered 20 local porters and the entire group walked 25 km to what had looked to be intact lower montane rainforest at 1400 m on Google Earth.

In the past most of the journey could have been made by vehicle, but the road has fallen into ruin and is impassable by even a 4-WD. The site we had decided on in advance did not disappoint. We set camp near a river in a dense, beautiful montane forest of giant tree ferns (*Cyatheales*) and 40 m tall *Podocarpus*. We promptly set out a mix of pitfall bucket lines for shrews and small rodents, trap lines, mistnets and camera traps. Over the next 10 days we caught approxi-



CRSN-Lwiro research station: one of the largest in Africa

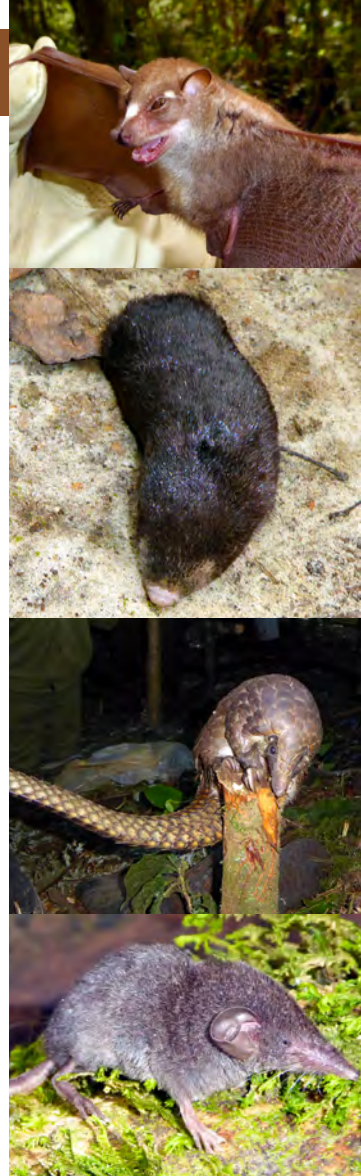


mately 25 species of shrews, rodents, and bats. Among our most exciting finds were two poorly known and strange mammals – a Giant Otter Shrew (*Potamogale velox*), which is actually neither a shrew nor an otter, but a Tenrec whose closest relatives are restricted to Madagascar, and several Hero Shrews (*Scutisorex somereni*) who have a bizarre, massively enlarged spinal column which can “heroically” withstand the full weight of a native tribesman of the region standing on it, hence the common name. Also, we were baffled by the identity of a series of small pollen-eating fruit bats weighing about 80 g. These looked to be from the monotypic genus *Megaloglossus*, but their external measurements were well outside that species’ documented range based on available taxonomic keys. Sequencing of a DNA barcode gene that is underway now should help determine whether these specimens, as well those of an unusually long-tailed shrew from Itombwe, are new to science or are relative “giants” from populations at the eastern limits of their respective ranges.

We returned to CRSN and prepared for the final segment of our surveys on the slopes of Mt Kahuzi (3307 m), an extinct volcano in Kahuzi-Biega National Park and a World Heritage Site. Although previous surveys by CRSN and U.S. colleagues documented small mammal diversity at mid-elevations, we were interested in finding out what diversity occurred on Mt Kahuzi at 2400 m and higher as well as targeting stream/swamp specialist mammals. We included a focused effort on the bamboo forests of the mountain where the micro-endemic semi-arboreal Bamboo

Climbing Mouse (*Dendromus kahuziensis*) was described in the 1960’s based on the only two known specimens. Three weeks collecting on Mt Kahuzi yielded remarkable shrew diversity, which was one of the goals of the expedition. From this single mountain we collected individuals from 7 of the 8 African shrew genera including *Crociodura*, *Sylvisorex*, *Suncus*, *Myosorex*, *Scutisorex*, *Paracrociodura*, and *Ruwenzorisorex*. This diversity is a good indication of the habitat and topographic complexity of the region as well as its evolutionary and conservation significance within tropical Africa. We never did catch the elusive Mt Kahuzi Climbing Mouse but I had the incredible luck to come upon a freshly killed individual of a second otter shrew species that is restricted to the Albertine Rift, *Micropotamogale ruwenzorii*. While setting out a streamside trap line in bamboo

forest at 2500 m I interrupted an unknown predator in the midst of what looked from a distance to be a rat dinner. On closer examination I was thrilled to see that it was a Ruwenzori Otter Shrew, an exceedingly rare specimen indeed, as there is only one other specimen housed in a U.S. museum. None of the DRC team had ever trapped or seen one alive, making this find exciting for everyone involved! Altogether we collected over 750 specimens from the Itombwe Massif, Mt Kahuzi, and CRSN grounds representing ~ 45-50 species. Because of the cryptic nature of many of these taxa, we won’t be able to definitively assign all individuals to species until we complete more detailed genetic and cranial morphological studies. Nevertheless, we already know that many new species have now been added to LSU MNS collections, and that publications resulting in part from this work should shed more light on the evolutionary dynamics of an irreplaceable and still barely known global hotspot of biodiversity.



Terry holding a Giant Otter Shrew (*Potamogale velox*)

# MNS Establishes an Antique DNA Laboratory

by Jake Esselstyn

Natural history museums like the MNS contain vast collections of specimens that were preserved before genetic data were routinely collected by biologists. These museum collections contain a massive archive of degraded genetic information that has been sheered into short fragments by light, humidity, and other environmental variables acting over decades. Until very recently, this genetic information had been locked up and inaccessible to researchers. But recent advances in DNA sequencing technology coincidentally use short fragments of DNA to determine the genetic code of organisms. In fact, modern lab techniques for preparing high quality DNA for sequencing require that the genetic strands be cut into short fragments, mimicking what happens to DNA preserved in a museum skin over many years. This is a fortuitous development for natural history museums, because researchers are now gaining direct access to historical measures of genetic diversity and genetic changes that take place over decades, all by isolating DNA from museum skins and skeletons.

Isolating and enriching this “antique” DNA requires a clean laboratory space free from modern, intact DNA and PCR products, which tend to contaminate the samples of older genetic material. At the MNS, we’ve just cut the proverbial ribbon on our new antique DNA lab, which we built in what was previously storage space for field equipment and photo files. In the new lab, students can now isolate genetic material from small pieces of skin, toe pads, and bits of muscle stuck to skeletal specimens, without worrying about contamination from our main genetics lab. This opens a wealth of opportunities for answering previously inaccessible questions in evolution and ecology, while adding value to our research collections. Importantly, this development represents a classic case of how museum specimens hold value that cannot be anticipated at the time they are preserved.



Above: Valerie Derouen testing out the new lab equipment.



# Caving in Northern Alabama

by Prosanta Chakrabarty



In May I felt the twinge of wanderlust that sometimes takes over me: I needed to get out into the wilderness, and see things others had not seen. Luckily I received an invite to do just that, even though it was in perhaps the most ordinary place on Earth - Scottsboro, Alabama. It was a place I knew little about, that perhaps few besides its own residents know much about. But this was a wonderful place; home to the southern most stretch of the Appalachians, it looks like something closer to the Smoky Mountains than the bayou. The fog is thick, the mountains tall and verdant, the air a refreshing cool. I was here to go caving and, of course, to look for cavefish.

Louisiana has caves, but no cavefish - a great disappointment. Alabama has caves, and perhaps an undescribed diversity of cavefishes - a great surprise. I'd fallen in love with caves in Madagascar, where I had first encountered them. I had been wholly unprepared then. Those Malagasy caves, full of strange life - odd birds, angry eels, giant-white-hairy spiders, big snappy crustaceans - was so new and unknown that I thought I was in Conan Doyle's 'Lost World.' Madagascar got me hooked on caves for life. When Dr. Matthew Niemiller, one of the world's preeminent young cave biologists, invited me to "no-where Alabama," I happily accepted.

Scottsboro is relatively close to Tuscaloosa; home to our LSU football (if not academic rivals) at the University of Alabama. I stopped over to visit their Museum of Natural History on my drive up from Baton Rouge. I found their museum quite beautiful, and their fish collections (in another building) in a much better housing than my own. I was glad to see our rivals on their own turf; and I was quite envious of their collections space and the wonderful Randy Singer, their collections manager, who was showing me around. After that brief visit I continued my drive to northern Alabama. I knew I was in cave country when the thick fog rolled in, I started to see limestone in the rock formations, and my car was pushing the limits climbing steep mountain passes.

Our target was Limrock Cave, and Dr. Niemiller and colleagues from Auburn joined me near there in Scottsboro. Auburn recently provided their fish curator, Jon Armbruster, with a new building of which I am also extremely envious. (I hope someone out there is getting the hint.) Jon brought along his students Pam Hart and Charles Stephen. I met up with them that first night and was amazed to learn that Charles had not only also went to McGill University like me for undergrad, but also the same tiny Macdonald College campus. He studies pseudoscorpions, of which I know nothing, to his and my great disappointment. These little critters are very

cool, especially, like most other things, the cave adapted forms.

After gearing up and a short hike we were at our target, Limrock Blowing Cave. It was pretty amazing. Rather than the homogenous setting I expected from a North American cave there was quite a lot of habitat diversity, with deep mud in some spots, long windy paths, cool clear water in streams and pools, boulders in collapsed sections (“breakdowns”), narrow passages we could barely squeeze through and great big stalagmite and stalactite chandeliers in large open spaces - and always that utterly complete darkness and silence. Thank goodness for our headlamps and spare batteries. I would occasionally turn off the light and sit quietly just to take in how very dark, cold and quiet it was. The entire cave was nearly 10,000 feet in length, with lots of odd turns, tight crawls, high waters, and cold temperatures to give you enough of a thrill to make you feel like you are on an adventure. But there were also a great many cave animals, wholly unfamiliar to me. We looked for everything, insects, crawfish, spiders, salamanders and fish. We found a great many of these. What we didn't find are bats; there was plenty of evidence that they were once there in great numbers but they became extirpated due to the scourge of the deadly white-nose syndrome.

Earlier this year Matthew and I described a new species of cavefish from Indiana, that we named *Amblyopsis hoosieri*, the Hoosier Cavefish. This odd creature garnered us some press because according to some reporters it looks like the human male's reproductive organ. It is also the first cavefish described from the U.S. in 40 years and its anus is positioned directly behind its head – an odd place even for a fish (some reporters dubbed this a “neck anus”). North America actually has a great many cavefish species, at least compared to the poorly known stygobitic fauna of the rest of the globe. Matthew, on the strength of DNA evidence noted that the cavefish from north of the Ohio River (in Indiana) were quite distinct from those from south of the river (in Kentucky). This evidence set up an easy species description based on morphology of the new Indiana species to distinguish it from the species in Kentucky. It was also pleasing to name a new fish species after the birthplace of American ichthyology. We named the new species, *Amblyopsis hoosieri* after the “Hoosiers”



**Above:** A little blind cave crawfish. I did not eat it, but I thought about it.

**Page 6:** Charles in a tight spot.

of Indiana University because the new species is found very close to IU and because David Starr Jordan had once been university president. Jordan is also the most recent common academic ancestor to most, if not all, practicing North American ichthyologists. (He also was a social Darwinist, and may have killed off the founder of Stanford University shortly after he took over as president of that university). In addition, the first female ichthyologist, Rosa Smith Eigenmann, wife of another noted Indiana ichthyologist, Carl Eigenmann, were also at IU. We named the new Indiana species to make note of the strong influence of IU on American ichthyology. I wanted to collect some of these North American cavefish for the first time so I travelled to Scottsboro, Alabama.

Again we saw a great many cave adapted species from salamanders, to blind pigment-free crawfish, to Charles's pseudoscorpions, to machete-wielding-Alabama hill people. I wore a double-layered wet suit with kneepads, helmet and lamp and I was sort of prepared for the cold and darkness of the cave, still I was having too much fun to notice any discomfort. We were after *Typhlichthys subterraneus*, which oddly for a cavefish is found in a rather wide and disjunct distribution. We found only three specimens all within an hour time span of the five hours we were in the cave. Each capture



was thrilling. These blind depigmented thumb-sized fish were not hard to capture once you found them: a quick flick of the dip net was enough to bag one. Being blind and not used to predators chasing them, they were basically sitting ducks. I had the privilege of being there when two of them were caught. (I can claim only a single assist when I whiffed after kicking up one cavefish out of the depths with my boots, and which Jon Armbruster deftly captured– he caught all three.) It was a great deal of cold, wet, fun.

Scientifically, it is unclear the significance of these specimens as of yet and I should say this is a Master's student's project at Auburn. I can say I am hooked again on cavefish and have some interesting Mexican material I can't wait to tell you about. I'll save that for another time.....



**Above:** Target organism captured.



# Ornithological Expedition to Mt. Mulu, Malaysian Borneo

by Ryan C. Burner

In June 2014 LSUMNS ornithology graduate students **Vivien Chua** and I traveled to Mt. Mulu National Park, a protected 7,795 ft. (2,376 m) mountain in the state of Sarawak, Malaysian Borneo. In the several months that followed we were joined by fellow graduate students **Paul van Els** and **Matt Brady**, as well as recent LSU undergraduate **David Bernasconi**. Our mission was three-fold: to collect tissues and skins of high elevation species to contribute to the Sheldon lab's ongoing reconstruction of the history of SE Asian avifauna, to preserve stomach contents and fecal matter for molecular diet analysis of these same species, and to survey bird communities quantitatively across Mulu's entire elevational gradient, the first-ever survey of its kind on the island of Borneo.

Mt. Mulu isn't accessible by road, so rather than take a 40 minute flight from the town of Miri on the coast of Borneo we loaded our equipment, collecting supplies, and several months worth of non-perishable food onto a 4WD truck and traveled along logging roads to the village of Long Terawan. After a lunch of monkey meat over rice (or was it civet? Our host couldn't quite recall) we chartered a longboat for a beautiful three hour ride on Sungai (river) Tutoh and Sungai Melinau under clear skies and the shadow of the approaching mountain.

In contrast with many of the sites where we often work in Borneo, Mt. Mulu is a popular tourist destination, and the national park facilities at the base of the mountain are excellent. In between our many expeditions up to remote sites on the mountain we were able to enjoy a variety of wonderful food in the cafeteria and develop friendships with the very hospitable Malaysian staff, as well as the local blowgun-toting Penan tribe. The Penan also served as our guides and accompanied us on our regular 1-2 week trips into the forest, during which we slept in simple elevated structures maintained at several points along the trail to the summit, or built our own camps while working far off trail.

Mt. Mulu is most famous for its extensive cave systems, some of which rank among the largest in the world, and for the millions of bats that exit the caves in continuous streams lasting several hours each evening, in preparation for foraging on insects across Sarawak. The bat phenomenon was indeed a spectacle to behold! But what drew us to Mt. Mulu as ornithologists was the intact primary rainforest that extends from near sea level at the base of the mountain all the way to the summit. Over the last 50 years Borneo has lost most of its undisturbed forest to logging and oil palm plantations, particularly in the lowlands, so Mulu's rare intact elevational forest gradient provided an invaluable opportu-

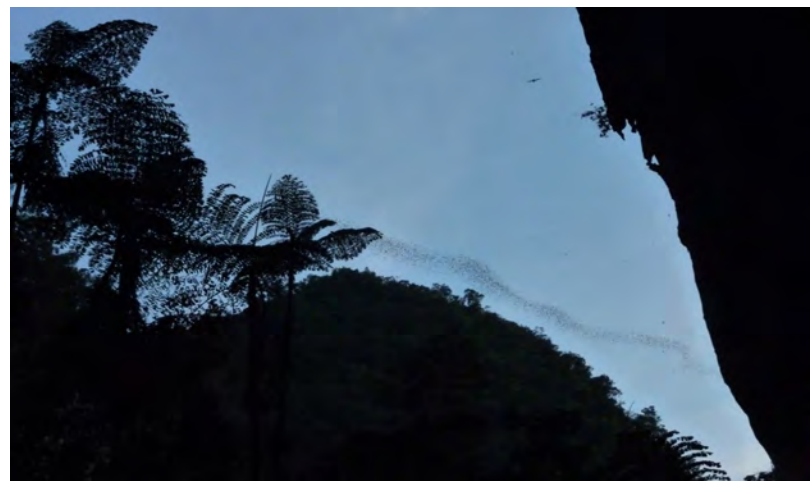




nity to study the ecology of bird communities as they have existed for millennia.

In the field, our daily routine consisted of simultaneous surveys and mist-netting beginning early in the morning. One of our guides and I would set off before light to conduct ‘point counts’, following transects at a variety of elevations and stopping every 200 m to count birds seen and heard during a 6-minute period, as well as to measure vegetation. We would navigate the steep slopes and slippery rocks until early afternoon and then return to camp for a break. Meanwhile, the rest of the crew would have opened mist nets at first light and be busy preparing specimens. This work would continue for a week or two until, exhausted and running low on food, we would make our way down to the base of the mountains to curate our samples, backup data, and feed and rest in preparation for another trip!

All in all it was a very productive expedition. We added many new species and subspecies to the LSUMNS collection, collected the first quantitative bird community data from such an expansive and intact elevational gradient in Borneo, and had a great time in some beautiful primary forest! Already memories of cool streams and jungle sounds have drowned out the discomfort of steep hikes and biting gnats, leaving us longing to return.



**Above:** Nightly bat exodus  
**Top Left:** Ryan Burner and David Bernasconi hit the trail.  
**Bottom Left:** Penan guide with poison tipped darts  
**Page 9:** View from Mt. Mulu





# Valerie Derouen defends her thesis & joins the MNS as the new Science Outreach Coordinator

by Valerie Derouen

This past November, I defended my Master's thesis under the guidance of Dr. Prosanta Chakrabarty entitled "Bridging Research and Education: A look into the evolutionary history of batfishes and how museum exhibits can be used to engage the public." My goal was to not only contribute to our understanding of batfishes but to also show interesting and educational ways research can be presented to the public. Batfishes are a unique family of tropical and sub-tropical marine anglerfishes that live on the ocean floor. They have flattened bodies, "limb-like" pelvic and pectoral fins, and a lure that emits chemicals to attract their prey. Relationships among batfishes as well as their position within the anglerfishes, their age, and their depth of origination in the water column had not been previously studied in great detail. My research centered on using maximum likelihood and Bayesian phylogenetics to answer these questions. I found the batfishes most closely related to the frogfishes, a shallow group of anglerfishes with lures that mimic the prey of their prey. They are likely Paleocene/Eocene in age, possibly originating on the lower continental shelf/upper continental slope.

To bring elements of the batfish research as well as to educate people about Louisiana fishes, I contributed to the LSU MNS fish exhibit book, "Making a Big Splash with Louisiana Fishes," which aimed to complement the concepts featured in the fish exhibit in an engaging and interactive way. We wanted to create a companion book that would allow visitors to experience the exhibit from anywhere and introduce them to topics such as aquatic habitats, threats to fish biodiversity, and unique adaptations, like bioluminescence. For my thesis, I created ten children's activities, as well as the ABC's of Louisiana pages and glossary.

Now, I am very excited to join you as the new Outreach Coordinator for the Museum of Natural Science. I began at the museum in the fall of 2007 as an undergraduate researcher in the mammal division under Dr. Mark Hafner and his Ph.D. student, Dr. Verity Mathis. I later joined the fish lab in 2011 for my Master's with concentrations in biological sciences and education. During my Master's, I participated in many outreach events for the LSU MNS. The museum has been a part of my life for almost eight years, and I am inspired by the commitment to discovery and high quality research exhibited by the faculty, staff, and students here. I want the LSU MNS to be more visible to the greater Baton Rouge community in order to better fulfill its mission. Most students at LSU do not realize the museum exists, and that is something I definitely want to change. As the new Outreach Coordinator, I will be in charge of producing the Museum's Quarterly Newsletter, developing science education activities and exhibits, conducting outreach events, maintaining the website and social media



Pancake Batfish

accounts, and writing grants to support the museum's outreach activities and exhibits. I am open to any suggestions you may have to help make our public face a noteworthy and accurate representation of the work done at the LSU MNS. Also, please keep me updated on any news and accomplishments so that I can feature them on our website and social media accounts. My email is [vderou1@lsu.edu](mailto:vderou1@lsu.edu).

# Bird Specimens from Museum's Collection of Genetic Resources Featured in Two Science Articles on Avian Genomics

by Alison Satake, Robb Brumfield, and Brant Faircloth



An international team of scientists completed the largest whole genome study of a single class of animals to date. To map the tree of life for birds, the team sequenced, assembled and compared full genomes of 48 bird species representing all major branches of modern birds including ostrich, hummingbird, crow, duck, falcon, parrot, crane, ibis, woodpecker and eagle species. The researchers have been working on this ambitious genetic tree of life, or phylogeny, project for four years.

As part of the Avian Phylogenomics Consortium — comprised of more than 200 scientists from 80 institutions across 20 countries — Museum ornithologists were part of two research papers featured in a special issue of *Science*.

“Reconstructing the tree of life is one of the grand challenges in biological science.” said co-author **Robb Brumfield**.

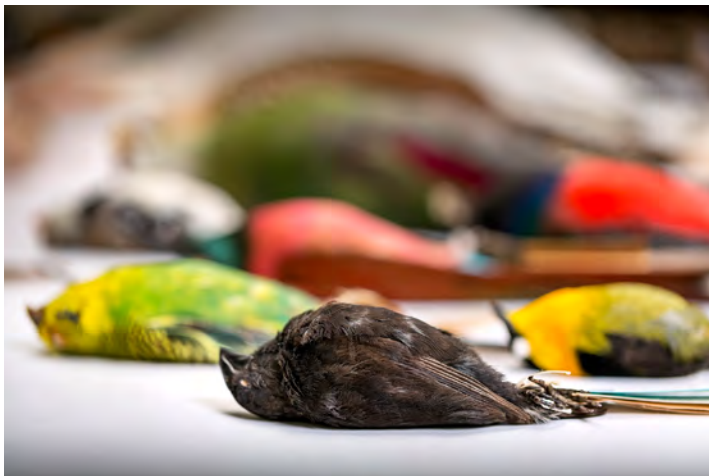
The LSU Museum of Natural Science maintains one of the world’s largest frozen tissue collections of birds, reptiles, amphibians and mammals. Since 1979, the museum’s curators and researchers have collected

samples from unexplored regions of the world. They carry liquid nitrogen tanks in the field to flash freeze the tissue samples, which are brought back and stored in the Museum’s Collection of Genetic Resources.

“When we collect a specimen, our goal is to preserve it in a way that will maximize its future utility. The challenge is that we don’t know what the future uses will be,” Brumfield said. “It would have been difficult for ornithologists collecting bird tissues in 1980 to imagine that 35 years later the entire genomes of these birds could be sequenced and featured in studies like this.”

One of the flagship papers published in *Science* titled, “Whole-genome analyses resolve early branches in the tree of life of modern birds,” presents a well-resolved new tree of life for birds, based on whole-genome data. Several Museum scientists are co-authors on this paper including Brumfield, Curator of Genetic Resources Frederick Sheldon and former Museum of Natural Science Post-doctoral Researchers Elizabeth Derryberry and John McCormack. New Assistant Professor of Biological Sciences Brant Faircloth played in a key role in analyzing genomes for the study.





**Page 21 & Above:** LSUMNS bird research specimens. Photos by Eddy Perez, LSU University Relations.

This ambitious international research project is significant because it disentangles parts of the bird tree of life that have been particularly challenging to resolve. Because modern birds split into species early in time and in quick succession, the different lineages did not evolve enough distinct genetic differences at the genomic level to clearly determine their early branching order using smaller amounts of data, the

researchers said. To overcome this problem and resolve the timing and relationships of modern birds, the consortium authors used whole-genome sequences to infer the bird species tree.

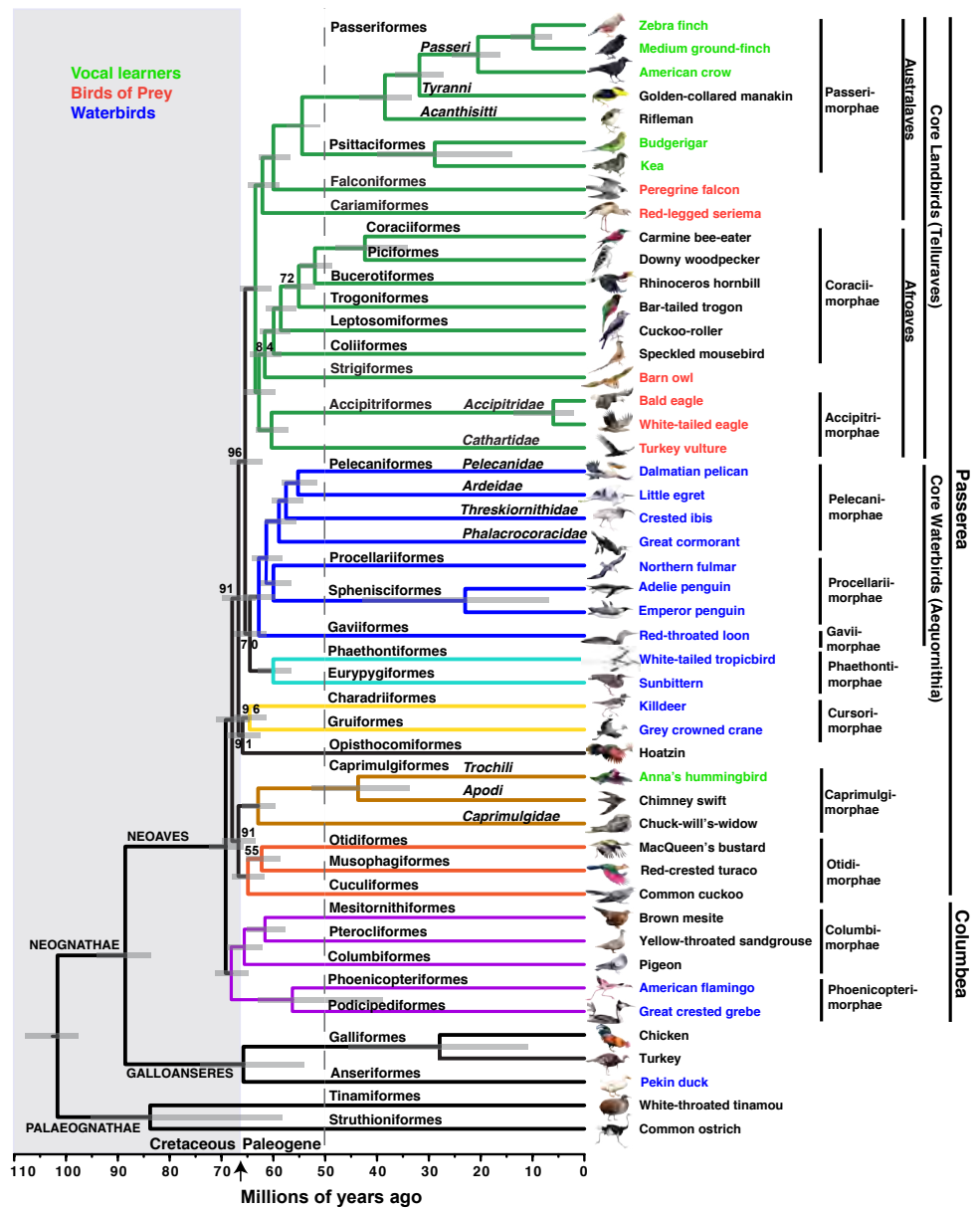
LSU's Brant Faircloth contributed to the reconstruction of the bird tree by running statistical analyses of genomic loci called ultraconserved elements, or UCEs that are found throughout the genomes of many organisms. His group, in collaboration with Brumfield's students and post-doctoral researchers, developed the technique for studying UCEs. By aligning these highly conserved parts of the genome and analyzing the subtle variations across the different species, the UCE data helped piece together this new tree of life for birds. Faircloth found that the UCE data provided consistent results to infer evolutionary history whereas traditionally, scientists have used data from the protein coding parts of the genome called exons for this purpose.

"It opens up the potential in terms of the types of data people will collect and use in the future when reconstructing the tree of life," Faircloth said. Once they inferred a tree from the data, collaborators used the fossil record to date the divergence of each species across millions of years. The result is a genome-scale phylogeny of birds that dates the evolutionary expansion of modern birds, or Neoaves, to 66 million years ago, when a mass extinction event killed off the dinosaurs, but a few bird lineages survived.

In addition to resolving the early branches of Neoaves, this new work supports conclusions about some relationships that have been long-debated. For example, the findings support three independent origins of waterbirds. They also indicate that the common ancestor of land birds, including songbirds, parrots, woodpeckers, owls, eagles and falcons, was an apex predator, which also gave rise to the giant terror birds that once roamed the Americas.

The second flagship paper titled, "Comparative genomics reveals insights into avian genome evolution and adaptation," illustrates that genomic diversity across birds correlates with adaptation to different lifestyles and evolutionary traits. These findings help bridge the chasm between micro and macroevolution.

Lastly, a third paper titled, “Three crocodylian genomes reveal ancestral patterns of evolution among archosaurs,” was co-authored by Faircloth, McCormack and fellow former LSU Post-doctoral Researcher David Ray (from Dr. Mark Batzer’s lab). They used newly assembled genomes of the closest living relatives to birds — crocodylians — to provide context for the diversification of archosaurs, a group that includes birds, crocodylians and dinosaurs. Using the genomes of the American alligator, the saltwater crocodile and the Indian gharial, the scientists showed that crocodylian genomes are among the slowest evolving vertebrates. Their collaborators also used these genomes to infer the genome sequence of the common ancestor of archosaurs and therefore all dinosaurs including those that became extinct 66 million years ago. Tissues of the individual crocodylians whose genomes were sequenced by the team will also be stored in the LSU Museum of Natural Science Collection of Genetic Resources.



Avian family tree based on phylogenetic analysis of 48 avian genomes. From Jarvis *et al.* 2014. *Science* 346:1311-1220.

Setting up the pipeline for the large-scale study of whole genomes — collecting and organizing tissue samples; extracting the DNA; analyzing its quality; sequencing, managing and analyzing torrents of new data — has been a massive undertaking. But the scientists say their work should help inform other major efforts for the comprehensive sequencing of vertebrate classes. To encourage other researchers to dig through this “big data” and discover new patterns that were not seen in small-scale data before, the Avian Genome Consortium has released the full dataset to the public in GigaScience and other databases.

search collections.”

This project received its main financial support from the Beijing Genomics Institute, or BGI, the world’s largest genomics organization as well as from the China National GeneBank, the U.S. National Institutes of Health, the U.S. National Science Foundation, the Howard Hughes Medical Institute, the Lundbeck Foundation and the Danish National Research Foundation.

“The next grand challenge in our field would be to expand upon this and sequence the genomes of all birds,” Brumfield said. “But I think an important take home message from these projects is the value of re-





# Art and Science

by Kelli Scott Kelley

Last semester my Advanced Figure Drawing class borrowed animal specimens from the LSU Museum of Natural Science for their final drawing project. Steven Cardiff and Dr. Frederick Sheldon generously offered a fox, an otter, an owl, a deer head and a gull for the students to incorporate into their figure drawings. The students worked with me to create a dramatic tableau with two nude live female models, drapery, dramatic lighting and the animals. Students made their drawings by working directly from the scene. The juxtaposition of the figures and animals offered the students many possibilities for creating interesting art works. Formal relationships between the figures and animals were considered. Many students created pieces that explored

narrative or symbolic meaning implied by the images. The students were thrilled to have the opportunity to work from the complex set-up to make creative original artworks.

**Top:** Painting by Mary Singleton  
**Right:** Students in Professor Kelley's Advanced Figure Drawing Class







Left: Students in Professor Kelley's Advanced Figure Drawing class



Painting by Michelle Marks



Drawing by Christopher Stafford



Painting by Taryn Nicholl



Painting by Monet duPlessis



# A Summer of Ornithological Expeditions to Borneo: Mountains, Hybrids, Songs, and Bird Poop

by Vivien Chua

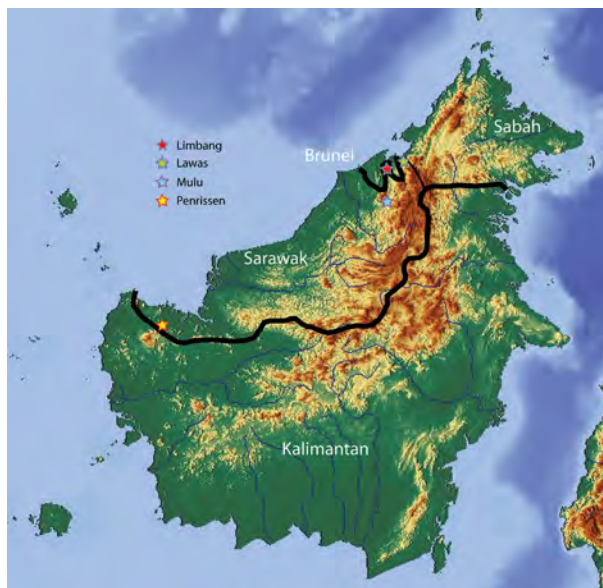


The summer of 2014 was a busy time for fieldwork in Borneo. A team of ornithologists (**Matt Brady, Ryan Burner, Vivien Chua, Dency Gawin, Haw Chuan Lim, Paul van Els, David Bernasconi, and Fred Sheldon**) ventured on expeditions to three areas of Sarawak in Malaysia, on the island of Borneo. We spent approximately three months in the rainforest collecting specimens and data on bird occurrence. Our expeditions had three principal aims. First, we wanted to obtain bird specimens, vocalizations, stomach samples, and fecal matter in mountains across Borneo for biogeographic and diet studies. Second, we were also interested in assessing bird communities quantitatively along an elevational gradient to understand their transition from lowland to montane forests. Third, our team was interested in obtaining specimens to study the genetic variation across a hybrid zone between Sarawak and Sabah in northern Borneo.

This broad array of goals is part of LSUMNS's grand plan to understand the complex evolutionary history of rainforest birds in Southeast Asia.

One of our study sites was Gunung (Mount) Mulu National Park. Mulu is a World Heritage Site and, at 2,376 meters, one of Borneo's highest peaks. The Park is known for its geology, including dramatic

limestone pinnacles, and its impressive array of cave systems, as well as its rich biodiversity. There are essentially no modern collections of birds from Mount Mulu; thus, our fieldwork allowed us to fill in an important sampling gap for molecular genetic studies of Bornean bird biogeography. In total, we collected 173 individuals of 67 species from this area. Most of the tissue samples are new for this area, and several were new for the LSU Museum of Natural Science collection, e.g., Sunda Cuckoo (*Cuculus lepidus*), Mossy-nest Swiftlet (*Aerodramus salagana*), Finch's Bulbul



Above: A map of Borneo and sampling sites  
Top: View from the long boat as we traveled to Mulu





**Top:** Verditer Flycatcher, *Eumyias thalassina*  
**Bottom:** An Argus Pheasant that was snared by a hunter, photographed, and released.

(*Alophoixus finchii*) and Black-sided Flowerpecker (*Dicaeum monticulum*). Some other exciting specimens were of Whitehead's Trogon (*Harpactes whiteheadii*), Hose's Broadbill (*Calyptomena hosii*), and Mountain Wren-Babbler (*Turdinus crassa*).

Our other research goal on Mt. Mulu was to add data for Ryan Burner's Ph.D. project. He is attempting to characterize the transition from lowland to montane bird communities on various mountains in Borneo. Mulu is an outstanding site for such work because essentially nowhere else on Borneo does primary forest still extend from close to sea level to the top of a high mountain. During our trip, Ryan conducted point counts at various elevations using vocal and visual censusing to determine the exact elevational range of a wide number of species. He also mounted automated audio recorders at various points on

the mountain to collect vocal data throughout the year. To help Ryan determine the forces responsible for lowland-to-montane community turnover (such as climate and competition), we collected stomach and fecal samples from all the birds we netted. These will be used in next-generation DNA analysis of bird diet.



One of the three campsites along Mt. Mulu

Among our biogeographic discoveries in Borneo is that lowland bird populations change abruptly from one genetic group to another near the Sarawak-Sabah border, even though there is no obvious difference in the rainforest in this area. We believe this genetic transition is an artifact of ancient climate change during the Pleistocene, which caused a single Bornean population to be subdivided into rainforest refuges in eastern and western parts of the island, perhaps a million years ago. Now, with the expansion of rainforests during warmer, wetter times, these bird populations are coming back together. Where they meet, near the Sarawak-Sabah border, they hybridize. Thus, we are interested in assessing the location, size, and other characteristics of this hybrid zone. To this end, some of our group collected in the Limbang and Lawas



Vivien Chua enjoying a break and the view next to a stream during the climb up Mt. Mulu.





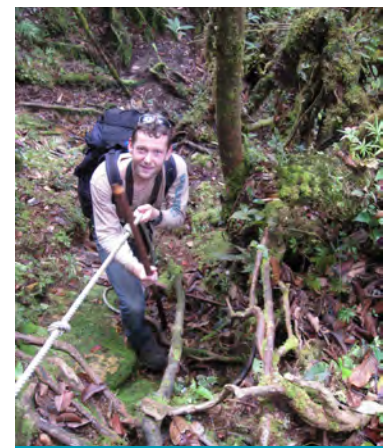
Field site in Limbang

region of Sarawak. Limbang lies near the country of Brunei, and Lawas in between Brunei and Sabah. In addition to many specimens important to our hybridization studies, several new species were also added to LSU's collection, including Raffle's Malkoha (*Phaenicophaeus chlorophaeus*), Malaysian Nightjar (*Lyncornis temmincki*), Large-tailed Nightjar (*Caprimulgus macrurus*), Stork-billed Kingfisher (*Pelargopsis capensis*), and Dusky Broadbill (*Corydon sumatranus*).

Our group also returned to Gunung (Mount) Penrissen, an isolated peak in the western part of Sarawak. On a 2013 trip to Penrissen, we were unable to sample above 800 meters, but this time we made it to the top of the mountain (about 1200 m). Our collections there allowed us to extend our sampling of Bornean montane birds substantially. Now we have specimens from northeastern Sabah to southwestern Sarawak, covering essentially the entire breadth of the island. A few highlights from Penrissen were two

endemics, the Bornean Whistling-Thrush (*Myophonus borneensis*) and the Bornean Forktail (*Enicurus borneensis*), which were likely range extensions

In summary, our team sampled several areas in Borneo that are important for a variety of ongoing and long-term research projects. As a result of this work, LSU Museum of Natural Science's collection of Bornean birds continues to grow into a premier resource for Southeast Asian ornithological studies. In the summer of 2014, we added 564 specimens of 140 species of birds, as well as hundreds of vocal recordings and samples of stomach contents and poop, for current and future scientific studies.



Paul van Els ascending Mt. Mulu





# Atlantic Coast Leopard Frog

by Cathy Newman

**Above:** *Rana kauffeldi*, the Atlantic Coast leopard frog

I was part of a team of researchers who discovered a new species of leopard frog in the northeastern United States. The species name, *Rana kauffeldi*, and description were published on October 29, 2014, in the journal *PLOS ONE*. *Rana kauffeldi* was featured as the #1 Top New Species in Time magazine.

In addition, my research on the genetics of *Rana kauffeldi* was a featured story in the November 2014 issue of *Highlights Magazine*, bringing this important scientific research to elementary school classrooms nationwide.



**Right:** Cathy examining a specimen of *Rana sphenoccephala*, a close relative of the new species *R. kauffeldi*.



# LSUMNS Section of Ornithology plays integral role in south Louisiana Christmas Bird Counts

by Steve Cardiff and Donna Dittmann



**Above:** Say's Phoebe at "Sweet-Cam". Photo by Donna Dittmann

The 115th season of the National Audubon Society's Christmas Bird Count (CBC) Program was recently completed from 14 December 2014 to 5 January 2015, and the LSUMNS "bird group" once again provided significant manpower for this important long-term early winter census effort. Despite the overlap with the holidays, with many of us out of town, seven different members of the Section of Ornithology invested 23 person-days of effort among eight of 16 southern Louisiana counts. CBCs are standardized surveys that involve a one-calendar-day census of bird density and diversity within a fixed 15-mile-diameter circle (about 176 square miles). In addition to absolute species diversity (=number of species reported on count day) and total bird abundance, abundances can be compared among species and among years as "# individuals divided by total party-hours" (with a party-hour = each hour of effort by teams of observers covering discreet sections of the circle). Although this type of analysis is relatively crude and subject to various pitfalls, CBC data have proven useful in revealing short-term and long-term trends in winter bird populations.

Three Louisiana CBCs are co-sponsored by

LSUMNS and are currently "compiled" (observer recruitment, coordination of field coverage, and data analysis) by LSUMNS Collection Managers Steven W. Cardiff and Donna L. Dittmann:

## Lacassine N.W.R.-Thornwell, Sunday 14 December 2015



Centered a few miles south of the community of Thornwell in southern Jefferson Davis Parish, the "Lac-Thorn CBC" includes most of Lac-

assine National Wildlife Refuge and stretches from the town of Lake Arthur west to the town of Hayes, incorporating a swath of northeastern Cameron Parish and a small chunk of eastern Calcasieu Parish. The landscape is dominated by rice agriculture but also includes portions of Lacassine NWR, and wooded areas along scenic Lacassine Bayou and the Mermen-tau River/Lake Arthur. This was the 13th running of the count since being established in December 1997,

and the sixth consecutive year after the count was revived in 2009 following a 5-year hiatus from 2004-2008. This year's count attracted 33 observers (also including LSUMNS's Van Remsen, Mike Harvey, and Glenn Seeholzer), who were divided into as many as 13 teams covering the circle from 5:30 AM-6:10 PM and generating about 130 party-hours. Fortunately, the weather was decent except that it got pretty windy from mid-morning onward. A strong team effort produced 488,712 individual birds representing 158 species. Somewhat surprisingly (given that diversity was generally considered "down" for this season's CBBs), That's slightly better than last year's 157 species, and possibly the highest number of species among Louisiana CBCs this season. A key aspect of this year's count was that we were able to take advantage of Fall 2014's exceptionally late rice harvest by monitoring rice-harvesting operation on count day. Rice farmer Kevin Berken saved his last acreage for us, and it paid off big time. From 10:30 AM to 1 PM we were able to monitor 37 acres of rice being harvested (thanks also to combine driver Richard Guillory). This took place in the section of the circle covered by Cardiff and Dittmann, who were at the harvest site for the first hour or so. Also assisting with observations for the duration of the harvesting activity were LSUMNS supporters Dave Patton, Jennifer Alexander, and Kevin Colley, and visiting birder Mara Factor of Massachusetts. The results were outstanding: 19 Yellow Rails, 5 King Rails, dozens of Soras and Virginia Rails, and a couple of American Bitterns. To cap things off, towards the end of the harvesting a very rare Ferruginous Hawk (new for the count and species #219 on the cumulative list) was attracted to the cut fields, obviously searching for newly exposed prey items. The Ferruginous Hawk had been first seen in the area on 10 December and was a new species for the count as well a first occurrence for Louisiana of the even rarer "dark-morph." Other highlights during the day included a Green Heron, White-tailed Kite, communal evening roost of Northern Harriers totaling at least 50 individuals, a whopping 50 Bald Eagles, 29 Semipalmated Plovers, 1 Willet, 3 Short-eared Owls (near harrier roost), 11 Crested Caracaras, 1 Least Flycatcher, 2 Say's Phoebes, 1 Ash-throated Flycatcher, 3 Lapland Longspurs, 2 Black-and-white Warblers, 1 Yellow-throated Warbler, 1 Henslow's Sparrow, 3 Nelson's Sparrows, 1 Indigo Bunting, and 2 Dickcissels. "Worst misses" were the normally reliable Tricolored Heron and Sprague's

Pipit.

### Sweet Lake-Cameron Prairie N.W.R., Saturday 20 December 2014



Centered on the Calcasieu-Cameron parish line at Hwy. 27 between Holmwood and Sweet Lake, the "Sweet-Cam CBC" circle includes all of Cameron Prairie National Wildlife Refuge and is otherwise dominated by farmland and pastures largely owned by co-sponsor Sweet Lake Land and Oil Company. The sixth running of the count started off in cold windblown fog under overcast skies (which likely cost us a few species during the AM flight), but conditions improved gradually, and it ended up being another fun day. We were fortunate to have 22 observers covering the area in up to 12 teams generating over 111 party-hours. Over a half million individual birds were tallied representing 148 species. We were disappointed to fall short of the coveted 150 species threshold, but 148 may end up ranking third among Louisiana CBCs this season. Unusual species included Cinnamon Teal, Say's Phoebe, Bell's Vireo (new to count, species #187 on cumulative list), Dickcissel, and 5 Yellow-headed Blackbirds. Also noteworthy were an estimated 300,000 Snow Geese, 554 Ross's Geese, Green Heron, 3 White-tailed Kites, 10 Bald Eagles, 1 American Avocet, 6 Semipalmated Plovers, 54 White-winged Doves, 5 Vermilion Flycatchers, 2 Sprague's Pipits, 4 Lapland Longspurs, 1 Wilson's Warbler, 1910 Brewer's Blackbirds, and 10,000+ Great-tailed Grackles. Numbers of the count's "signature" species, Sandhill Crane and Crested Caracara, went through the roof. We try to be conservative in estimating both species because they can move long distances during the day dispersing from roosts in the AM and returning in the evening. In the case of Sandhill Cranes, based on AM and PM trajectories of major concentrations exiting and returning to roosts, it seemed justified that there were 3 different groups involved totaling 1850, 1000, and 425 individuals respectively. Counting other miscellaneous smaller flocks scattered across the circle, the grand total came to 3440! Crested Caracaras were reported from all areas and the conservative total was 104 individuals! This included 36 seen by Dittmann



and Cardiff, with a concentration of 26 in view at once (22 sitting in one tree); reports of 19 and 12 were submitted by other areas. Worst misses were Inca Dove and Herring Gull.

### White Lake, Sunday 5 January 2015



This was just the fourth running of the White Lake CBC, which is in Vermilion Parish south of Gueydan and west of Forked Island. This is another very rural circle

dominated by freshwater marsh, rice farms, crawfish ponds, and patches of hardwood forest and which also includes the recently created White Lake Wetland Conservation Area. Many areas were flooded and inaccessible due to heavy rains during the preceding 24 hours, and it was cool and windy. Eleven observers in 6-8 parties covering 6 areas generated over 63 party-hours and managed to locate almost 185,000 individual birds representing 143 species. That's three fewer species than last year and continues a downward trend

in diversity, but seems pretty respectable (considering that species totals for most LA CBCs were below average) and may be competitive for fourth place among Louisiana CBCs this season. Rarities included Fulvous Whistling-Duck, Willet (new to count), Great Kiskadee (one of the apparent residents at White Lake Lodge), Couch's Kingbird (returnee from last year), Black-and-white Warbler, Yellow-throated Warbler (new, and species #190 on the cumulative list), and Purple Finch. Also of interest were 1 Green Heron, almost 35,000 White-faced Ibis, 8 Bald Eagles, 1 White-winged Dove, 3 Crested Caracaras, 12 Vermilion Flycatchers, and 1 Nelson's Sparrow. Noticeably absent were American Bittern, Ruddy Duck, White-tailed Kite (first time missed), Black-bellied Plover, Forster's Tern, Say's Phoebe (first time missed), Fish Crow, Brown Creeper, and Dark-eyed Junco.

Other CBCs assisted by LSUMNS observers during the 2014-2015 season included Baton Rouge (3 Jan.; Cardiff, Dittmann, Lane, Seeholzer), Creole (22 Dec.; Cardiff, Dittmann), Crowley (16 Dec.; Brumfield, Remsen) Grand Isle (18 Dec.; Cardiff, Dittmann), and Sabine N.W.R. (21 Dec.; Cardiff, Dittmann).



Ferruginous Hawk at "Lac-Thorn". Photo by Donna Dittmann



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# MNS NEWS & UPDATES

## Student Research Awards:

**Mary Lou Applewhite Award** - Michael Harvey

**Carrie Lynn Yoder Memorial Award & Bruch Award for Graduate Student Travel** - Ryan Terrill

These awards aim to reward students who have excelled in the early part of their scientific career as indicated by publications in the primary literature, to provide time to enhance their research efforts.

## Outstanding Graduate Student Award:

At this year's Annual LSUMNS Holiday Party, Ichthyology Ph.D. student Caleb McMahan was awarded the 2014 Outstanding Graduate Student Award.

## Great Start of the Year for the CENEX Lab:

Four students, Isil Akyuz (MS), Madison Kymes (MS), Kate Griener (PhD) and Marie Thomas (PhD) received the news this month that their research results have been accepted for publication in various peer-reviewed journals including the high profile Global and Planetary Change journal.



## Forbes 30 under 30:

Congratulations to former LSUMNS Ornithology student, John Mittermeier, for being named one of Forbes 30 under 30 in Science!

## 30 Years of Service:

Congratulations to Steve Cardiff who is being honored at the 2015 Employee Recognition Jazz Brunch for his 30 years of service to LSU!

## Top New Species:

Three species discovered by LSUMNS researchers were featured on multiple 'Top New Species of 2014' lists.

### Discover Magazine's Top 5 New Species of 2014:

Hoosier Catfish, *Amblyopsis hoosieri* - Dr. Prosanta Chakrabarty

Sulawesi Water Rat, *Waiomys mamasae* - Dr. Jacob Esselstyn

### Time's Top 10 New Species of 2014:

Atlantic Coast Leopard Frog, *Rana kauffeldi* - Cathy Newman

## TEDxLSU:

Curator of Fishes, Dr. Prosanta Chakrabarty, will be a featured speaker at TEDxLSU on February 28th! He will speak on his experience as an ichthyologist and natural historian. Tickets on sale now at [tedxlsu.com](http://tedxlsu.com).





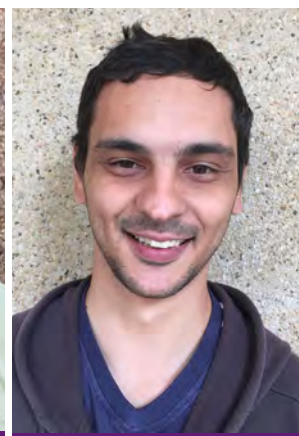
# Welcome New Graduate Students!



**Subir Shakya**  
Ph.D. Candidate  
Ornithology (Sheldon)



**Mark Swanson**  
Ph.D. Candidate  
Mammalogy (Esselstyn)



**Marco Rego**  
Ph.D. Candidate  
Ornithology (Brumfield)



**Glauca del Rio**  
Ph.D. Candidate  
Ornithology (Brumfield)



**Zach Rodriguez**  
Ph.D. Candidate  
Herpetology (Austin)



**Oscar Johnson**  
Ph.D. Candidate  
Ornithology (Brumfield)



**Rafael Marcondes**  
Ph.D. Candidate  
Ornithology (Brumfield)



**Andre Moncrieff**  
Ph.D. Candidate  
Ornithology (Brumfield)



**Genevieve Mount**  
Ph.D. Candidate  
Herpetology (Austin)



# 2015 Spring Seminar Speakers

- 16 Jan:** Kristin Brzeski - LSU School of Renewable Natural Resources “Endangered Red Wolves: assessing inbreeding, MHC variation, and disease”
- 23 Jan:** Dr. Andrew Mack - Department of Biology, Indiana University of Pennsylvania “Ecology and Conservation of Cassowaries in Papua New Guinea”
- 30 Jan:** Dr. Kevin Ringleman - LSU School of Renewable Natural Resources “Ducks and Skunks: Behavioral Ecology and Density Dependence in Breeding Waterfowl”
- 6 Feb:** Dr. Scott Solomon - Dept. of Ecology and Evolutionary Biology, Rice University “Evolution in Ant and Human Societies”
- 13 Feb:** No Seminar - Mardi Gras Break
- 20 Feb:** Dr. William Eberhard - Smithsonian Tropical Research Institute; Escuela de Biología, Universidad de Costa Rica; LSU Museum of Natural Science. “Zombie spiders: parasitic wasp manipulation of the web-building behavior of their hosts”
- 27 Feb:** Dr. Michael Polito - LSU Department of Oceanography & Coastal Sciences Title TBA
- 6 Mar:** Dr. Sabrina Taylor - LSU School of Renewable Natural Resources Title TBA
- 13 Mar:** Dr. Sunshine Van Bael - Department of Ecology and Evolutionary Biology, Tulane University “Fungal and bacterial symbionts in wetland plants”
- 20 Mar:** Dr. Jessica A. Oswald - LSU Museum of Natural Science “Historical insights into the processes shaping diversity, distributions, and community composition in Neotropical dry forest”
- 27 Mar:** Oscar Johnson - LSU Museum of Natural Science “Within and across-year social cohesion in wintering migrant Sparrows”
- 3 Apr:** No Seminar - Spring Break
- 10 Apr:** No Seminar - Spring Break
- 17 Apr:** Dr. Sophie Warny - LSU Museum of Natural Science “The unsuspected importance of pollen and mammal collections”
- 24 Apr:** Dr. Nicola Mary Anthony - Department of Biological Sciences, University of New Orleans “Evolution and conservation of central African biodiversity”
- 1 May:** Dr. David Steadman - Museum of Natural History, University of Florida “The last 10,000 Years of Birdlife in the Bahamas: The effects of Changing Sea Level, Island Area, Habitats, and Human Activity”

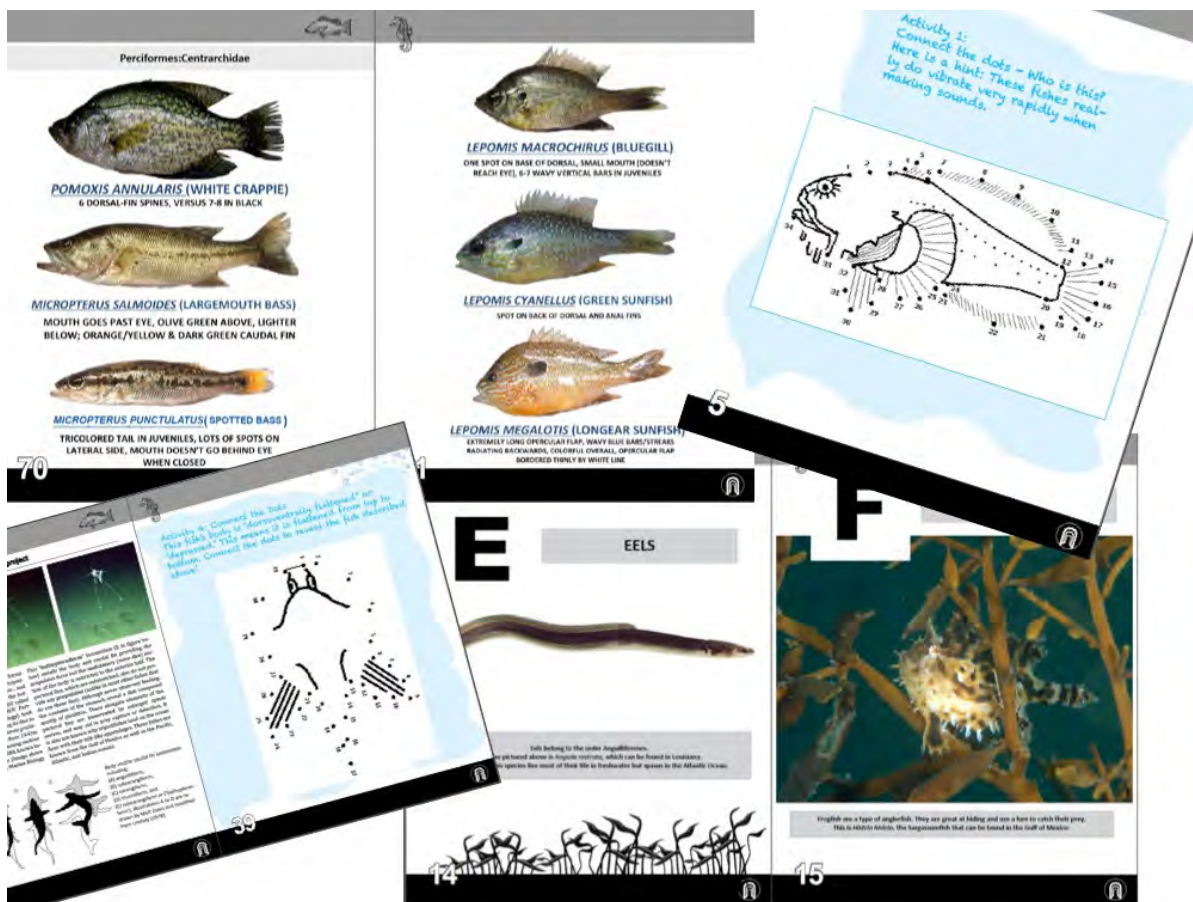




# New book available at the MNS

“a true guide to Louisiana fishes”

A new book targeting students young and old has been published by the Museum of Natural Science. The book, “Making a Big Splash With Louisiana Fishes,” was written by **Curators Prosanta Chakrabarty and Sophie Warny with Outreach Coordinator Valerie Drouen**. The book is a complement to a recently created fish exhibit at the MNS in Foster Hall, and includes nearly 100 pages of text, activities, stories, and a field guide to common fishes of Louisiana. It is available for free, at [<http://sites01.lsu.edu/wp/mnspapers/>]. It is also available for purchase (at cost) printed in color and bound for \$20 by check written out to “LSU Foundation” with “Occasional Papers” written in the memo field. Checks can be sent to “LSU Museum of Natural Science, 119 Foster Hall, Baton Rouge, LA 70803.” Additional donations can be added to the check but please add “Ichthyology fund” in the memo field and the dollar amount going to each. To request a hard bound copy please email [prosanta@lsu.edu](mailto:prosanta@lsu.edu).



# New Geology Exhibit now open in Howe Russell!



Thank you to the LA BoR and for your support!

## Giving Form to Support the Museum of Natural Science

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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. 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.

Email your material to [swarny@lsu.edu](mailto:swarny@lsu.edu) or mail to:

The LSU Museum of Natural Science  
Education Office  
119 Foster Hall  
Baton Rouge, LA 70803

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