'Early bird' project really gets the worm

June 26 2008

Scientists from the LSU Museum of Natural Science, or MNS, recently participated in a project joining together the most prominent ornithological research programs in the world. This study – the largest study of bird genetics ever completed – has not only shaken up the avian evolutionary tree, but completely redrawn it. The results of this massive research project, which relied heavily upon the LSU MNS' genetic resources collection, will be published in *Science* on June 27.

The results of the study are so broad that the scientific names of dozens of birds will have to be changed, and biology textbooks and birdwatchers' field guides will have to be revised.

LSU participants in the study include: Fred Sheldon, director of the LSU MNS; Ben Marks, recent graduate of LSU's biological sciences doctoral program; and Chris Witt, former LSU graduate student and current assistant professor in the Department of Biology and Museum of Southwestern Biology at the University of New Mexico.

For more than five years, the Early Bird Project, funded by the National Science Foundation's "Assembling the Tree-of-Life" research program, has been collecting DNA sequence data from all major living groups of birds.

"One thing that makes this project unique is its breadth; both in its taxonomic scope and in terms of the amount and type of data we collected," said Marks.

Thus far, scientists have built and analyzed a dataset of more than 32 kilobases of nuclear DNA sequences from 19 different locations on the DNA of each of 169 bird species.

"This paper makes tremendous strides toward determining the evolutionary relationships of the major branches in the bird family tree," said Witt. "It uses DNA sequences to infer key events in the diversification of birds that happened tens of millions of years ago."

For example, we now know that:

Birds adapted to the diverse environments several distinct times because many birds that now live on water (such as flamingos, tropicbirds and grebes) did not evolve from a different waterbird group, and many birds that now live on land (such as turacos, doves, sandgrouse and cuckoos) did not evolve from a different landbird group.

- Similarly, distinctive lifestyles (such as nocturnal, raptorial and pelagic, i.e., living on the ocean or open seas) evolved several times. For example, contrary to conventional thinking, colorful, daytime hummingbirds evolved from drab nocturnal nightjars; falcons are not closely related to hawks and eagles; and tropicbirds (white, swift-flying ocean birds) are not closely related to pelicans and other waterbirds.
- Shorebirds are not a basal evolutionary group, which refutes the widely held view that shorebirds gave rise to all modern birds.

The other co-authors of this study include scientists from the Field Museum in Chicago; the University of Florida; University of California, Berkeley; Smithsonian Institution; Stellenbosch University (South Africa); University of Maryland; Wayne State University; and the University of New Mexico. More than half of the people who worked on or trained in this project were women.

There are an estimated 82 million birdwatchers in the United States alone, making it the country's second most popular hobby, surpassed only by gardening. Therefore, interest in the results of the Early Bird research project will be far reaching.

Both Marks and Witt agree that being a graduate student at LSU afforded them a special opportunity to be involved in cutting-edge research.

Source: Louisiana State University