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MUMMY DNA HELPS RESEARCHERS SOLVE THE RIDDLE OF THE NILE CROCODILE

DNA ANALYSIS SHOWS TWO SEPARATE SPECIES, SUGGESTS CHANGE IN CONSERVATION MANAGEMENT

Extensive DNA detective work tracing the evolutionary history of the Nile crocodile brought researchers affiliated with the American Museum of Natural History a startling solution to a centuries-old mystery: the Nile crocodile (*Crocodylus niloticus*) is actually two distinct species. Conducting the study in the Museum's Sackler Institute for Comparative Genomics, first authors Evon Hekkala of Fordham University and Matthew Shirley of the University of Florida, and their colleagues, sequenced DNA from 123 Nile crocodiles collected throughout Africa as well as from 57 tissue samples harvested from mummified crocodiles – some of them 2,000 years old – from ancient Egyptian temples. They discovered evidence of two *Crocodylus niloticus* lineages – an ancestral western clade that has been named *C. suchus*, and a derived eastern *C. niloticus*. In a paper published in the early online edition of *Molecular Ecology*, the researchers estimate that the two groups last shared a common ancestor approximately 8 million years ago.

“Crocodiles are often portrayed as ‘living fossils,’ but that is a misnomer,” says George Amato, director of the Sackler Institute. “Although they may look ancient and unchanging, the genetic evidence shows that these crocodiles are dynamic and adaptable and as modern as any other species alive today.”

The Nile crocodile is a widespread, commercially exploited species throughout sub-Saharan Africa. Its striking size – crocodiles sometimes reach 18 feet or more in length – and streamlined body has long served as an iconic image of ancient Egypt.

“This is the most comprehensive survey ever conducted of the Nile crocodile, covering not only all the major biogeographic regions where it exists today, but exploring museum collections to uncover evidence from the historical record in areas where it no longer exists,” explains Hekkala.

The taxonomic discovery reveals a level of biodiversity that was previously cryptic or hidden and has implications for future conservation management for the Nile crocodile.

“Agreements intended to promote the sustainable harvest of the Nile crocodile should be reconsidered to reflect the need to preserve two distinct species, not one,” Amato says. “In fact, following the original quotas and policies may inadvertently result in a significant loss of crocodilian diversity.”

The western Nile crocodile (*C. suchus*) is particularly vulnerable. This species is becoming increasingly rare due to disappearing wetlands, illegal harvesting of crocodile skins, and the bushmeat trade.

Researchers also gained new insights into the evolutionary journey of *Crocodylus*. The study revealed that the eastern Nile crocodile is most closely related to four species in the Caribbean. The research team hypothesizes that the global distribution of *Crocodylus* out of Africa occurred relatively recently – within perhaps the last 3 million years – with eastern *C. niloticus* rafting or possibly swimming thousands of miles over to the Western Hemisphere.

In addition to Hekkala, Shirley, and Amato, coauthors include James Austin, University of Florida, Suellen Charter of the Institute for Conservation Research at the San Diego Zoo; John Thorbjarnarson of the Wildlife Conservation Society (WCS); Kent Vliet of the University of Florida; Marlys Houck of the San Diego Zoo; Rob DeSalle of the Sackler Institute for Comparative Genomics at the American Museum of Natural History; and Michael Blum of Tulane University. The research was funded in part by the American Museum of Natural History, the University of Florida, WCS, Columbia University, Conservation, Food, and Health Foundation, Columbus Zoo, Idea Wild, Conservation Leadership Programme, St. Augustine Alligator Farm Zoological Park, Disney Wildlife Conservation Grant, US EPA Star Fellowship, and the Zoological Society of San Diego.

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