

Scientists use fossil feathers reveal lineage of extinct, flightless ibis

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The skull of *Apteribis sp.* Credit: Carla Dove

A remarkable first occurred recently at the Smithsonian's National Museum of Natural History when ornithologists Carla Dove and Storrs Olson used 700- to 1,100-year-old feathers from a long extinct species of Hawaiian ibis to help determine the bird's place in the ibis family tree. The feathers are the only known plumage of any of the prehistorically extinct birds that once inhabited the Hawaiian Islands.

Discovered with a nearly complete skeleton, the [feathers](#) retained enough [microscopic structure](#) to allow the scientists to confirm the classification of the bird, known by its scientific name *Apteribis sp.*, as a close relative of the American white ibis (*Eudocimus albus*) and scarlet ibis (*Eudocimus ruber*). DNA analysis confirmed this classification.

Remarkably, the feathers also retained enough pigmentation for Dove and Olson to determine that the bird was brown-black to ivory-beige in color. This is a first—the plumage color of any prehistorically extinct Hawaiian bird up until now had been speculation.

Apteribis sp. is one of only two species of flightless ibis, both now extinct. Its [skeleton](#) differs so much from its mainland ancestors that the bird's relationship to other ibises could only be determined through the study of its feathers and [DNA analysis](#).



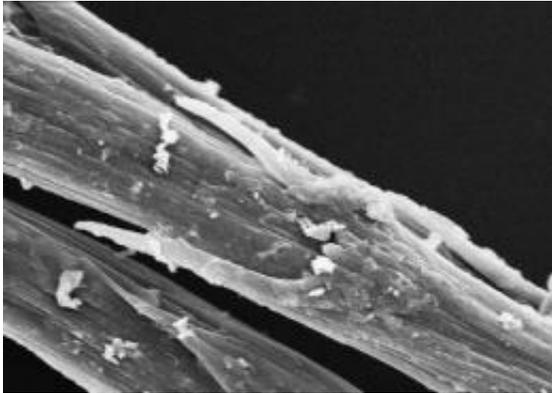
A detail of the top of the skull showing feathers adhering to the cranium of *Apteribis sp.* Credit: Carla Dove

"This find is highly unusual because feathers do not preserve well and often decay before a bird is fossilized," Dove said. "These weren't fossil imprints in a rock, but feathers and bones we could actually pick up."

Exceptional geologic circumstances led to the preservation of the feathers inside a lava cave on the Hawaiian Island of Lanai. The floor of the cave was partially covered in a deep layer of flaky gypsum crystals, which, for hundreds of years absorbed humidity in the cave and created

an arid environment ideal for preservation of the feathers.

From a taxonomic standpoint feathers are significant because the shape of microscopic barbs on specific areas of a feather have distinct features that taxonomists can use to determine what bird group it belongs to.



This scanning electron photomicrograph shows the prongs on the downy barbules of an *Apteribis sp.* feather. Credit: Carla Dove

"The barbs are unique only on the downy, fluffy part at the base of the feather, not at the tip," Dove said. "These microstructures are similar among orders of birds—pigeons, ducks, songbirds, for example.

Using specimens from the Smithsonian's collection, Dove compared the microscopic structures of the ancient feathers to those of modern day birds. Her analysis confirmed that *Apteribis sp.* is most closely related the New World ibises of the genus *Eudocimus*. *Apteribis sp.* was first described from fossils found on the Hawaiian Islands of Molokai and Maui. It is one of dozens of bird species known to have gone extinct following the arrival of humans on the [Hawaiian Islands](#).

"Fossil Feathers from the Hawaiian Flightless Ibis (*Apteribis SP.*): Plumage Coloration and Systematics of a Prehistorically Extinct Bird," by Carla Dove and Storrs Olson appeared in the September 2011 issue of the *Journal of Paleontology*.

Provided by Smithsonian

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