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Four-winged Microraptor Had Iridescent Black Plumage, Suggests Feathers Developed for Display

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An artist's recreation of Microraptor, a pigeon-sized, four-winged dinosaur that lived about 130 million years ago. Recent research has shown that the dinosaur had iridescent plumage. (Jason Brougham/University of Texas)

From keeping birds warm to assisting them in flight, feathers have a wide variety [1] of functions. But the evolution of this miracle trait—one of birds' most unique and beautiful [2] characteristics—has long-eluded ornithologists and paleontologists alike. But a new study of the four-winged dinosaur *Microraptor* suggests the trait could have also developed to attract mates.

A team of 10 American and Chinese researchers revealed the color and feather pattern of *Microraptor*, a pigeon-sized, four-winged dinosaur that lived about 130 million years ago. The study, to be published [3] in the March 9 edition of *Science*, not only determines the dinosaur had iridescent black feathers, but also emphasizes the importance of display in feather evolution.

This is the first published record of a non-avian creature with iridescent

Reconstruction of a *Microraptor* based on digital overlays of nine fossilized specimens. (American Museum of Natural History/M. Ellison)

feathers says Mark Norell, one of the study's authors and chair of the American Museum of Natural History's Division of Paleontology. Like a crow or starling's iridescent feathers, the Mircroraptor's feathers would have appeared to change color with the angle of illumination. "It's the diffraction of light," says Norell.

These bright black feathers, along with the *Mircroraptor*'s long tail, would have hindered its ability to move around and elude predators, explains Matt Shawkey, a co-author and associate professor of biology at the University of Akron.

"The idea is that when you see bright colors on birds and when you see things like ornaments, like a peacocks' tail, things that are really showy but hindered ability, it was probably something to display to a potential mate," says Shawkey.

"We argued that the primary role of the feather was for communication —recognizing individuals of the same species, luring different sex," explains Ke-Qin Gao, another coauthor of the study and researcher from Peking University in Beijing.

While the *Microraptor* has four wings and other bird-like traits, it is considered a non-avian dinosaur, included in the same group as the *Velociraptor*. Scientists can only speculate about the purpose for the Microraptor's four wings, but Norell says that they could have been used for gliding.

"When we look at the shape of the wings they really do resemble flying animals, but I don't think that any of us think that this dinosaur actually flew," Norell says. "It may have used the wings for gliding."

However, Julia Clarke, another co-authors and an associate professor of paleontology at The University of Texas at Austin, says she believes the *Microraptor* probably wouldn't have just used the wings for gliding, but may have used them for short spurts of flight.

"I personally believe it was more active than gliding, that there's some precursor to the avian flight stroke that is there," she says.

The study also determines the *Microraptor*'s tail was broader than previously believed, and was probably also related to communication like the creature's feathers.

In the study, researchers sampled the feathers from *Microraptor* fossil from northeastern China in Beijing Museum of Natural History. They then compared the samples' melanosomes—pigment-bearing organelles that partially produce feather color—with those of modern birds.

When melanosomes are organized in stacked layers, feathers are iridescent. Using a database of melanosomes from a variety of contemporary birds, a statistical analysis predicted the Microraptor

Fossilized *Microraptor* specimen from the Beijing Museum of Natural History. (American Museum of Natural History/M. Ellison)

was black with a glossy, iridescent blue sheen.

The new findings contradict other studies suggesting that the Microraptor was nocturnal, as dark, iridescent plumage is not common in modern nighttime birds.

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