



ScienceWatch – Feathers on Display

“Our evidence that *Microraptor* was largely iridescent thus suggests that feathers were important for display even early in their evolution.” – M. Sharkey

Long before birds took their first flight non-avian dinosaurs* were sporting feathers. The 150-million-year-old feathered fossil, *Archaeopteryx*, is generally considered by paleontologists to be a major link between reptiles and birds. But all agree it couldn't fly. So what was this non-aerial creature and others like it doing with feathers?

Insulation, sex (mating displays), camouflage, and species recognition has each in turn been posited by scientists for the early role of feathers. Now a study published in the March 9, 2012 issue of *Science* indicates that sex did play an important role.

A team of ten American and Chinese scientists headed by Quango Li from the Beijing Museum of Natural History closely examined a *Microraptor* fossil specimen with extremely well-preserved feathers on the right forelimb, left hind limb and tail that was recovered from Liaoning Province, China. *Microraptor* was a pigeon-sized, four-winged, non-avian dinosaur first discovered in 2003 that lived about 130 million years ago. With claws on all four limbs, it probably glided from trees, but like *Archaeopteryx* was incapable of powered flight.



The team collected 26 tiny samples from the feathered areas of the fossil and looked at the melanosomes— minute cell particles that synthesize the dark pigment melanin. They used a scanning electron microscope to examine the sausage-shaped melanosomes, which are 100 times smaller than the width of a human hair, and compared their orientation with those obtained from feathers of five extant bird species.

The *Microraptor* melanosomes were found to be arrayed end-to-end, densely packed and in sheets like those found in the dark, iridescent feathers of living birds, leading the researchers to conclude that *Microraptor* was “black with a glossy, weak iridescent sheen”, similar to a modern crow (*Corvis bracyyrhynchos*). The fine detail of the

fossilized feathers preserved in this specimen further revealed that the extremely long tail feathers, equal in length to the body, did not end in a teardrop shape as had been previously thought but in two streamers.

Shiny, strikingly colored feathers with a streamer-like tail that surely hampered flight—such results indicate that *Microraptor*'s feathers played a major role in some kind of sexual display. According to Matthew Sharkey, one of the researchers, “The idea is that when you see bright colors on birds and when you see things like ornaments, like a peacock’s tail, things that are really showy but hindered ability, it was probably something to display to a potential mate.”

Other non-avian dinosaurs like *Caudipterx zoui* and *Protoarchaeopteryx robusta* that lived around 145 million years ago also had feathers on their arms and tail, but like *Microraptor* couldn’t fly (www.hras.org/sw/sciencedino3.html). So it seems feathers were used for sex before they were used for flight.

Sexual selection must have been an important force in the early evolution of feathers just as it is today.

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*Non-avian dinosaurs are extinct ancestors of living birds. The latter are now considered “avian dinosaurs” by most paleontologists.