FLIGHT-TESTING A DINOSAUR: NOVA POWERS UP A WIND TUNNEL TO EXPLORE HOW DINOSAURS GOT THEIR WINGS

The Four-Winged Dinosaur

Tuesday, February 26 at 8pm ET/PT on PBS

pbs.org/nova/microraptor

In 2002, the discovery of a beautiful and bizarre fossil astonished scientists and reignited the debate over the origin of flight. With four wings and superbly preserved feathers, the creature was like nothing paleontologists had ever seen before. Now, NOVA travels to the Chinese stone quarry where the fossil was discovered—a famed dinosaur treasure-trove—and teams up with the world's leading figures in paleontology, biomechanics, aerodynamics, animation, and scientific reconstruction to perform an unorthodox experiment: a wind tunnel flight test of a scientific replica of the ancient oddity. Find out whether this 130 million-year-old relic takes flight on ***The Four-Winged Dinosaur***, premiering Tuesday, February 26 at 8pm ET/PT on PBS (check local listings).

Dubbed *Microraptor*, the crow-sized fossil is one of the smallest dinosaurs ever found and one of the most controversial, challenging conventional theories and assumptions about the evolution of flight. But how did *Microraptor* use its wings?

Did *Microraptor* array its arm- and leg-mounted wings in the style of an early-20th-century biplane to produce high lift at low speed? Did it use them to create a single lifting surface for efficient, swift gliding? Did it employ some combination of these two methods? Or were the extra wings useless for flight and likely to have been for some other purpose, such as attracting a mate?

To answer these questions, NOVA interviews Chinese paleontologist Xu Xing, who first recognized the importance of *Microraptor* and gave it its name; paleontologist Mark Norell and artist Mick Ellison of the American Museum of Natural History; paleontologist Larry Martin of the University of Kansas; anatomist Farish Jenkins of the Museum of Comparative Zoology at Harvard University; and aerodynamicist Kenny Breuer of Brown University.

Artists have historically played an important role in paleontology by helping to reconstruct the appearance and behavior of ancient animals. In the case of *Microraptor*, two completely different reconstructions were made, one at the American Museum of Natural History, and the other at the University of Kansas, based on different specimens and different techniques.

In addition, NOVA commissioned a "flight-ready" wind tunnel model of *Microraptor* complete with feathers and articulating joints.

The different reconstructions play into a long-running scientific controversy over the origin of flight in birds. For years the debate has been a standoff between two camps—those who believe dinosaurs were the ancestors of birds, and those who do not.

Believers in the dinosaur-bird connection have generally assumed that flight must have begun from the ground up, with fast-running dinosaurs that eventually got airborne as feathered arms evolved into wings and running leaps evolved into powered flight.

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Skeptics of the dinosaur-bird link say it would have been physically impossible for running dinosaurs to overcome gravity and get off the ground. It made more sense for flight to evolve from the trees down, with small, arboreal reptiles that glided from the treetops on their way to becoming full-fledged fliers. And that seemed to rule out dinosaurs, which, presumably, couldn't climb trees.

On NOVA, Mark Norell of the American Museum of Natural History is one of the proponents of the "birds-are-dinosaurs" hypothesis, which is the predominant view among most paleontologists, while Larry Martin of the University of Kansas speaks out for the minority view that birds descended from non-dinosaur tree dwellers.

Tantalizingly, *Microraptor* is the unexpected missing link that has reignited the debate and just might settle the issue—or at the very least deepen our understanding of the long-ago era when the ancestors of birds first took to the air.

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