This feathered dinosaur probably flew, but not like modern birds

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With this Archaeopteryx specimen, imprints from plumage can be seen near the shoulder and the tail's tip. Photo by: Pascal Goetgheluck/ESRF.

What at first looked like a fake fossil proved to be a hint to a larger, grander discovery.

In 1861, German paleontologist Christian Erich Hermann von Meyer wrote a short paper about the unusual fossil. What appeared to be a bird feather was pressed into 150-million-year-old limestone. Von Meyer labeled it Archaeopteryx, meaning old wing, and a full skeleton was found shortly after. He wasn't even sure if it was real.

The bones, discovered two years after Charles Darwin published his "On the Origin of Species," revealed a path to modern birds from their ancient ancestors. This discovery set the stage for a later revelation scientists had: birds are living dinosaurs.

During the next 150-plus years, paleontologists discovered 10 more Archaeopteryx skeletons. A picture of the creature emerged, of a dinosaur the size of a crow, weighing little more than a pound and covered in plumage. Still, having feathers, as the penguin and ostrich know, does not necessarily mean flight.

Animal Used More Shoulder Action To Fly

A new report in Nature Communications suggests that Archaeopteryx probably flapped through the air. The dinosaur did so unlike any bird flying today. Archaeopteryx used more shoulder action, the authors of the new report say. Imagine something like a butterfly stroke, according to Dennis Voeten, a researcher at the European Synchrotron Radiation Facility in France and the study's lead author.

Not everything that looks like a bird was a bird, especially in the Jurassic period, when dinosaurs roamed Earth. Recent discoveries have said Archaeopteryx was not a transitional dinosaur-to-bird fossil - there are now many finely feathered dinosaurs scientists know about. Archaeopteryx was probably not a direct tie to sparrows and ostriches, but a member of an offshoot group, Voeten said.

Scientists Debate Its Ability To Take Flight

As scientists have probed Archaeopteryx's family tree, they also questioned its ability to fly. In the second half of the last century, two ideas emerged. One group said, yes, Archaeopteryx flapped its way off the ground. The other group said, no, Archaeopteryx scrabbled up trees using its clawed wings, then let go and sailed to the ground like a sugar glider, a type of possum. A few paleontologists suggested other ideas. Perhaps Archaeopteryx was in the process of losing its flight ability, not gaining it.

In the new study, Voeten and his team examined Archaeopteryx fossils using a synchrotron - a powerful source of radiation. The concept is similar to an X-ray, but your dentist's X-ray machine would fail to distinguish fossilized skeletons from the background rock. A synchrotron beam is much more sensitive.

Bones, Voeten pointed out, record our daily stress. "The right upper arm bone of a professional tennis player is thicker than the left upper arm bone," he said. Likewise, the stress of flying reshapes the wing bones in modern birds. He decided to look for similar evidence in Archaeopteryx.

Bones Resemble Those Of "Burst Fliers"

The study authors examined cross-sections of the Archaeopteryx bones and compared these structures to bones in flying birds, flightless birds, other dinosaurs and modern dino-like reptiles, like crocodiles. The Archaeopteryx bone characteristics closely resembled what Voeten called "burst fliers." These are birds like pheasants, roadrunners and turkeys - animals comfortable on the ground but capable of taking flight with a snap of the wings. The study concludes that Archaeopteryx was probably this type of flier.

Still, it did not fly like a pheasant. "The modern bird has a very nifty pulley system," Voeten said. The muscle groups that move bird wings up and down are attached at the sternum, or ribcage, like the wheel of a pulley. However, if you flap your arms to mimic a bird, you use muscles that are anchored at the chest and shoulders. Archaeopteryx wings were attached like our arms, with no chest pulley. "We're sure that it's incapable of flying like a modern bird does," he said.

Voeten expects that the new study will attract Archaeopteryx flight critics and says, "I warmly welcome them." He is not beholden to the idea Archaeopteryx could fly, he said. "This is a very famous, notorious debate that I am entering in as a new guy."