

# Caudipteryx Revealed

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## RESEARCH PROJECT

Supported in part by your Society

It was late when a visitor appeared in my dimly lit hotel room in Beipiao, China. Geologist Ji Qiang carried a cloth sack containing a broken slab of rock. He had just acquired it from a collector who works the rich fossil beds of Liaoning Province. These formations have produced more specimens relevant to the origin of birds than all the world's other sites combined.

The director of China's National Geological Museum, Ji believed he now possessed the best specimen yet of *Protarchaeopteryx*. This feathered creature is even more primitive than *Archaeopteryx*, a fossil considered the earliest bird since its discovery in Bavaria in 1861. Yet as we would soon discover, Ji had found something entirely new.

Three months later Ji and I were in Beijing, huddled in the red-carpeted conference room of Ji's museum. As we studied three specimens identified as *Protarchaeopteryx*, some inconsistencies began to appear. The three fossils were the same size and all had body feathers, but two had much shorter arms. Were we looking at males and females? Was





With surgical precision, technician Kevin Aulenback prepares a newfound fossil from Sihetun called *Caudipteryx zoui* (diagram at left), a curious creature that has further blurred the line between dinosaurs and birds.

*Protarchaeopteryx* a creature with much variation?

Fortunately Kevin Aulenback, one of the most skillful technicians at the Royal Tyrrell Museum of Palaeontology in Drumheller, Alberta, where I am curator of dinosaurs, was with us. As he cleaned the skulls under a microscope with a dental probe, we were startled by differences in the teeth. In both upper and lower jaws *Protarchaeopteryx* has *Archaeopteryx*-like conical teeth, except that they are serrated. But the two short-armed specimens had long, sharp teeth with deep, bulbous roots. And the teeth were confined to the front of the

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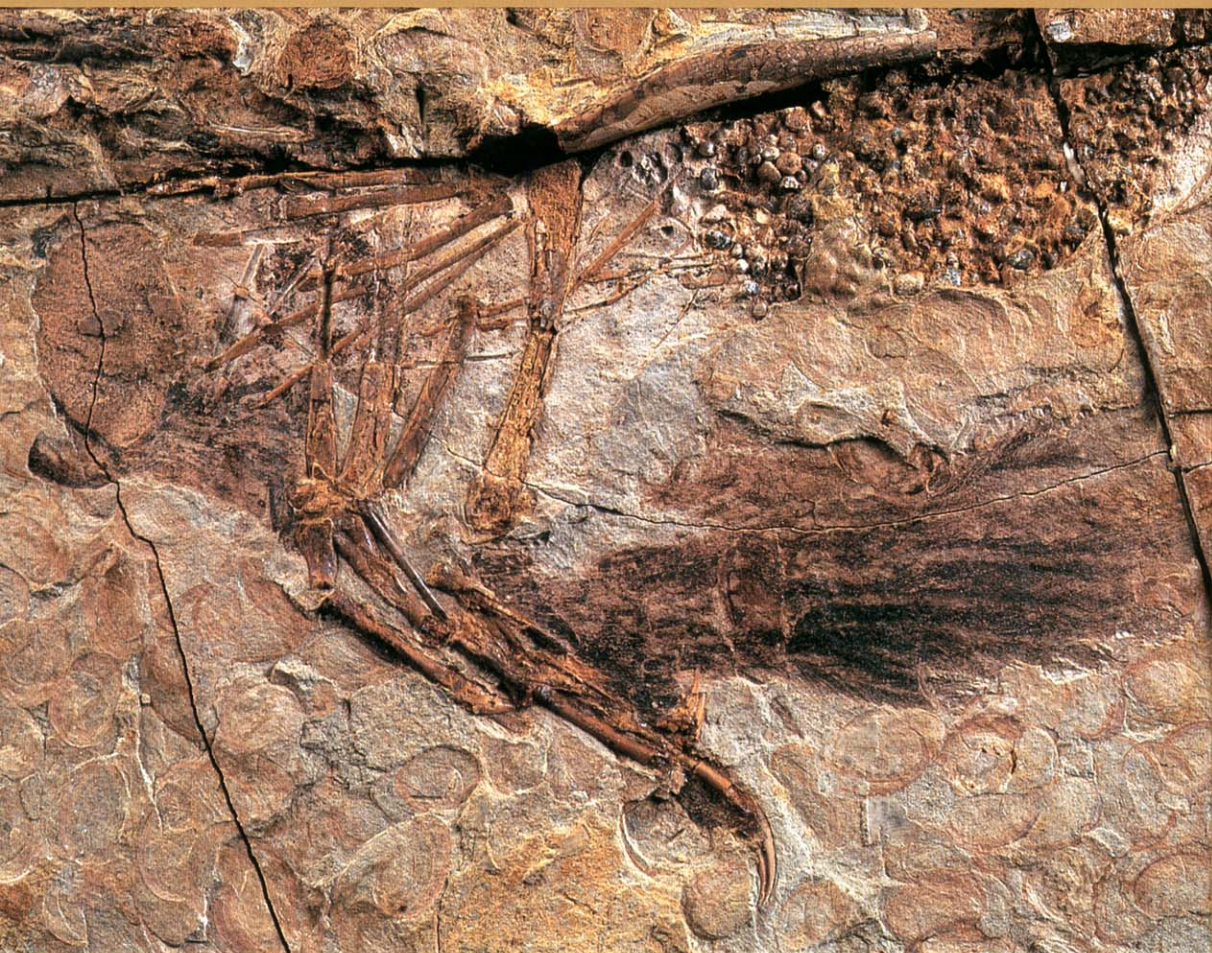
upper jaw, pointing more forward than down. They may have been incorporated into a birdlike beak with only the tips protruding.

We were now convinced that we had found a species never before seen. We named it *Caudipteryx*,

or “tail feather,” for the tail plumes that the creature likely fanned out for display. The feathers of *Protarchaeopteryx* and *Caudipteryx* seal their relationship to the earliest known birds, though neither animal had the ability to fly. In their body form they look less like that 19th-century evolutionary icon *Archaeopteryx* and more like those slender, meat-eating dinosaurs called theropods.

*Caudipteryx* becomes the fourth type of “feathered” animal from the remarkable Sihetun locality. It joins *Protarchaeopteryx* and *Confuciusornis*—a creature with relatively short, clawed wings that was probably one of the first birds to fly well—and *Sinosauropteryx*, one of the most important dinosaur finds of the 20th century.

My introduction to *Sinosauropteryx* had taken place during another memorable meeting with Ji. A year earlier at his museum he opened a



silk-wrapped gift box for me. Inside was a stunningly complete chicken-size fossil with a halo of feather-like structures on its back and tail, yet with the body of a theropod—a sensational find that made news as a possible missing link between dinosaurs and birds. Paleontologists and ornithologists are now grappling with redefining what constitutes a bird.

*Caudipteryx* and *Protarchaeopteryx* make the dividing line between dinosaurs and birds even less distinct and strengthen the theory that birds evolved from small carnivorous ground-dwelling dinosaurs.

These four discoveries were made within just a few years at Sihetun. I can't help but wonder what other treasures are to be found there.

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Fossils of *Protarchaeopteryx*, *Caudipteryx*, and *Sinosauropteryx* and models of the latter two species will be displayed at Society headquarters through July 19.



Peering into a cloudy past, Aulénback and paleontologist Philip Currie (above, at right) examine *Caudipteryx* with Ji Qiang of China's National Geological Museum, a co-author of the specimen's scientific description. Below its feathered arms the fossil shows stones called gastroliths (left, at upper right). These were ingested to grind food, as in the gizzards of modern birds.