



## ScienceWatch – Four-Winged Flyers

**“It is amazing that so many early birds had large leg feathers. [These findings] are important for both flight origin and the evolution of feathers.” – Xing Xu**

The first controlled, powered, heavier-than-air human flight was made in a four-winged-biplane 110 years ago. Recent fossil evidence indicates that birds were using four wings to fly 130 million years before that.

A team of Chinese paleontologists, including the renowned feathered-dinosaur-fossil-finder, Xing Xu, has provided a detailed analysis of 11 fossil specimens of “basal birds”, an extinct group with large flight muscles, which directly gave rise to modern birds. The fossils, like *Sapeornis* (shown below with a close up of its leg feathers, were collected in Liaoning Province, a region in northeastern China that has produced many well-preserved fossils of feathered dinosaurs that lived about 130 million years ago.

The analysis was done by a team of paleontologist led by Xiaoting Zheng at Shandong Tianyu Museum of Nature, Shandong, China, and published in the March 15, 2013 issue of *Science*. It clearly shows that each of the specimens had well-developed feathers on all four limbs. Some exhibit clusters of feathers just above the feet, others have feathers that continue up the leg. Zheng *et al.* conclude that unlike leg feathers in modern birds, which protect and insulate the leg, these feathers had curved shafts and were stiff enough to be “aerodynamic in function, providing lift, creating drag, and/or enhancing maneuverability, and thus played a role in flight.”

makes it difficult to determine the precise orientation of the leg feathers in every case, the scientists maintain that the specimens “confirm the presence of a four-winged condition in basal birds.”

Prior examples of fossils with leg feathers came from bird precursors that are non-avian dinosaurs like *Microraptor* and *Anchiornis* (<http://hras.org/sw/swmay2012.htm>, <http://hras.org/sw/swapril10.htm>). But until now no one had evidence for hind wings in

basal birds.



According to the team the basal bird fossils show an evolutionary trend for a

gradual loss of feathers starting at the ankle and moving up the leg, so they ended up using two wings to fly and not four. This process, they say,

allowed the legs of early birds to become specialized for efficient locomotion on land and their arms to become highly efficient wings. The final result is the legs we see in modern birds, which are covered in scales and may have some small fluffy feathers above the ankle. They note that the same genes control the production of both scales and feathers—scales are undeveloped feathers—so it's easy to see how this can occur.

Mark Norell, a paleontologist at the American Museum of Natural History in New York is a bit skeptical. Commenting on the report he said, "The work is most interesting, but I would like to see a denser sampling. The origin of flight is not going to come from just one discovery."

Saul Scheinbach