

Discovery raises new doubts about dinosaur-bird links

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Researchers at Oregon State University have made a fundamental new discovery about how birds breathe and have a lung capacity that allows for flight - and the finding means it's unlikely that birds descended from any known theropod dinosaurs.

The conclusions add to other evolving evidence that may finally force many paleontologists to reconsider their long-held belief that modern [birds](#) are the direct descendants of ancient, meat-eating [dinosaurs](#), OSU researchers say.

"It's really kind of amazing that after centuries of studying birds and flight we still didn't understand a basic aspect of bird biology," said John Ruben, an OSU professor of zoology. "This discovery probably means that birds evolved on a parallel path alongside dinosaurs, starting that process before most dinosaur species even existed."

These studies were just published in *The Journal of Morphology*, and were funded by the National Science Foundation.

It's been known for decades that the femur, or thigh bone in birds is largely fixed and makes birds into "knee runners," unlike virtually all other land animals, the OSU experts say. What was just discovered, however, is that it's this fixed position of bird bones and musculature that keeps their air-sac lung from collapsing when the bird inhales.

Warm-blooded birds need about 20 times more oxygen than cold-

blooded reptiles, and have evolved a unique lung structure that allows for a high rate of gas exchange and high activity level. Their unusual thigh complex is what helps support the lung and prevent its collapse.

"This is fundamental to bird physiology," said Devon Quick, an OSU instructor of zoology who completed this work as part of her doctoral studies. "It's really strange that no one realized this before. The position of the thigh bone and muscles in birds is critical to their lung function, which in turn is what gives them enough lung capacity for flight."

However, every other animal that has walked on land, the scientists said, has a moveable thigh bone that is involved in their motion - including humans, elephants, dogs, lizards and - in the ancient past - dinosaurs.

The implication, the researchers said, is that birds almost certainly did not descend from theropod dinosaurs, such as tyrannosaurus or allosaurus. The findings add to a growing body of evidence in the past two decades that challenge some of the most widely-held beliefs about animal evolution.

"For one thing, birds are found earlier in the fossil record than the dinosaurs they are supposed to have descended from," Ruben said. "That's a pretty serious problem, and there are other inconsistencies with the bird-from-dinosaur theories.

"But one of the primary reasons many scientists kept pointing to birds as having descended from dinosaurs was similarities in their lungs," Ruben said. "However, theropod dinosaurs had a moving femur and therefore could not have had a lung that worked like that in birds. Their abdominal air sac, if they had one, would have collapsed. That undercuts a critical piece of supporting evidence for the dinosaur-bird link.

"A velociraptor did not just sprout feathers at some point and fly off into

the sunset," Ruben said.

The newest findings, the researchers said, are more consistent with birds having evolved separately from dinosaurs and developing their own unique characteristics, including feathers, wings and a unique lung and locomotion system.

There are some similarities between birds and dinosaurs, and it is possible, they said, that birds and dinosaurs may have shared a common ancestor, such as the small, reptilian "thecodonts," which may then have evolved on separate evolutionary paths into birds, crocodiles and dinosaurs. The lung structure and physiology of crocodiles, in fact, is much more similar to dinosaurs than it is to birds.

"We aren't suggesting that dinosaurs and birds may not have had a common ancestor somewhere in the distant past," Quick said. "That's quite possible and is routinely found in evolution. It just seems pretty clear now that birds were evolving all along on their own and did not descend directly from the theropod dinosaurs, which lived many millions of years later."

OSU research on avian biology and physiology was among the first in the nation to begin calling into question the dinosaur-bird link since the 1990s. Other findings have been made since then, at OSU and other institutions, which also raise doubts. But old theories die hard, Ruben said, especially when it comes to some of the most distinctive and romanticized animal species in world history.

"Frankly, there's a lot of museum politics involved in this, a lot of careers committed to a particular point of view even if new scientific evidence raises questions," Ruben said. In some museum displays, he said, the birds-descended-from-dinosaurs evolutionary theory has been portrayed as a largely accepted fact, with an asterisk pointing out in

small type that "some scientists disagree."

"Our work at OSU used to be pretty much the only asterisk they were talking about," Ruben said. "But now there are more asterisks all the time. That's part of the process of science."

Source: Oregon State University ([news](#) : [web](#))

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