



University of Utah study looks at why lizard lungs work like those of birds

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It's not just for the birds: Air flows through the lungs of reptiles in a pattern that scientists previously thought necessary only for high-altitude flight.

C.G. Farmer, an associate professor of biology at the University of Utah, discovered in 2010 that alligator lungs exhibit the same one-way airflow as their avian cousins, and that method thus evolved about 80 million years before the first birds. Wednesday, another Farmer study published in the journal Nature finds that also true of monitor lizards — whose ancestors branched off from alligators' ancestors 20 million years earlier.

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Either one-way airflow evolved independently in monitor lizards, or, as Farmer thinks more likely, it originated more than 270 million years ago — around 100 million years before birds took to the skies.

So what does that tell us?

That we're not as smart as we thought.

"That's surprising that we don't know something so incredibly basic about the biology of a group of animals," she told The Tribune by phone from Denmark, where she is currently doing more research.

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When humans and other mammals breathe in, air flows through our lungs in a tidal pattern. It enters our lung airways and dead-ends at small chambers called alveoli. There, oxygen is deposited and carbon dioxide is released.

the same way it came in.

In birds, air enters a lung in one direction and makes a loop before leaving. Scientists have long figured out that this method evolved to allow for strenuous activity in low-oxygen environments — airlines coexist with condors at 30,000 feet, Farmer says, but if a panel were to come off the plane, passengers "had better hope the oxygen masks pop down."

"We thought that this made them in a sense a more effective lung than you would find otherwise," Farmer said. "Finding this in animals that don't have those metabolic rates means we were probably wrong."

But we don't yet know why reptiles, like African savannah monitor lizards, would benefit from a one-way system. At low altitudes, tidal and one-way are thought to be a wash.

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It sort of made sense that alligators would have evolved the one-way system because they came about 250 million years ago, when atmospheric oxygen levels were low after the Permian-Triassic mass extinction. But if indeed it evolved in the common ancestor of the alligator and the monitor lizard cold-blooded diapsids — then scientists need to go back to the drawing board because oxygen levels were relatively high at that time.



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