

Researchers find lungs in amphibian previously reported to be lungless

March 18 2014



The head of C. iwokramae, with arrows showing the position of the open nostrils. Left: CT scan of the head. The skull is in yellow. Right: photo of the head with the nostril stained blue.

The discovery of a well-developed lung and working nostrils has overturned the mistaken identity of an amphibian previously reported to be lungless.

When it was first described in 2010, the amphibian, Caecilita iwokramae, caused a stir because of its lack of lungs or open nostrils. The revelation was widely reported in the science press.

Although there are several other known examples of lungless amphibians, this was the only one that had clearly evolved on land, rather than in water, challenging a popular theory of why some creatures lost



their lungs.

Now, in research published today in the journal *Zootaxa*, a team led by scientists at the Museum has re-examined the original sample of C. iwokramae and several new specimens, and found it does in fact have one well-developed <u>lung</u> connected to working nostrils.

Breathing easy

The evolution of lungs is thought to have helped animals conquer the land, and most living amphibians still use lungs. However, a few amphibian lineages later evolved away from lungs, instead exchanging gases through their skin.

While there are several possible explanations as to why this happened, a popular idea is that it developed in species living in fast-flowing waters. Here, lungs would make them more buoyant, so that they would be unstable in the currents and be swept away.

All the previously discovered lungless species do live in such conditions. Caecilita iwokramae was instead found living on land, on the floor of a forest in Guyana. Its discovery seemed to fatally challenge the hypothesis of reduced buoyancy in fast-flowing water.

Failed expedition?

When the lungless C. iwokramae was announced, it was described from just one specimen. Hoping to find more, Drs Mark Wilkinson and David Gower, with their Belgian colleague Philippe Kok, set out on an expedition to the Iwokrama Forest in Guyana where the original specimen was collected.



But they did not find what they were expecting. 'We were continually disappointed to only find animals with open nostrils and this made us believe, at the end of an arduous expedition, that we had failed,' Dr Wilkinson said.

They collected these anyway, and later decided to re-examine the original specimen, on which the lungless diagnosis had been based. When they did, they were surprised to find it had one lung and nostrils that, although small, were open and working. That the nostril is open was confirmed and visualised by Dr Farah Ahmed in the Museum's micro-CT scanning facility.

'We discovered that we had not failed at all: we had succeeded in recollecting the species, which seems fairly common in the area we searched,' Dr Wilkinson said. Their examination of the old and new specimens led them to re-classify C. iwokramae as belonging to a previously known group of amphibians.

Extraordinary claims

'The bottom line is that the scientists who described this animal made a fairly spectacular mistake and that the species is actually not relevant to our understanding of why lunglessness has evolved in some species,' Dr Wilkinson said.

'With observational sciences the lesson is to get others to check your findings when you can especially if the findings are of something highly unusual.' Extraordinary claims like these, that seem to counter all previous knowledge, require extraordinary evidence.

Provided by Natural History Museum



Citation: Researchers find lungs in amphibian previously reported to be lungless (2014, March 18) retrieved 28 April 2024 from <u>https://phys.org/news/2014-03-lungs-amphibian-previously-lungless.html</u>

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