

## INVESTIGATING ORIGINS

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### “Fins to Feet Again?”

The scientific world was recently rocked by the discovery of what appeared to be the unquestionable missing link between fish and land-dwelling amphibians, one of the classic images of evolutionary theory. The fossilized remains, which contained only part of the creature, were discovered in Arctic Canada and given the scientific name *Tiktaalik roseae*. It was touted worldwide as indisputable evidence that tetrapods (four-footed, land-dwelling animals) evolved from fish that had crawled out of the water.

However, as with so many other instances in the incredibly complicated search for origins, *Tiktaalik* is not quite the Golden Fleece paleontologists have been looking for. The journal *Science News* reported:

“The well-preserved remains of *Tiktaalik* go a long way, but not quite the whole way, toward filling the gap in the fossil record between the earliest tetrapods and the lobe-finned fish that preceded them, says [Jennifer A.] Clack [a vertebrate paleontologist at the University of Cambridge]. Even though the bones in *Tiktaalik*’s fin resemble those of tetrapod digits, they’re still very much part of a fin. If the digits of early tetrapods evolved from these bones, the process must have involved considerable changes in anatomical development, Clack notes” (Perkins 2006: 380).

According to current theory, as *Tiktaalik*’s evolutionary successors spent more time on land, their fins evolved into digits (that is, fingers and toes). The most famous of these early tetrapods were *Ichthyostega* and *Acanthostega*, which are held to be the first land-dwelling animals to have evolved from *Tiktaalik* or its immediate successors. One problem with this scenario, however, is that, according to *Science News*, “some aspects of *Ichthyostega*’s anatomy, including the structure of its ear, suggest that the creature spent a significant amount of time in the water” (Ibid.). The journal further point out:

“Paleontologists have unearthed hundreds of specimens of *Ichthyostega*. However, all those fossils are fragmentary, and no single specimen includes a complete spinal column, says Clack. Previous reconstructions of *Ichthyostega*, which were typically based on just a few bones, portrayed all the creature’s vertebrae, from its neck to its tail, as being similar. However, a new analysis by Clack and her colleagues Per Ahlberg and Henning Blom of Uppsala University in Sweden indicates that those interpretations are probably wrong” (Ibid.)

Clack’s analysis consisted of a careful study of six *Ichthyostega* specimens that included substantial portions of their spinal columns. Clack’s team discovered that the vertebrae in some segments of *Ichthyostega*’s spinal column were shaped differently from those in other segments. These visible differences in shape had not been shown in earlier reconstructions of the creature (Ibid.).

On top of this revelation that *Ichthyostega* reconstructions have been less than reliable, *Science News* noted that the “gap” in the famed evolutionary chain from fish to land-dwelling animals has not actually been filled by *Tiktaalik*:

“Although *Tiktaalik* has shrunk the gap in the fossil record between tetrapods such as *Ichthyostega* and the lobe-finned fish that preceded them, that gap hasn’t gone away, says Clack.

Another breach exists between partially aquatic species such as *Ichthyostega* and *Acanthostega* and the fully terrestrial [land-dwelling] tetrapods that arose millions of years later” (Ibid.).

Unfilled gaps, incomplete fossils, and incorrect anatomical reconstructions should give us pause before we jump to hasty conclusions about a missing link between fish and tetrapods. The jury must remain “out” until further evidence can be found.

Reference:

Perkins, S. 2006. “Amphibious Ancestors.” *Science News* 169, no. 24.

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