From ocean to land: The fishy origins of our hips

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Researchers compared the hips of Axolotls (pictured) with Australian Lung Fish. Credit: ThinkStock

New research has revealed that the evolution of the complex, weight-bearing hips of walking animals from the basic hips of fish was a much simpler process than previously thought.

Tetrapods, or four-legged animals, first stepped onto land about 395 million years ago. This significant change was made possible by strong hipbones and a connection through the spine via an ilium - features that were not present in the fish ancestors of tetrapods.

In a study published in the journal *Evolution and Development*, Dr Catherine Boisvert of the Australian Regenerative Medicine Institute at Monash University, MacQuarie University's Professor Jean Joss and

Professor Per Ahlberg of Uppsala University examined the hip structures of some of human's closest fish cousins.

They found the differences between us and them are not as great as they appear - most of the key elements necessary for the transformation to human hips were actually already present in our fish ancestors.

Dr Boisvert and her collaborators compared the hip development - bones and musculature - of the Australian lung fish and the Axolotl, commonly known as the Mexican Walking Fish. The results showed that, surprisingly, the transition from simple fish hip to complex weight-bearing hip could be done in a few evolutionary steps.

"Many of the muscles thought to be "new" in tetrapods evolved from muscles already present in lungfish. We also found evidence of a new, more simple path by which skeletal structures would have evolved," Dr Boisvert said.

The researchers found that the sitting bones would have evolved by the extension of the already existing pubis. The connection to the vertebral column could have evolved from an illiac process already present in fish.

"The transition from ocean-dwelling to land-dwelling animals was a major event in the evolution of terrestrial animals, including humans, and an altered hip was an essential enabling step," Dr Boisvert said.

"Our research shows that what initially appeared to be a large change in morphology could be done with relatively few developmental steps."

Provided by Monash University

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