

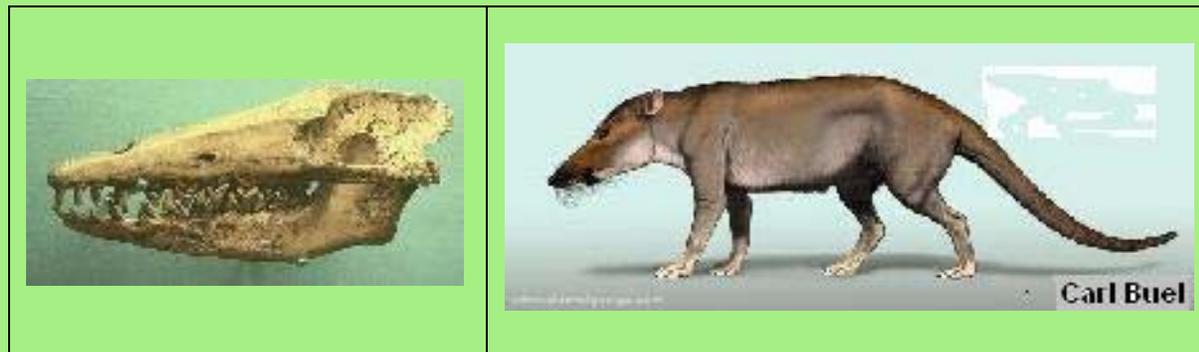
Whales get their feet wet

The link between land-based animals and whales in the sea has been found in Kashmir, says S. Ananthanarayanan.

It is known that the animals of the land evolved from ancestors that lived in the sea. Early creatures crawled out of the water and fins evolved into legs and the gills changed to lungs. But the whale represents the reverse journey - from the land, back to the sea, with legs adapting to become flippers, to be useful in the water.

Evolution track

We know about whales having come from land-based animals because of the fossil record at hand since 30 years. In 1978, paleontologist Phil Gingerich discovered a 52 million year old skull of a wolf-like carnivore, whose inner ear had features found in the *Archeocetus*, the oldest of known whales, whose inner ear is adapted for hearing under water. The skull has been named *Pakicetus*, to indicate that it was found in Pakistan and was connected with Cetacea, the order of whales, dolphins and porpoises.



Another, more recent ancestor is the amphibian *Ambulocetus*. The name also indicates that it could walk as well as swim, like a whale. This animal had forelimbs with fingers and hooves, but the hind limbs were adapted for swimming, which it did, perhaps, by undulating its back, like otters or the whale.

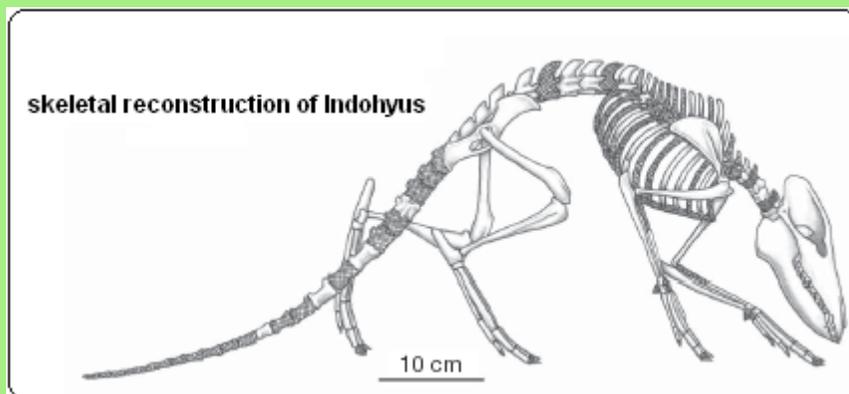
The next two species on the way to whales were the Rhodocetus and the Basilosaurus. The Rhodocetus shows a shorter and more stable neck and an inner ear clearly adapted to underwater hearing. The Basilosaurus, of about 40 million years ago, was well adapted to living in the sea, with flippers and a long, flexible body, but still with small, weak hind legs left over from its evolutionary past.

But all these animals, although similar to whales, were not the direct ancestor of the modern whale, they may have been side branches in the evolutionary tree. The clear ancestor from which the modern whale descended was not known.

Found in Kashmir

But just recently, the report in *Nature* is only of last week, Prof Thewissen, to whom is credited much of what was known so far about the evolution of whales, and colleagues at Northwestern University, Ohio, report fossils of a fox-like creature in the Kashmir region that qualifies as the closest yet to the modern whale.

The *Indohyus* was raccoon sized, hooved and shared many features with whales. In the structure of its inner ear, its premolars, the density of its limb bones and in the chemical composition of its teeth, the Indohyus was similar to whales, particularly the thickening of a part of the inner ear, just like found only in whales. But what is significant is that the animal had already undertaken aquatic life. This indicates that the aquatic existence of whales had started even before the order Cetacea was born.



As the Indohyus was a weed eater, it suggests that whales took to the water before adapting to becoming meat eaters.

The conclusions are based on the study of hundreds of bones of the plant eating animal. Apart from skeletal clues, leads also came from the structure and composition of the bones and teeth. And the learning advances our understanding of the processes that have shaped the world.
