Pannoniasaurus inexpectatus: World's first freshwater mosasaur

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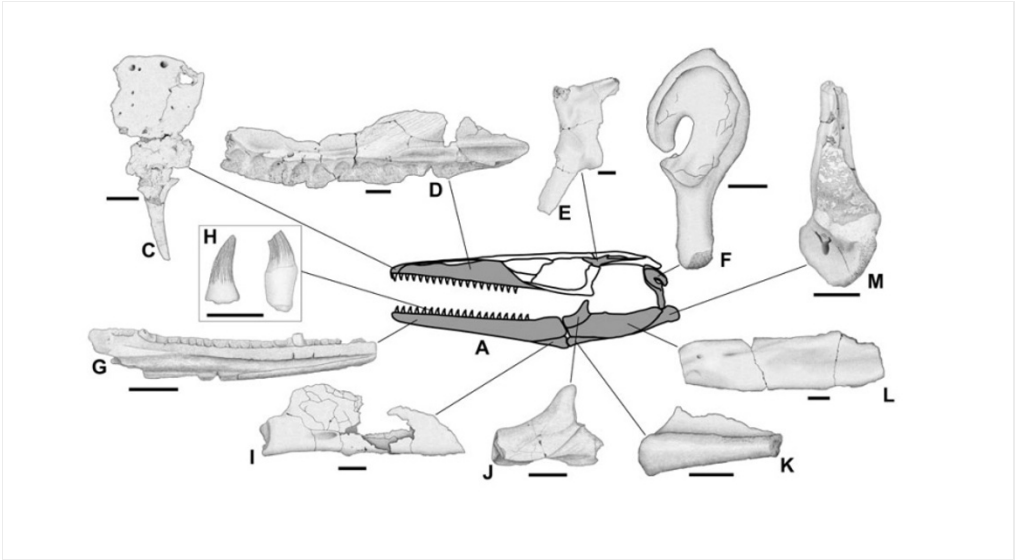
21 December 2012



Makadi L, Caldwell MW, Osi A (2012)

Skeletal anatomy of the first freshwater mosasaur, Pannoniasaurus inexpectatus, found in Hungary.

A blog by Scientific American.

Fossilised bones of a new species of mosasaur have been unearthed in Hungary, providing the first evidence that these giant, aquatic lizards lived in both freshwater and marine environments.

Since the first mosasaur was discovered in 1764, thousands of specimens have been discovered all over the world. But because there was no evidence that they lived in freshwater environments, it's been assumed that they were exclusively marine predators.

In 1999, a single vertebra was discovered alongside a variety of fish and crocodile teeth in the waste dump of a coal mine in Ajka, an industrial town in Western Hungary. This is the first known specimen of the mosasaur – named Pannoniasaurus inexpectatus, because no one expected to find one in what used to be a freshwater environment. The following year, a dried-up river system known as the Csehbánya Formation was exposed by a site named Iharkút, discovered about 20 km away at an open-pit bauxite mine. Over several years, more fragmentary vertebrae of Pannoniasaurus were found at the site, as well as the bones of turtles, lizards, amphibians, alligators, pterosaurs and more fish. But these fossils were so fragmentary, they were mistaken for the bones of large terrestrial lizards.

It wasn't until recently that more bones, including the all-important skull bones, were discovered at Iharkút, causing the excavators to realise that they had unwittingly been piecing together a new, very unusual species of ancient aquatic reptile.

"Until now, mosasauroids have been regarded as an exclusively marine group. However, with the discovery and description of Pannoniasaurus, mosasauroid evolution is now understood as also having involved important and unsuspected adaptations to freshwater ecosystems," the team, led by palaeontologist Laszlo Makadi from the Hungarian Natural History Museum, report in today's issue of PLoS One. The researchers have now collected over 100 Pannoniasaurus bones, from individuals large and small, young and old, from the Csehbánya Formation, and the site has never produced a single marine or brackish faunal or floral specimen.

According to the researchers, Pannoniasaurus lived between 85.8–83.5 million years ago during the Late Cretaceous period, and it thrived in a freshwater river system of an island landmass in the western Tethyan Archipelago – a series of island chains that sat between the African and Eurasian landmasses in what once was the Tethys Ocean.

Comparing its vertebrae and other bones to those of known marine mososaurs, the team suggested that Pannoniasaurus could have grown up to six metres long, making it the largest known aquatic predator of this palaeonenvironment. It appears to have been super-

specialised for its freshwater environment, with a flattened skull like a crocodile for ambushing prey on both land and in shallow water, and while there is little evidence for what its limbs would have looked like, the researchers suggest that it could have had limbs like a terrestrial lizard. They say Pannoniasaurus probably adapted to its environment like modern freshwater river dolphins adapted to life in the Amazon, Ganges, Yangtze and La Plata River.

The smallest vertebra found likely belonged to a Pannoniasaurus that was just 70 cm long, which, according to the researchers, means it's likely that this area, and Ajka nearby, was a place were many individuals of varying sizes and ages lived all year round, rather than migrating from marine environments for seasonal food or breeding activity. But they concede that definitive evidence is lacking. "Whether or not Pannoniasaurus was restricted to freshwater environments, or perhaps instead was a seasonal, opportunistic migrant and consumer in these habitats, remains uncertain," they write in their report. "[However,] sedimentological, taphonomical (fossilising conditions), morphological and geochemical evidences suggest the former."

Nature | doi:10.1038/nature.2012.12128