Prehistoric giant fish could grow more than 16 metres long

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Credit: Bob Nicholls paleocreations.com

The skeletal remains of the biggest fish ever to have swum the seas have revealed just how massive the prehistoric creature could grow.

The Leedsichthys was a huge bony, plankton-eating fish that lived in the Middle Jurassic period around 165 million years ago.

A number of skeletal remains of the creature have been uncovered over

the years but haven't preserved well, meaning no-one was really sure just how large the fish could grow.

Now an international team of researchers from National Museums Scotland and the Universities of Glasgow and Edinburgh have deduced the Leedsichthys could grow to eight or nine metres in 20 years and reach 16.5 metres in length in 38 years.

The experts believe their findings reveal an important missing piece in the evolutionary story of fish, mammals and ocean ecosystems.

Professor Jeff Liston of National Museums Scotland, said: "The giant plankton-feeders we know to live in today's oceans are among the largest living vertebrate animals alive. The Leedsichthys was the first animal known to occupy this role.

"What we didn't have any clear idea of, was how large this large fish really was: its skeleton preserves poorly, it is often just isolated fragments, so previous size estimates were largely historical arm-waving exercises."

Together the team, which included researchers from the Grant Institute of the University of Edinburgh, the University of Glasgow's Scottish Centre for Ecology and the Natural Environment (SCENE), and the Royal Tyrrell Museum of Alberta, Canada, studied various remains of the fish – including a new specimen unearthed in Peterborough.

Prof Liston said: "We sat down and looked at a wide range of specimens, not only at the bones, but their internal growth structures as well – similar to the growth rings in trees – to get some ideas about the ages of these animals, as well as their estimated sizes.

"What we have demonstrated here is that a small adult Leedsichthys of

8-9 metres could reach that length within around 20 years, whereas after 38 years it would be around 16.5 metres long – possibly even outgrowing today's massive whale sharks.

"This fish was a pioneer for the ecological niche filled today by mammals, like blue whales, and cartilaginous fish, such as manta rays, basking sharks, whale sharks.

"Before then, vertebrate suspension-feeders did not get larger than 50cm in length. Something important had changed. The existence of these large suspension-feeding fish at this time is highly significant, as it would seem to be clear evidence of a major change in plankton populations in Earth's oceans of Jurassic Earth – a 'smoking gun' that something new, widespread and highly edible was around – possibly related to the first appearance of small crustaceans called copepods.

"This has implications for our understanding of biological productivity in modern oceans, and how that productivity has changed over time."

Leedsichthys was the first truly giant suspension feeder of the oceans, appearing during the Age of the Dinosaurs, when gigantism – large body size – on the land was producing some of the largest dinosaurs.

Leedsichthys was around for at least ten million years in the Middle and Upper Jurassic. Although its relatives, all pachycormid fish, continued to successfully suspension feed on plankton through the rest of the Age of the Dinosaurs until the end of the Cretaceous 66 million years ago, the largest examples were in the 4-6 metre range, and never again quite in the same league as Leedsichthys.

Dr Mike Newbrey, of the Royal Tyrrell Museum of Palaeontology, Alberta, Canada, noted: "Study of the age and growth of Leedsichthys provides new insight into the biology of this poorly known and ancient

fish."

Professor Colin Adams, Director of SCENE, said: "Clearly from its size alone Leedsichthys must have been a charismatic animal – however, equally fascinating for ecologists are the ecological processes that enabled such a large aquatic animal to thrive."

Prof Liston said: "One of the truly fascinating aspects of this fish as a suspension feeder, is that it seems to have developed a unique mesh structure on its gills to help it extract plankton as the seawater passed through its mouth.

"Extremely delicate and rarely-preserved, it resembles the honeycomb pattern in a bee-hive. It functioned like a trawler's net to trap plankton, and obviously was very effective, given the large sizes this animal achieved. This mesh structure is very different to what we see in today's suspension-feeding fish and whales. It had a unique way of solving a similar problem.

"This is why Leedsichthys was such a successful animal, with its remains found around the world, from northern Germany to the Normandy coast of France, Mexico and the Atacama Desert in Chile."

Dr Tom Challands, of the Grant Institute at the University of Edinburgh, said: "Our new study forms one large piece of the jigsaw puzzle of life in the Jurassic seas, however, much still remains to be understood. Did these animals migrate like their modern equivalents? Preliminary geochemical studies investigating the composition of the bone when the animal lived and soon after it died may soon help to answer this question."

The results of the studies are published in the volume *Mesozoic Fishes 5: Global Diversity and Evolution – Proceedings of the International Meeting*.