

Ancient sea creatures filtered food like modern whales

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This is one of the fossil feeding appendages of *Tamisiocaris borealis*, an anomalocarid that lived 520 million years ago during the Early Cambrian. A new study of *Tamisiocaris* fossils discovered in northern Greenland has found that these ancient marine animals used bizarre facial appendages to filter food from the ocean. The research, led by the University of Bristol, UK, is published this week in *Nature*. Credit: Jakob Vinther, University of Bristol

The animals lived 520 million years ago during the Early Cambrian, a period known as the 'Cambrian Explosion' in which all the major animal

groups and complex ecosystems suddenly appeared. *Tamisiocaris* belongs to a group of animals called anomalocarids, a type of early arthropod that included the largest and some of the most iconic animals of the Cambrian period. They swam using flaps down either side of the body and had large appendages in front of their mouths that they most likely used to capture larger prey, such as trilobites.

However, the newly discovered fossils show that those predators also evolved into suspension feeders, their grasping appendages morphing into a filtering apparatus that could be swept like a net through the water, trapping small crustaceans and other organisms as small as half a millimetre in size.

The evolutionary trend that led from large, apex predators to gentle, suspension-feeding giants during the highly productive Cambrian period is one that has also taken place several other times throughout Earth's history, according to lead author Dr Jakob Vinther, a lecturer in macroevolution at the University of Bristol.

Dr Vinther said: "These primitive arthropods were, ecologically speaking, the sharks and whales of the Cambrian era. In both sharks and whales, some species evolved into suspension feeders and became gigantic, slow-moving animals that in turn fed on the smallest animals in the water."

In order to fully understand how the *Tamisiocaris* might have fed, the researchers created a 3D computer animation of the feeding appendage to explore the range of movements it could have made.

"*Tamisiocaris* would have been a sweep net feeder, collecting particles in the fine mesh formed when it curled its appendage up against its mouth," said Dr Martin Stein of the University of Copenhagen, who created the computer animation.

"This is a rare instance when you can actually say something concrete about the feeding ecology of these types of ancient creatures with some confidence."

The discovery also helps highlight just how productive the Cambrian period was, showing how vastly different species of anomalocaridids evolved at that time, and provides further insight into the ecosystems that existed hundreds of millions of years ago.



This is an artists' reconstruction of *Tamisiocaris borealis*, an anomalocarid that lived 520 million years ago during the Early Cambrian. A new study of *Tamisiocaris borealis* fossils discovered in northern Greenland has found that these ancient marine animals used bizarre facial appendages to filter food from the ocean. The research, led by the University of Bristol, UK, is published this week in *Nature*. Credit: Rob Nicholls, Palaeocreations.

"The fact that large, free-swimming suspension feeders roamed the oceans tells us a lot about the ecosystem," Dr Vinther said. "Feeding on the smallest particles by filtering them out of the water while actively swimming around requires a lot of energy – and therefore lots of food."

Tamisiocaris is one of many recent discoveries of remarkably diverse anomalocarids found in rocks aged 520 to 480 million years old. "We once thought that anomalocarids were a weird, failed experiment," said co-author Dr Nicholas Longrich at the University of Bath. "Now we're finding that they pulled off a major evolutionary explosion, doing everything from acting as top predators to feeding on tiny plankton."

The *Tamisiocaris* fossils were discovered during a series of recent expeditions led by co-author David Harper, a professor at Durham University. "The expeditions have unearthed a real treasure trove of new fossils in one of the remotest parts of the planet, and there are many new [fossil](#) animals still waiting to be described," he said. "Our new understanding of this remarkable animal adds another piece to a fascinating jigsaw puzzle."

More information: 'A suspension feeding anomalocarid from the early Cambrian' by Jakob Vinther, Martin Stein, Nicholas R. Longrich and David A. T. Harper in *Nature* [DOI: 10.1038/nature13010](https://doi.org/10.1038/nature13010)

Provided by University of Bristol

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