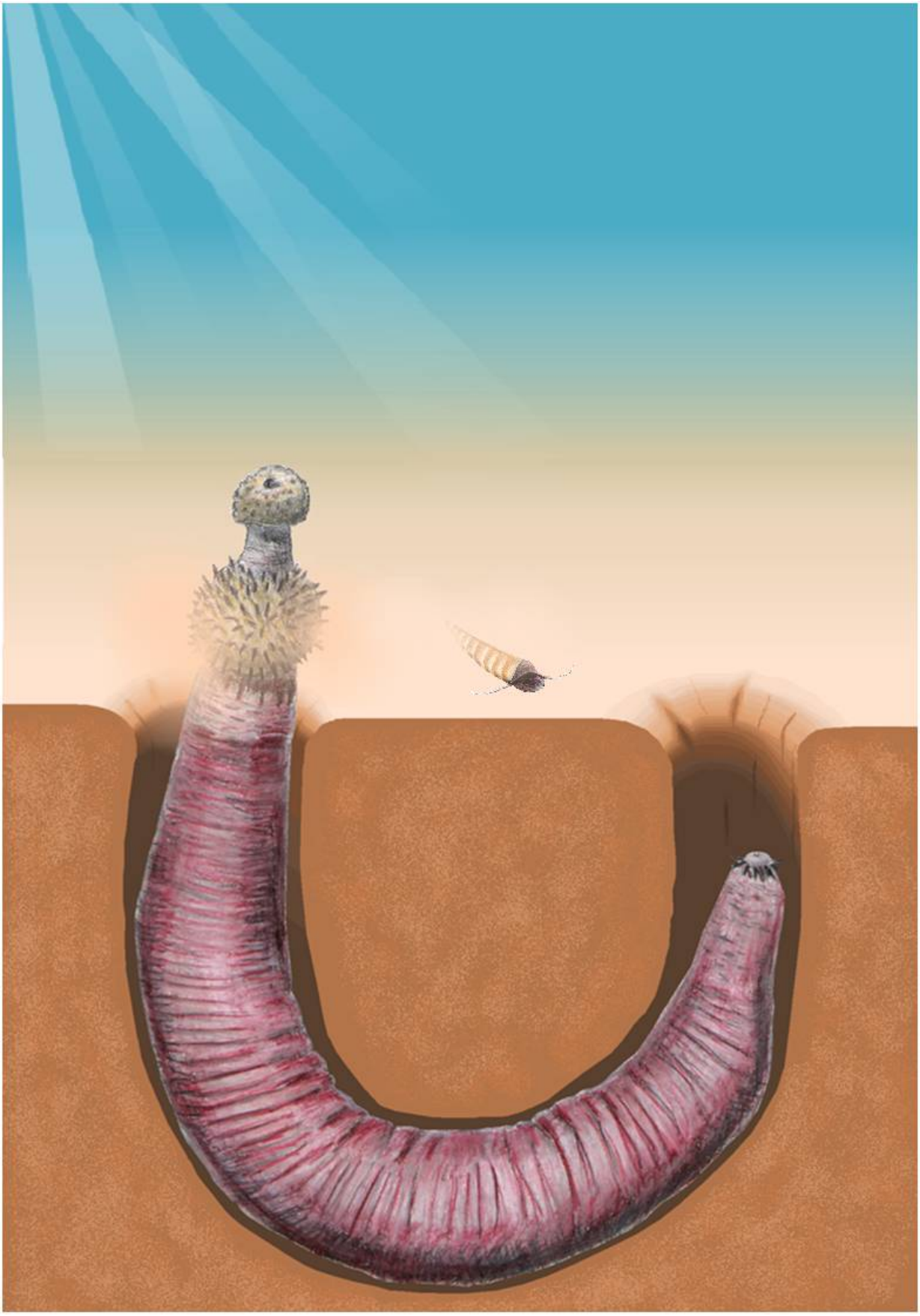
Compiling a 'dentist's handbook' for penis worms

May 6 2015



Reconstruction of the Penis Worm Ottoia in its burrow. Credit: Smokeybjb

A new study of teeth belonging to a particularly phallic-looking creature has led to the compilation of a prehistoric 'dentist's handbook' which may aid in the identification of previously unrecognized specimens from the Cambrian period, 500 million years ago.

It sounds like something out of a horror movie: a penis-shaped worm which was able to turn its mouth inside out and drag itself around by its tooth-lined throat, which resembled a cheese grater. But a new study of the rather unfortunately-named penis worm has found that their bizarre dental structure may help in the identification of previously unrecognised fossil specimens from the time on Earth when animals were first coming into their own.

Reconstructing the teeth of penis worms, or priapulids, in fine detail has enabled researchers from the University of Cambridge to compile a 'dentist's handbook' which has aided in the identification of fossilised teeth from a number of previously-unrecognised penis worm species from all over the world. The results are published today (6 May) in the journal *Palaeontology*.

The researchers used electron microscopy to examine the internal structure of the teeth of these creatures, which first emerged during the 'Cambrian explosion', a period of rapid evolutionary development about half a billion years ago, when most major animal groups first appear in the fossil record.

The teeth of these Cambrian priapulids had different shapes according to

their function: some were shaped like a cone fringed with tiny prickles and hairs, some were shaped like a bear claw, and some like a city skyline.

During the Cambrian, most animals were soft-bodied, like worms and sponges. Therefore, outside of the few very special places where conditions are just right to enable preservation of soft-bodied creatures, it is difficult to know for certain how far certain species were distributed across the Earth at the time.

Fossil of Ottoia from the 508 million year old Burgess Shale. Credit: Martin Smith

"As teeth are the most hardy and resilient parts of animals, they are much more common as fossils than whole soft-bodied specimens," said Dr Martin Smith, a postdoctoral researcher in Cambridge's Department of Earth Sciences and the paper's lead author. "But when these teeth - which are only about a millimetre long - are found, they are easily misidentified as algal spores, rather than as parts of animals. Now that we understand the structure of these tiny fossils, we are much better placed to a wide suite of enigmatic fossils."

Both modern and Cambrian penis worms have spent their lives burrowing into the sediment beneath the ocean since they first appeared 500 million years ago.

During the Cambrian, penis worms were voracious predators, gobbling up anything that crossed their path, including worms, shrimp and other marine creatures. They were able to turn their mouths inside out to reveal a tooth-lined throat that looked like a prehistoric cheese grater.

These teeth were not just used for eating food, however. By turning their mouths inside out, penis worms could also use their teeth sort of like miniature grappling hooks, using them to grip a surface and then pull the rest of their bodies along behind.

Close-up of the everted tooth-covered 'throat' of Ottoia, in a fossil from the Burgess Shale. Credit: Martin Smith

"Modern penis worms have been pushed to the margins of life, generally living in extreme underwater environments," said Smith. "But during the Cambrian, they were fearsome beasts, and extremely successful ones at that."

For this study, the researchers examined fossils of Ottoia, a type of penis worm, about the length of a finger, which lived during the Cambrian. The fossils originated from the Burgess Shale in Western Canada, the world's richest source of fossils from the period, full of weird and wacky-looking creatures that have helped scientists understand how animal life on Earth developed.

Compendium of microfossils identified as Ottoia teeth. Scale bar represents 50 µm (0.05 mm). Credit: Tom Harvey

Using high resolution electron and optical microscopy, they were able to expose the curious structure of Ottoia's teeth for the first time. By reconstructing the structure of these teeth in detail, the researchers were then able to identify fossilised teeth of a number of previously-unrecognised penis worm species from all over the world.

"Teeth hold all sorts of clues, both in modern animals and in fossils," said Smith. "It's entirely possible that unrecognised species await discovery in existing fossil collections, just because we haven't been looking closely enough at their teeth, or in the right way."

Provided by University of Cambridge

Citation: Compiling a 'dentist's handbook' for penis worms (2015, May 6) retrieved 3 May 2024 from https://phys.org/news/2015-05-dentist-handbook-penis-worms.html