Oldest octopus fossil found to not be an octopus

Finding a radula, the chitinous, toothed, conveyor-belt-like tongue used by mollusks to scrape food, was the definitive proof that Pohlsepia was indeed a mollusk. A more precise answer came in the form of the teeth. The synchrotron scan was sharp enough to let researchers count the tiny, individual tooth impressions across the radula's transverse rows. They observed a central rachidian tooth, pairs of lateral teeth, marginal teeth, and smooth marginal plates, adding up to at least 11 distinct elements per row. The only animals matching this exact 11-element configuration are Nautiloids, ancient, shelled relatives of modern cephalopods.

"Pohlsepia mazonensis is a nautiloid that died, decomposed, lost its protective shell and was subsequently flattened into the mud and preserved as an ambiguous stain," Clements said.

Switching titles

But while the fossil's "oldest octopus" badge is most likely gone, it managed to earn itself some new superlatives. "The first is of course the most difficult fossil to work on that I've ever worked on," Clements said. "The second would probably be the most fun fossil I've ever worked on."

The results of his study also made Pohlsepia the oldest unequivocal piece of evidence of nautiloid soft tissues ever found in the entire Paleozoic fossil record. "I'd say unequivocal because other nautiloid soft tissue fossils are a bit questionable," Clements said.

His team now plans to use the same advanced imaging on other fossils. “Mazon Creek in particular is full of very interesting and very weird fossils which have not been looked at for a long time, and you know, all of these new techniques can be used on them,” Clements said.

He thinks that even for Pohlsepia itself, it’s not yet the end of the story. “It’s the oldest nautiloid now, so it would be interesting to study it more.”

Clements’ study on the Pohlsepia mazonensis is published in Proceedings of the Royal Society B Biological Sciences: https://doi.org/10.1098/rspb.2025.2369

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