

Geologist analyzes earliest shell-covered fossil animals

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This is a *Cambrothyra* fossil. Credit: UCSB

The fossil remains of some of the first animals with shells, ocean-dwelling creatures that measure a few centimeters in length and date to about 520 million years ago, provide a window on evolution at this time, according to scientists. Their research indicates that these animals were larger than previously thought.

John Moore, a Ph.D. student in the Department of Earth Science at UC Santa Barbara, and his collaborators, analyzed fossils from the epoch called the Early Cambrian. During this important time in the history of the earth, there was a tremendous diversification of animal life in the oceans. Many of the major animal groups that are still alive today appeared at this time, as well as many unusual groups that went extinct.

In particular, the Cambrian marked the first widespread occurrence of animals with shells or other hard parts. Many of these early animals had complex external armors containing dozens to thousands of tiny pieces. When the animals died, the armor fell apart. From the resulting jumbled puzzle pieces, Moore and his research team discerned what the animals were like, and how they are related to other animals.

"In our study, we focused on a strange Cambrian creature, called *Cambrothyra*," said Moore. He explained that *Cambrothyra* fossils look like tiny jars or vases, a few tenths of a millimeter long. They have been found in only a few locations in central China. The research team collected rocks from China's Shaanxi Province and brought them back to the lab where they extracted the fossils from the host rocks.

"While some scientists once thought that each little jar-like structure of *Cambrothyra* was the shell of a tiny single-celled protist, our work instead supports the hypothesis that *Cambrothyra* was an animal, probably a few centimeters long, that was covered with an armor that was made up of hundreds of separate tiny, jar-shaped pieces," said Moore. "In particular, *Cambrothyra* seems to be related to another unusual Cambrian animal, the chancelloriids, which were attached to the sea floor and looked a bit like barrel cacti -- although they were animals rather than plants which suggests that *Cambrothyra* may have been a relative." *Cambrothyra* also shares similarities with a different Cambrian group, the halkieriids. This animal looked like a slug covered with armor. It traveled around the sea floor and thus may help support the

idea that chancelloriids and halkieriids are closely related to each other, despite very different appearances.

Moore presented his findings at the annual meeting of the Geological Society of America in Portland, Ore., today. He completed the work in collaboration with his advisor Susannah Porter, assistant professor in the Department of Earth Science at UCSB; Michael Steiner of the Freie Universität, Berlin; and Guoxiang Li of the Nanjing Institute of Geology and Palaeontology of the Chinese Academy of Sciences.

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