Examining embryo-like fossils from the Ediacaran Doushantuo formation, South China

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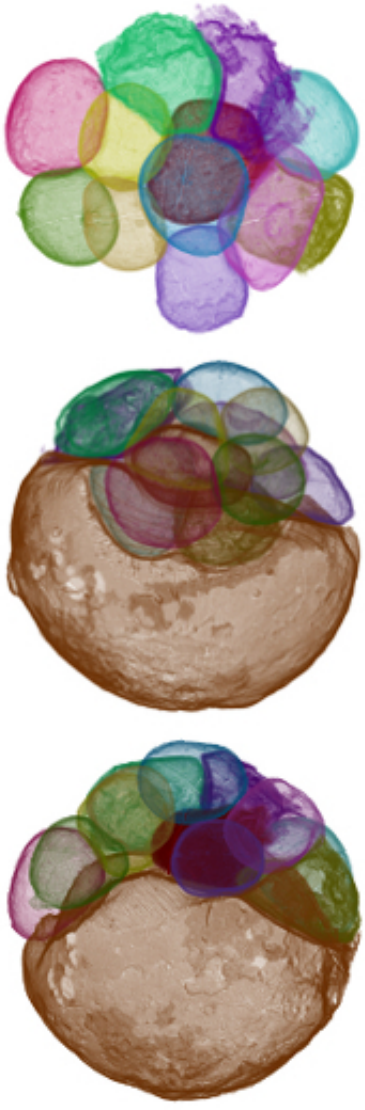

The images show a 600-million-year old phosphatized animal embryo

undergoing discoidal cell division. The size of the embryo is about 510 micron in diameter. The images are three-dimensional reconstructions based on volume data collected by high-resolution phase contrast synchrotron radiation X-ray microtomography (voxel size is 0.56 micron). The images were produced by Dr. Zongjun Yin, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences. Higher resolution versions are available. Credit: Geology and Dr. Zongjun Yin, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences.

The origin and early evolution of animals have been a fascinating topic since Charles Darwin. Definite early animal fossils largely appear from early Cambrian, so the fossil records are often interpreted as documenting a "Cambrian explosion" of animals. The phosphatized embryo-like fossils displaying cellular and subcellular structures from Ediacaran Doushantuo Formation, South China, provide an unparalleled snapshot of life before the Cambrian.

Because the fossils are from the interval in which animal clades were diversifying, according to molecular estimates, they were thought to have great potential to reveal the evolution of animals 600 million years ago. However, the affinities of these fossils are contentious.

In their article for *Geology*, Zongjun Yin and colleagues report new Doushantuo embryo-like fossils. They used high-resolution synchrotron radiation X-ray microtomography to reconstruct three-dimensional structures of the fossils, and the results demonstrate that these fossils preserve unique features directly comparable to living animal embryos that utilize a special kind of cell division pattern known as discoidal cleavage. Given that discoidal cleavage only occurs in animal embryos, the biological affinities of these fossils are probably animals.

This result substantiates the conclusion derived from molecular estimates

that animal lineages had evolved by the mid-Ediacaran after the termination of the Marinoan Glaciation, if not earlier.

More information: Meroblastic cleavage identifies some Ediacaran Doushantuo (China) embryo-like fossils as metazoans, Zongjun Yin *et al.* http://geology.gsapubs.org/content/early/2016/07/21/G38262.1.abstract.

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