

Apatite for Construction: the oldest fossil evidence of biomineralization



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The evolution of biomineralization is one of the most pivotal events in the history of life on earth, binding together biotic and abiotic systems. Biomineralization is common today across all major groups of eukaryotes, but its origins and history are unclear. Here we report primary eukaryotic biomineralization in middle Tonian fossils from the Fifteenmile Group, Yukon, Canada. These fossils, known as apatitic scale microfossils (ASM) are composed of an interwoven lattice of hydroxyapatite crystals as revealed through high resolution transmission electron microscopy and crystallography. We have constrained the age of the fossils through Re-Os geochronology on a shale horizon directly below the fossiliferous horizons. We hypothesize that the ASM organism utilized calcium phosphate as a biomineralization source due to relatively high levels of bioavailable phosphate in an ocean where sediments fluctuated between oxic and anoxic conditions. The ASM taxa represent the first evidence of eukaryotic organisms creating complex mineral structures and point to direct feedbacks between organisms and their environment in Neoproterozoic oceans.

**Wednesday, May 4
7:00 pm**

Paino Lecture Hall

Beneski Museum of
Natural History
Amherst College