GSA Connects 2023 Meeting in Pittsburgh, Pennsylvania

Paper No. 223-1

Presentation Time: 8:05 AM

A BIOFILM CHANNEL ORIGIN FOR VERMIFORM MICROSTRUCTURE IN CARBONATE MICROBIALITES (Invited Presentation)

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Three-dimensional tubular microfabrics known as ‘vermiform microstructure’ in Phanerozoic and Neoproterozoic carbonate microbialites have been hypothesized to represent the body fossil of nonspicular keratosan demosponges. If correct, this interpretation extends the sponge body fossil record to ~890 Ma, in good agreement with molecular clock estimates for the emergence of metazoans. However, the veracity of the keratose sponge interpretation for tubular microstructures remains in question and the origin of the microtubule texture is enigmatic.

Here, we compare exceptionally preserved microbialite textures from Upper Triassic microbialites to channel networks created by modern microbial biofilms. We demonstrate that anastomosing channel networks of similar size and geometries to ‘vermiform microstructure’, are produced by microbial biofilms in the absence of sponges, suggesting the origin for the three-dimensional tubular microfabric in ancient carbonates is not unique to sponges and perhaps best interpreted conservatively as likely microbial in origin. We present a taphonomic model of early biofilm lithification in seawater with anomalously high carbonate supersaturation necessary to preserve delicate microbial textures. This work has implications for the understanding of three-dimensional biofilm architecture that goes beyond the current micro-scale observations available from living biofilm experiments and suggests that biofilm channel networks have an extensive fossil record.

Session No. 223

T133. New Advances in the Study of Microbialites Wednesday, 18 October 2023: 8:00 AM-12:00 PM

335 (David L Lawrence Convention Center)

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Back to: T133. New Advances in the Study of Microbialites