**A Window Into Our Evolutionary Past: Mazon Creek Lagerstatten Siderite Concretions**

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Understanding the formation of fossils can shed light on taphonomic bias in the fossil record, and elucidate the processes by which new species emerge. Exceptional soft tissue preservation in Pennsylvanian-aged (280Ma) fossils of Mazon Creek, Illinios is accredited to the formation of siderite concretions, which encapsulate the remains of terrestrial and marine flora and fauna. The concretions display an evolution in the mineralogy radiating around the preserved organism, transitioning form carbonate-dominated to silicate-dominated, suggesting changes in the micro-paleoenvironment in which they formed. Cross-sectional analyses of the concretions reveal the evolution of processes involved in mineral formation and the conditions in which exceptional soft-tissue preservation occurred. Studies of similar fossils suggest that concretion formation is associated with the decaying organism they encapsulate, with the organism acting as a nucleation surface for the precipitation of minerals by sulfate reducing bacteria (SRB). Carbon and sulfur isotopic compositions may elucidate the potential role microbes played in the formation of the concretions, and if there was a transition from SRB to methanogen influence on the mineralogy. This work represents the first-ever detailed geochemical analysis of the Mazon Creek concretions, and represents an important step toward broadening our understanding of evolution and exceptional fossilization in deep time.