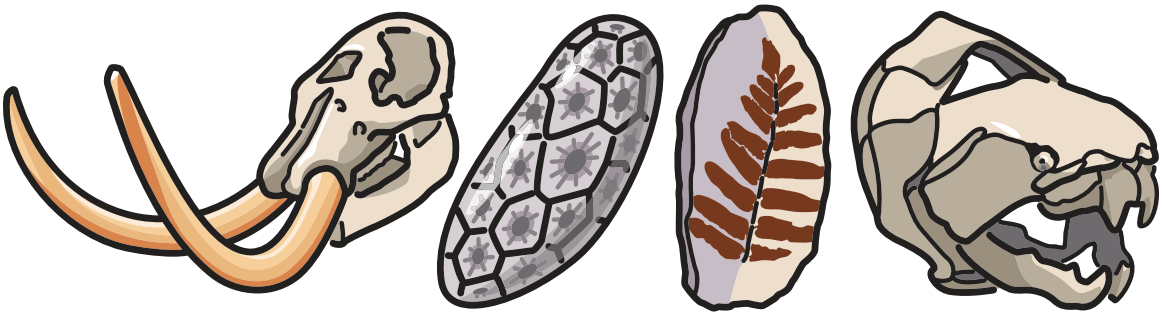
Ann Arbor, MI USA

NAPC 2024



12th NORTH AMERICAN PALEONTOLOGICAL CONVENTION

University of Michigan 17–21 June 2024

PROGRAM with ABSTRACTS

Germs but noted similarities to *Cloudina borrelloi* from the San Juan Province, Argentina described by Yochelson and Herrera in 1974. This led the authors to cautiously identify their Antarctic specimens as *Cloudina?*, though subsequent reports expressed skepticism about placing the Argentinian materials within the *Cloudina* genus, suggesting a more plausible association with *Salterella* or *Acuticloudina.* Based on this single report, Ediacaran paleontologists have often, but tenuously, expanded the geographic distribution of *Cloudina* to include Antarctica. As the International Commission on Stratigraphy's Ediacaran Subcommission has defined the use of Ediacaran tubicolus organisms, including all plausible designations of *Cloudina*, as the leading index fossil group for placement of the terminal Ediacaran stage, this long-overdue reexamination is both timely and important for gaining a clearer picture of the cosmopolitan nature of this genus. Our initial analysis shows that these tubicolus taxa are single-walled, non-nested, and smooth-walled, gently tapering, conical tubes. Herein, we aim to reevaluate the taxonomy of these fossils using modern microanalysis and high-resolution photography to shed light on their potential phylogeny and evaluate their role in the broader context of late Ediacaran to early Cambrian tubular fossils.

Funding source: NSF EAR Instrumentation and Facilities #2242732

REEVALUATION OF AGNOSTOID ARTHROPOD MORPHOLOGY AND REASSESSMENT OF TRILOBITE AFFINITY USING SILICIFIED SPECIMENS FROM THE GREAT BASIN

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Agnostoids are an extinct group of blind, cosmopolitan, benthic arthropods which are known from the early Cambrian through the Late Ordovician. Although agnostoids are some of the most common Cambrian fossils and are important biostratigraphic indices with widespread use, the group continues to be shrouded in disagreement over their phylogenetic affinities, namely their potential relationship to trilobites and position on the arthropod evolutionary tree. While traditionally considered trilobites, agnostoids lack a number of significant trilobite features (such as a calcified protaspid larval stage, facial sutures, and a rostral plate) and also substantially differ from trilobites in their appendage placement and structure, lack of a transitory pygidium, differences in thoracic articulation, and differences in the relationship between pairs of appendages and thoracic tergites due to each of their two thoracic tergites not representing individual true metameric body segments. These significant morphological differences that set agnostoids apart from trilobites are well supported, with some having been continually described in agnostoid literature since the mid-19th century. Such differences have often been overlooked, overridden, or mischaracterized in phylogenetic analyses, resulting in the classification of agnostoids within Trilobita being upheld. To address this matter, secondarily silicified agnostoid specimens have been collected from the Marjuman (Miaolingian; Guzhangian) Lincoln Peak Formation at a locality near Cleve Creek, northwest Schell Creek Range, eastern Nevada. Well preserved silicified agnostoid specimens representing at least six genera (*Acmarhachis*, *Clavagnostus*, *Kormagnostus*, *Lejopyge*, *Oedorhachis*, and *Proagnostus*) were freed from their host limestone using hydrochloric acid digestion. These specimens provide ample new supporting data, including rich ontogenetic material, that demonstrates important agnostoid-specific morphological characters. On silicified juvenile agnostoid pygidia, both thoracic tergites are shown to differentiate and subsequently be released from the same position on the anterior end of the incipient pygidial shield, in stark contrast to the transitory pygidium of trilobites in which thoracic tergites are produced in a posterior generative zone and then work their way anteriorly through the whole pygidium until being released. In addition, articulated (enrolled) silicified specimens ranging from the earliest ontogenetic stage through holaspids demonstrate the unique lack of an articulating half-ring between the cephalon and thorax in agnostoids. This indicates that agnostoids do not share the same type of thoracic articulation as trilobites. Reconsideration of agnostoid hard parts does not support recent codings of putative dorsal exoskeleton synapomorphies shared with trilobites, but instead suggest that agnostoids are not ingroup Trilobita.

Funding source: Evolving Earth Foundation student research grant. UIowa EES department funding.

EXPLORING RATES OF CHANGE AND MODES OF EVOLUTION IN BLASTOZOAN ECHINODERMS

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Studies assessing shifts in rates and modes of anatomical evolution have been a critical component of paleobiology for nearly half a century. However, many fossil groups lack a rigorous phylogenetic framework to assess rates of character change and modes of evolution in an iterative and repeatable manner. Blastozoans, a diverse, globally distributed, and morphologically disparate clade of Paleozoic echinoderms, are one such group with few phylogenetic frameworks. Recently, advances have been made in understanding

echinoderm homologies, allowing for the development of more reliable character states, and therefore, the development of phylogenetic frameworks upon which to test hypotheses of rates and modes of character evolution. Herein, we focus on three groups of blastozoans: diploporans (Ordovician–Devonian), paracrinoids (Ordovician), and eublastoids (Silurian–Permian) that have had recently published phylogenetic hypotheses. We evaluate character group evolution within and across each of these groups, using time-stratified phylogenetic trees. We also consider character group rates of change in context with major climatic and biotic shifts (e.g., the Late Ordovician Mass Extinction), and explore possible relationships between different character groups to understand if rate shifts in some character groups might trigger rate shifts in others. We use reversible jump Markov Chain Monte Carlo (rjMCMC) model averaging to test these hypotheses. Characters were partitioned into categories (e.g., feeding characters or attachment characters). rjMCMC allows for the testing of different combinations of functional group partitions and assesses support for which sets of characters are evolving according to similar mechanisms and to co-fit other model components (such as the fossilized birth-death tree model) at the same time. This is a more computationally tractable approach than previous more iterative methods utilizing the stepping stone analyses.This work provides the first exploration of this framework to fossil organisms and provides new insights into the connections between different character groups' evolutionary patterns within extinct echinoderms. Initial results indicate that each of the three groups of blastozoans favor distinct models of evolution and rate shifts.

CHARACTERIZING SOFT TISSUE PRESERVATION IN MAZON CREEK (PALEOZOIC; PENNSYLVANIAN) AMPHIBAMIFORMS (TEMNOSPONDYLI; AMPHIBAMIFORMES)

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The Mazon Creek fossil assemblage is a Pennsylvanian age (309–307 mya) Lagerstätte notable for the exceptional preservation of plants and soft-bodied animals within siderite concretions. This site preserves a shallow marine, nearshore paleoenvironment with high terrestrial input. Within this assemblage are two distinct faunal horizons: the Essex biota, a more offshore component primarily preserving marine organisms, and the Braidwood biota, a more nearshore component preserving plants, freshwater fish, and terrestrial organisms. Included among the terrestrial fauna of Mazon Creek are members of the temnospondyl clade Amphibamiformes—largely represented at the site by the species *Amphibamus grandiceps*. Many adult and larval stage (tadpole) amphibamids at the site have been assigned to this taxon. The purpose of this study was to characterize soft tissue preservation across the bodies of five amphibamid specimens at varying ontogenetic stages: two tadpoles and three adults. Scanning electron microscopy (SEM) and energy dispersive X-ray spectroscopy (EDS) were used in tandem to examine the topography and mineralogy of specific anatomical structures. Siderite was responsible for the preservation of most non-skeletal regions of the body. Pyrite, a common precipitate found in many Mazon Creek fossils, was not observed in high concentrations within any samples. Clay interpreted as kaolinite was largely responsible for infilling molds of bony tissue structures in adult specimens. Potassium-bearing clay was also intermittently observed. Fossilized melanosomes and melanosome molds were distributed within the eyes and body of both tadpoles but were not observed in the three adult specimens examined. Strong carbonaceous signatures found in conjunction with these melanosomes suggested preservation of original melanin. These melanosomes exhibited distinct morphologies depending on where in the body they were observed, indicating differential function as in modern tetrapods. Structures resembling glandular skin were observed on one adult specimen which, upon closer examination, had carbon and phosphate signatures consistent with the preservation of original bone. Adult specimens also preserved teeth as both molds and casts, in addition to dorsal and ventral dermal armor. The manner of preservation varied ontogenetically across adult and larval specimens. Specifically, melanosomes were not observed in any adult specimen, indicating either a lack of pigmentation in life or an ontogeny-specific fossilization trajectory inconsistent with the preservation of melanosomes. These results help showcase the high fidelity of fossilization at the Mazon Creek and highlight the critical role ontogeny plays in understanding the taphonomy and preservation of animals at this site.

VERTEBRATE PALEONTOLOGICAL RESOURCES FROM LOWER CARBONIFEROUS ROCKS OF THE HOOSIER AND SHAWNEE NATIONAL FORESTS (USA: ILLINOIS AND INDIANA)

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The eastern United States is home to the earliest significant fossil discoveries in North America, yet fossil vertebrates in