

GSA Connects 2022 meeting in Denver, Colorado

Paper No. 68-12

Presentation Time: 11:05 AM

PHYLOGENY OF EARLY PALAEOZOIC CEPHALOPODS (Invited Presentation)

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Cephalopods are charismatic mollusks that play an important role in modern ecosystems. At the same time, they have an outstanding fossil record and contain some of the most iconic and widely known fossils, such as ammonites and belemnites. Their fossil record reaches back until the late Cambrian, but surprisingly, this early phase of their evolution is poorly understood. The common perception is that nautiloids (represented by the living *Nautilus* and *Allonautilus*) are the ancestral group, while ammonoids and coleoids evolved only later from this group. However, even in this simplified model, the Nautiloidea is paraphyletic and thus insufficiently describes the evolutionary dynamics within early cephalopods. The use of *Nautilus* as an example for ancestral cephalopod morphology has been repeatedly shown as questionable, because the earliest cephalopods in the Cambrian bear little resemblance to it, apart from having an external shell. The uncertainty of assigning groups from the Cambrian and Ordovician to either the stem lineage or crown group is one of the confounding problems in better understanding this initial radiation. For the first time, we have thus compiled a large, comprehensive character matrix of early Palaeozoic cephalopods, covering the morphological variability and stratigraphic ranges of different lineages. These data were analyzed using Bayesian tip-dating approaches, i.e., the fossilized birth-death model. The analyses revealed a rapid diversification near the Cambrian-Ordovician boundary into three major clades: Endoceratoidea, Multiceratoidea and Orthoceratoidea. We show where our results agree with previous hypotheses, where they resolve existing controversies, where uncertainties remain and how new findings can alter our understanding of the phylogenetic relationships within these groups.

Session No. 68

[D21. Laying the Foundation for the Modern Earth System at the Neoproterozoic-Paleozoic Transition](#)

Monday, 10 October 2022: 8:00 AM-12:00 PM

Mile High Ballroom 4C (Colorado Convention Center)

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