Deciphering Desmoceratoidea (Ammonoidea) turnover rates during Cenomanian-Turonian Ocean Anoxic Event 2 using Bayesian and parsimony-based phylogenetic approaches

Kaylee A. Walty[a], Margaret M. Yacobucci[a], Peter J. Wagner[b], and Linn N. Howard[b]
[a] School of Earth, Environment, and Society, Bowling Green State University, Bowling Green, OH 43403
[b] Department of Earth and Atmospheric Sciences, University of Nebraska-Lincoln, Lincoln, NE 68588
Corresponding author: kwalty@bgsu.edu

Abstract
The Cenomanian-Turonian (C-T) interval of the Late Cretaceous was a time of environmental perturbation, particularly within marine ecosystems. Ocean Anoxic Event 2, or OAE2, occurred during this time (around 93.9 million years ago) and is characterized by a high amount of organic carbon sequestration, deposition of black shales, and expansion of the oxygen minimum zone. Sea surface temperatures were the highest they have been in the last 120 million years, reaching over 30°C around certain parts of the equator. This event varied by region in its intensity, as demonstrated by previous research. A significant number of marine invertebrates went extinct during this period, especially ammonoids and foraminifera. One ammonoid superfamily that survived this extinction event is the cosmopolitan Desmoceratoidea. Until now, the effects of OAE2 on this superfamily were not well understood. I used both parsimony-based and Bayesian phylogenetic approaches to assess turnover through the C-T interval in this superfamily. In doing so, I developed the first quantitative species-level phylogenetic dataset for Desmoceratoidea. Parsimony-based analyses show that most genera do not form monophyletic clades. Some genera, such as *Damesites*, *Puzosia*, and *Lewesiceras*, have species scattered throughout the tree. Other genera overlap and show many similarities, like *Beudanticeras* and *Desmoceras*. The parsimony-based analyses could not provide adequate resolution to assess evolutionary relationships or turnover dynamics during the C-T interval. A Bayesian phylogenetic approach offers more promise in rigorously testing hypotheses about rates of turnover in Desmoceratoidea. Results of Bayesian analyses (in process) and interpretations of C-T turnover patterns will be presented. I will also discuss implications for revising desmoceratoid taxonomy. This study provides insight from a cosmopolitan ammonoid clade's perspective into a critical interval in Earth history.

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