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A Cladistic Approach to Understanding Dinosaur Egg Diversity and the Evolution of Reproductive Traits Within Dinosauria: Preliminary Results

Only a small percentage of fossil eggs contain identifiable embryonic remains. Consequently, knowledge of eggshell structure and reproductive strategies remains incomplete for many dinosaur clades. Most previous cladistic analyses of dinosaur eggs and eggshell focus on dinosaur egg types (ootaxa) with identified embryos and aim towards understanding the evolution of avian reproductive traits. To provide a broader phylogenetic framework for dinosaur ootaxa by which gain and loss of eggshell and reproductive characters might be better understood across the entire clade, a comprehensive cladistic analysis of representatives of each major dinosaur oofamily was undertaken. We utilize a greater number of characters than most prior studies and subject three oofamilies (Faveoolithidae, Dendroolithidae, and Arriagadoolithidae) to cladistic analysis for the first time. Cladistic analyses of eggshell remain complicated by apparent homoplasy between some ootaxa, as evidenced by the polytomy of Faveoolithidae (?Sauropoda), Dendroolithidae (Therizinosauria), and Dictyoolithidae (?Theropoda) consistently recovered in strict and majority-rule consensus trees in this study. Strong support is also found for a clade of derived theropod and avian eggshell. Future work includes adding taxonomically unassigned ootaxa to a dinosaur skeletal data matrix to form hypotheses (constrained by eggs with embryos) of likely assignment to parent dinosaur clades for unidentified ootaxa.