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Testing Late Cretaceous Laramidian paleobiogeographic hypotheses: evidence from the evolution of baenid turtles

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Recent discoveries demonstrate that Campanian dinosaur assemblages across the western North American sub-continent (Laramidia) exhibit basin-scale endemism, with each sedimentary basin possessing its own unique assemblage, and an apparent higher-level biogeographic boundary between northern and southern Laramidia. Subsequently, during the Maastrichtian, most taxa are present in multiple basins, with some forms, such as *Alamosaurus*, *Edmontosaurus*, and *Triceratops*, supporting the presence of distinct northern/southern provinces, whereas others are more cosmopolitan (e.g., *Tyrannosaurus rex*). Despite these dinosaur biogeographic data, little attention has been paid to other vertebrate groups. To test these biogeographic hypotheses, I examined the paleobiogeography of the paracryptodiran turtle clade Baenidae using a newly-generated species-level phylogeny. Baenids were one of the most diverse and abundant turtle clades during the Late Cretaceous, are restricted to North America, and have a well-sampled fossil record, making them an ideal study system for examining Laramidian biogeography.

To reassess the phylogeny of Baenidae, I revised and expanded the character and taxon sampling of previous studies, with 106 characters and 32 baenid taxa (the pleurosternid *Glyptops plicatulus* was the outgroup), including adding three new taxa from the middle Campanian Kaiparowits Formation of southern Utah. These are two new, large-bodied species of the genus *Neurankylus* and a taxon closely related to *Hayemys latifrons* from the Maastrichtian Lance Formation of Wyoming. I also added new morphologic data from known taxa, such as the previously undescribed skull of *Denazinemys nodosa*. Based on occurrences alone, Campanian baenid assemblages display distinct northern and southern provinces with no taxonomic overlap. To investigate the evolutionary patterns of this biogeographic signal, I applied a dispersal-extinction-cladogenesis model to the strict consensus tree and three randomly selected most parsimonious trees (out of a total of 18) from my phylogenetic analysis. For each tree, I computed both smoothed and strict temporal calibrations. My analysis reveals that the ancestral ranges for basal baenid branches were cosmopolitan across either Laramidia or all of North America. More derived baenids (i.e., sub-clade Baenodda) possessed ancestral ranges in the area of Montana, Wyoming, and the Dakotas; the analysis reconstructs multiple individual lineages then dispersing to southern Laramidia and Alberta.

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