Cranial osteology and phylogenetic relationships of a Late Triassic parareptile from the Chinle Formation of the American Southwest

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Introduction

Procolophonidae, a family of small to medium-sized parareptiles, emerged in the Permian, survived the Permian-Triassic mass extinction, and diversified until the Triassic-Jurassic extinction. This group was very widespread, with fossils known from every continent. Typical procolophonids are recognized by their small size, elongated orbits, and bulbous or bicuspid molariform teeth.

MCZ 9312 and 9313 are two specimens of a highly derived procolophonid that were found in the Owl Rock Member of the Chinle Formation in the American Southwest, dating to the Late Triassic.

57 cranial, dental, and skeletal characteristics could be applied to and coded for these cranial and dental characteristics

Procolophonidae. Only 26 of these cranial and dental characteristics could be applied to and coded for the MCZ specimens.

Parsimony analysis in TNT (Tree Analysis Using New Technology) was utilized to create a phylogenetic tree for this family (Goloboff et al. 2003). Implicit Enumeration, a branch-and-bound algorithm that provides exact trees, was used in the analysis, and all characters were equally weighted. Collapsing rule 1 was employed, which collapses all branches that are ambiguous or unsupported.

Results

Photographs of MCZ 9312 and 9313, highlighting the most derived characteristics found in members of the subfamily Leptopleuroninae

Phylogenetic Relationships

MCZ was most closely related to Hypsognathus from the Newark Supergroup in eastern North America. Their only difference is in the presence of maxillary monocuspid teeth in Hypsognathus which are absent in MCZ specimens. This shows a rare link between the east and west of present-day North America that is rarely displayed in the fossil record.

Diet

The deep dentary and pronounced coronoid process allowed for attachment of large jaw adductor muscles. Uniquely cusped teeth allowed for chopping, while occlusal surfaces between maxillary and dentary teeth provided a large area for crushing and shearing. These features suggest a diet of primarily high-fiber plant material.

Geographic Relationships

Two leptopleuronines, Libognathus, from the Dockum Group (Texas), and the Abajo skull, from the Owl Rock Member of the Chinle Formation (Utah), are related to the MCZ specimens. Only one dentary of Libognathus was found, but it shares a deep dentary and large coronoid process with MCZ specimens. The Abajo skull shares a lack of maxillary monocuspid teeth and a flattened snout.

Conclusions

Subfamily

The MCZ specimens belong to Leptopleuroninae, due to the absence of vomerine teeth, oblique ventral and dorsal surfaces of the dentary, and the articulare situated well below the dentary.

References


Acknowledgments

Thank you to Elizabeth Cottrell, Gene Hunt, and Diogo Sá for careful reviews and comments. Thank you to Dieter Sues for loaning them to Hans Sues at NMNH.