



RESEARCH ARTICLE

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Internal cranial anatomy of Early Triassic species of †*Saurichthys* (Actinopterygii: †Saurichthyiformes): implications for the phylogenetic placement of †saurichthyiforms

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Abstract

Background: †Saurichthyiformes were a successful group of latest Permian–Middle Jurassic predatory actinopterygian fishes and constituted important, widely-distributed components of Triassic marine and freshwater faunas. Their systematic affinities have long been debated, with †saurichthyiforms often being aligned with chondrosteans, a group today comprising sturgeons and paddlefishes. However, their character-rich endocranial anatomy has not been investigated in detail since the first half of the 20th century. Since then, major advances have occurred in terms of our understanding of early actinopterygian anatomy, as well as techniques for extracting morphological data from fossils.

Results: We used μ CT to study the internal cranial anatomy of two of the stratigraphically oldest representatives of †*Saurichthys*, from the Early Triassic of East Greenland and Nepal. Our work revealed numerous previously unknown characters (e.g., cryptic oticooccipital fissure; intramural diverticula of braincase; nasobasal canals; lateral cranial canal; fused dermohyal), and permitted the reevaluation of features relating to the structure of cranial fossae, basicranial circulation and opercular anatomy of the genus. Critically, we reinterpret the former †saurichthyiform opercle as an expanded subopercle. For comparison, we also produced the first digital models of a braincase and endocast of a sturgeon (*A. brevirostrum*). New information from these taxa was included in a broad phylogenetic analysis of Actinopterygii. †Saurichthyiforms are resolved as close relatives of †*Birgeria*, forming a clade that constitutes the immediate sister group of crown actinopterygians. However, these and other divergences near the actinopterygian crown node are weakly supported.

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