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The Evolution of the Maxillary Canal in Therocephalians: Implications for Facial Sensitivity and Phylogeny.

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Abstract

The maxillary canal is an osseous tube, in the upper jaw that houses key branches of the trigeminal nerve, and plays a crucial role in facial sensitivity and motor function in vertebrates [1,2]. Although its evolution has been widely studied in the sister taxon, Cynodontia (which includes modern mammals), far less is known about this structure in therocephalians [2,3]. Therocephalians are a morphologically diverse clade of Permo-Triassic therapsids, that occupied a wide range of ecological niches [4,5]. The diversity of therocephalians suggests the substantial variation in its maxillary canal anatomy, but no broad comparative analysis has been conducted [3,4, 5,6]. This study investigates the evolution, morphology, and developmental implications of the maxillary canal across therocephalian subclades. Particularly focusing on its relationship to postcanine dental variation, the anterior expansion of the canal into the premaxilla and the ancestral condition of the canal in both cynodonts and therocephalians [1,2]. High-resolution CT scans of multiple therocephalian taxa will be used to reconstruct the maxillary canal in three dimensions, allowing comparisons across phylogeny [7], ecology, and morphology. By clarifying the ancestral condition of the maxillary canal in both therocephalians and their sister group, the cynodonts, this research will refine our understanding of cranial, sensory, and developmental evolution along the mammalian stem lineage, shedding light on the origins of key mammalian traits.

References

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