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The jaw muscles of extant archosaurs have been well documented in numerous descriptive and functional studies. However, paraphyletic treatment of crocodylians and birds, poorly integrated descriptions of neighboring structures, and disparate nomenclatures have clouded hypotheses of homology of the muscles in Archosauria. Consequently, the jaw muscle anatomy and thus feeding biology are poorly understood in fossil archosaurs, such as non-avian dinosaurs. This project seeks to synthesize the topological relationships of archosaur jaw muscles and their neighboring soft and hard-tissue structures to establish hypotheses of muscular homology and to use these data to infer the relevant anatomy of extinct species. Data from extant archosaurs and other sauropsids were collected via dissection, radiographic imaging, and serial sectioning in order to identify soft-tissue patterns. Most differences between crocodylians and birds are merely positional—the result of divergent cranial morphologies. Despite these superficial modifications, there are a number of topological similarities, including the courses of particular mandibular nerve branches and vascular structures relative to the different jaw muscles. Using these data, tentative muscle homologies have been identified and will be further tested via the extant phylogenetic bracket approach using the osteological correlates of muscles and other relevant soft tissues in the fossil record. These bony signatures are traceable among numerous extant and fossil archosaurs and will provide the means not only to establish muscular homology but also to accurately reconstruct jaw muscles in dinosaurs so that evolutionary and functional questions regarding the group's feeding apparatus can be better addressed.