2002. Journal of Vertebrate Paleontology 22 (Supplemnt to 3):66A

FUNCTIONAL ANATOMY OF ARCHOSAURIAN JAW MUSCULATURE: PRELIMINARY FINDINGS

HOLLIDAY, Casey M., and WITMER, Lawrence, Dept. of Biological Sciences, Irvine Hall, Ohio Univ, Athens, OH 45701.

The skeletomuscular system is a complex and integral component of the cephalic anatomy of vertebrates. Not only is it responsible for complex and powerful movements of the feeding apparatus, but it also contributes biomechanical loadings on the skull, and constrains the size and location of other soft-tissue structures. Although there have been numerous descriptions of jaw muscles and intracranial joints in extant archosaurs and several in non-avian dinosaurs, few studies have been conducted in a phylogenetic context or have incorporated the morphologies of other relevant soft tissues such as arteries, nerves, or air sinuses. Using the EPB approach, we investigate the evolution of cephalic myology and arthrology to identify relevant functional and structural patterns in the feeding system of archosaurs. Objectives of the overall project include a synthesis of relevant hard- and soft-tissue structures in extant archosaurs to establish hypotheses of homology, tests for validity of osteological correlates, congruence testing by surveying fossil taxa, phylogenetic analysis of muscular osteological correlates to map character evolution, soft-tissue reconstruction of the musculature and relevant structures in extinct taxa, and formation of functional and evolutionary hypotheses. The feeding system of representative extant archosaurs was investigated using dissection, histological and whole mount staining, serial sectioning, and imaging techniques. Anatomical correspondences in cephalic musculature and related soft tissues, as well as their osteological correlates, provided a robust similarity test of homology. Congruence testing involves surveying extinct archosaurs for the specified osteological correlates. Preliminary studies of several dinosaur taxa confirm that many of these bony signatures are clearly identifiable. These data on muscle homologies provide the foundation for muscle reconstruction in extinct archosaurs, which in turn will shed light on the functional anatomy, ecology, and evolution of dinosaur feeding.