

Fleshing Out Fossils: The Present as the Key to a Very Different Past

Witmer, Lawrence M.; Ohio University, Athens, OH, USA (witmer@exchange.oucom.ohiou.edu)

Fossils tend to preserve only bones and teeth, and so morphologists are challenged to reconstruct those aspects of biology that have been lost. Soft tissues are particularly important, because they not only animate the skeleton, but form the basis for broader biological inferences. Information on any unpreserved feature must come from modern taxa, most relevant being the two extant outgroups of the fossil, which form the extant phylogenetic bracket (EPB). Central to EPB studies is the specification of the causally associated osteological correlates of the inferred attributes, because these bony signatures link the past and present. Based on the phylogenetic support for inferred attributes of extinct taxa, different levels of inference can be identified, with strong level I inferences drawing the most support and weak level III inferences drawing least. Remarkably, level III inferences are common and among the most interesting, because they represent the evolution of anatomical novelties. Inferring novelty in fossils is tractable when grounded in the extant realm. Consideration of unpreserved features (soft tissues, physiology, behavior) of extinct taxa is often necessary for extant studies because modern species have an evolutionary history and the current time plane does not sample the full range of organismal form and function. Ironically, rather than “modernizing” fossils, using the present to reconstruct the past often reveals the uniqueness of extant taxa.