

Hieronymus, T. and Witmer, L.: CRANIAL RUGOSITY AND DINOSAUR “HORNS:” RHINO AND GIRAFFE AS MODEL SYSTEMS FOR SKIN RECONSTRUCTION IN FOSSIL TAXA

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The archetypal conception of “horn” is based on bovids in which a horny sheath (a true keratinous horn) covers a bony core. Bovid horns have been the model for dinosaurs such as Triceratops. However, cranial rugosities that do not form cornual processes are often overlooked. These rugosities have sometimes been interpreted as bony scaffolding for elaborations of the dermis and/or epidermis (e.g. the nasal boss of the ceratopsid *Pachyrhinosaurus*, the dome of pachycephalosaurid dinosaurs, and the nasal rugosities of tyrannosaurs, titanotheres and mylagaulid rodents). Extant animals with cranial rugosities can provide model systems to characterize associations between skin and rugose bone. The rugosities on the nasal and frontal bosses of white rhinoceros are the model for a massive keratinous horn, whereas those on giraffe skulls are the model for a more simple, skin-covered system. Based upon the comparison between these two species, rugosities associated with the massive horn of rhinos can be distinguished by the following characters: (1) grossly fibrous orthogonal bone surface textures that reflect the histological character of the dermis, and that may be oriented obliquely or tangentially to the bone surface; (2) rugosities that are more pronounced around the periphery than at the center (“bull’s-eye” appearance); and (3) mid-size (~1mm) vascular canals that traverse the underlying bone and emerge perpendicular to the bone surface. In contrast, rugosities associated with the non-cornified skin of giraffe show the following characters: (1) grossly nonfibrous surface textures that extend tangentially to form shelves of bone; (2) rugosities that are more pronounced at their center than at their periphery; and (3) mid-size vascular canals that course within the underlying bone tangentially and emerge at very low angles to the bone surface. These hypotheses have not yet been tested within a phylogenetic framework, but as preliminary results they provide “rules of construction” upon which to base case studies of skin reconstruction in fossil taxa.