

HIERONYMUS, T.L.*; WITMER, L.M.; Ohio University; Ohio University: Dermal Entthesis: Anatomy and Histology of Rhinoceros Horn Attachment

Rugosities on dermal bones of the skull have often been used to support inferences regarding unpreserved cutaneous appendages in extinct animals (e.g., horns). Such associations often seem obvious when examined in extant osteological specimens, where the conformation of epidermal appendages remains intact, but inferences regarding the type and morphology of unpreserved cutaneous appendages are not always so clear. Rhinoceros horn provides an example of an epidermal appendage in which the morphology cannot be readily determined from the shape of its associated rugosity. The horn attachments of two adult white rhinoceros (*Ceratotherium simum*) were examined by CT scanning, dissection, and histological sectioning. The horn proper is an epithelial structure composed of hair-like filaments embedded in a keratinized and mineralized matrix, which in turn is strongly affixed to the dense irregular connective tissue of the dermis. Rhinoceros dermis is quite thick in general, ranging from 1.5 – 3cm thick across the skin of the face. The dermis retains much of its thickness beneath the horn, ranging from 1 – 2cm thick beneath the nasal horn, and from 2 – 3cm thick beneath the frontal horn. The horn-dermis complex is affixed to the bone itself by dense populations of extrinsic fibers derived from the reticular dermis. These fibers penetrate the bone at an oblique angle, creating a histological structure similar to a tendon-mediated fibrous entheses. The irregular mineralization of the extrinsic fibers gives the cleaned bone surface its characteristic rugose appearance. A more thorough understanding of how this appendage affects the morphology of the underlying bone aids in differentiation between horn-induced rugosities and rugosities with other causal associations, such as tendon attachment or secondary dermal ossification.