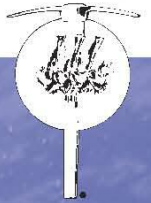


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THE FACIAL SKIN OF *MAJUNGASAURUS CRENATISSIMUS* (ABELISAURIDAE: SAURISCHIA): PRONOUNCED DERMAL METAPLASIA AS THE CAUSE OF RUGOSITY IN ABELISAURID SKULLS

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Abelisaurid theropods are characterized by pronounced bony ornamentation present on their skulls, ranging from rugosity to structures interpreted as horn cores. This ornamentation was directly overlain by skin in life, and has often been compared to the bony ornamentation associated with heavily cornified plates such as the rhamphotheca of birds and turtles. We investigated the bony ornamentation of the abelisaurid theropod *Majungasaurus* by comparing the histology and gross morphology of its ornamented bone with similar bony structures seen in extant sauropsids. We sampled an area of rugose bone from a *Majungasaurus* lacrimal (UA 8718). This sample was μ CT scanned, embedded in polystyrene resin, and sectioned at 1 mm intervals. A set of skin/bone contact samples from several extant sauropsid taxa were embedded in polymethylmethacrylate resin and sectioned at 0.8 mm intervals for synoptic comparison. We found that the fine-scale bony ornamentation of *Majungasaurus* is composed of metaplastically ossified dermal tissue. Large fiber bundles from the base of the preserved dermis formed crossed arrays, an organization consistent with dermis that is subject to relatively high mechanical stress. Similar arrays of fiber bundles attach avian rhamphotheca to bone. This arrangement contrasts to the parallel arrays of smaller-diameter fiber bundles that attach squamate scales or crocodylian skin to underlying bone. Although the base of the dermis itself is directly preserved by ossification, the morphology of the overlying epidermis must be inferred from gross osteological correlates. The diversity of gross correlates across the skull of *Majungasaurus* are consistent with a range of epidermal structures, from lightly cornified and tightly adherent skin (e.g. *Chelydra*, *Alligator*), to heavily cornified epidermal sheets (e.g. avian rhamphotheca), to elaborate epidermal scales (e.g. *Moloch*). Given the apparent bias in theropods towards dorsal nasal and frontal crests, an elaboration of scaled epidermis across the skull roof, involved in comparatively high-energy agonistic behaviors, is suggested as the most likely alternative.