

AN UNUSUAL PERIOSTEAL TISSUE IN THE RIBS OF TWO PLESIOSAURS (SAUROPTERYGIA: PLESIOSAUROIDEA) FROM THE UPPER CRETACEOUS OF ANTARCTICA

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The structure of tissues is generally not preserved in fossils because soft tissues of the vertebrate body usually have no potential to fossilize. However, the inorganic components of bone preserve the spatial orientation of organic components such as osteocyte lacunae, vascular canals, and collagen fibers. Here we examined ribs of two plesiosaurs recovered from the Maastrichtian (Late Cretaceous) of Antarctic Peninsula. The primary bone tissue shows dense, longitudinally oriented fibres organized into bundles instead of typical periosteal bone. These fibre bundles are diamond-shaped when cut exactly perpendicular and are surrounded by a distinct sheath. This structural organization is similar to ossified tendons found in ornithomimid dinosaurs (e.g., hadrosaurs) and birds, and in cervical ribs in sauropod dinosaurs. In the ossified tendons of dinosaurs the nature of the primary bone matrix indicates that these structures mainly originated through direct mineralization (metaplasia) of tendinous structures. However, as far as we know, this type of histological organization has never been observed in tetrapod dorsal ribs. We hypothesized that this structural organization of the elasmosaurid ribs may have some biomechanical advantage in the retention of the rib curvature and in resistance against crushing. Testing of this hypothesis requires further expand the samples and biomechanical analyses.

