3D RECONSTRUCTION OF LATE TRIASSIC COLEOID CRANIAL CARTILAGE FROM THE POLZBERG KONSERVAT-LAGERSTÄTTE (NORTHERN CALCAREOUS ALPS)

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Hyaline cartilage is widely distributed in various invertebrate groups such as sabellid polychaetes, molluscs (cephalopods, gastropods) and the chelicerate arthropod group of the horseshoe crabs. It can be seen as convergent trait in animal evolution and thus it does not seem to be a vertebrate invention. Due to the poor fossil record of cartilaginous structures, occurrences of mineralized fossil cartilages are of vast importance for evolutionary biology and palaeontology. Although the biochemical composition of recent cephalopod cartilage differs from vertebrate cartilage, histologically, the cartilages of these animal groups resemble remarkably. The examined material derives from the late Triassic Polzberg Konservat-Lagerstätte near Lunz am See (Lower Austria, Northern Calcareous Alps), which has been known for nearly 150 years. Besides the preservation of a rich Carnian vertebrate and invertebrate carbonized and phosphatized fauna, a morphogroup (often associated with coleoid remnants) of black, amorphous appearing fossils still remained undetermined. In this study, the conspicuous micro- and ultrastructure of these fossils was examined by thin sectioning and Scanning Electron Microscopy (SEM). The geochemical composition analysed by Microprobe and Energy Dispersive X-ray Spectroscopy (SEM-EDX) revealed carbonisation as taphonomic pathway for this fossil group. High-resolution serial sectioning by micro-tomography (m-CT) of 14 specimens and their 3D reconstruction allows detailed insights to the interior of these unique Mesozoic fossils. Preliminary results point to a characteristic branched channel system as well as to exterior attachment grooves for a coleoid muscular system. Measurements of internal structures of the preserved elements and landmarking on the exterior surface facilitated the identification of the different elements and their assignment to their equivalences in recent coleoid cartilage. The findings provide new knowledge on the early coleoid evolution and in particular the morphology and function of cephalopod cartilage. Finally, the morphology and internal structure of cranial cartilage can also hint evidence for evolutionary relationships.