/subtropical habitats grew in size and adapted to temperate and subarctic regions. In our presentation, we give an overview of size and shape in some living cervid species and the correlation with behavior and habitat. We use the results to infer on behavior and ecology in fossil cervids.

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The Evolutionary Significance of Phosphatic Otoliths in Cartilaginous Fishes (Chondrichthyes, Elasmobranchii)

Poster Presentation

Dense bodies made of calcareous crystals are found in the skeletal inner ear labyrinths of living and extinct vertebrates and vary regarding both the material composition and the morphology. While large, solitary structures termed otoliths have long been known and analysed in bony fishes, the significance, and functions of such structures are widely neglected in cartilaginous fishes. Holocephalans (chimaeras) and elasmobranchs (sharks, rays and skates) are considered to develop single crystalline structures made of different calcium carbonate polymorphs as well as to incorporate exogenous material in their inner ears via the endolymphatic duct. In the present study, we investigated the morphology and composition of these structures in two extant rays and their distribution in 35 extant chondrichthyan specimens. Dissections, micro-CT scanning, and 3D reconstructions were used to examine the presence, shape, and positioning of the structures within the skeletal labyrinth. Infrared spectroscopy analysis provided information on the chemical composition. Contrary to earlier findings, these rays form solid, solitary otoliths within the skeletal labyrinth. Elasmobranch otoliths can be differentiated by a specific morphology similar to the lagena, utricle, and lapillus in bony fishes and are clearly identifiable in micro-CT scans. According to our results, phosphatic otoliths are plesiomorphic for vertebrates occurring in both agnathans and chondrichthyans and the presence of calcium carbonate otoliths in bony fishes thus are derived features. The presence of otoliths in ostracoderms and placoderms as well as the underlying reasons for the shift from phosphatic to carbonatic otoliths within gnathostomes, however, remain elusive momentarily.