German museums by about one hundred years into the past. The earliest specimen was collected by Samuel Dale (1659 – 1739). Once again, most of the early collections are represented by large herbarium specimens of Flustra foliacea, considered to be seaweed at that time. Many flustriids show dense encrustation by other epifaunal species and colonies. This makes older specimens from the 17th to the 19th century a valuable research infrastructure for studies on climate change, local extinctions and neozoan invasions through shipping.

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Funktionmorphologie von Wirbeltiergebissen

Wear pattern analysis and functional morphology in dryolestid molars (Cladotheria, Mammalia)

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Dryolestid mastication is characterized by embrasure shearing where the lower molars slide into the interdental spaces of the uppers. Due to the alignment in reversed triangles, the function of the mesio-distally compressed primary trigon and trigonid is mainly shearing. In addition, the sharp pairs of leading edges paracrista/protocristid and metacrista/paracristid act as cutting devices when sliding past. Striation analysis and virtual simulation of the chewing process demonstrated that the wear pattern of dryolestids differs significantly from that of the tribosphenic molars investigated. The lower molars of the dryolestids show distinctive exposure of dentine along the shearing edges protocristid and paracristid due to their thin enamel which is also the case in the uppers. A sloping of the mesial and distal exposed dentine fields that is typical for the dryolestid molars has not been observed in tribosphenic molars with thicker enamel. A correlation between mode of wear and enamel thickness exists, since thinner enamel is easier abraded during mastication. A maximum of occlusal contacts was observed at moderately worn molars. This reflects highest efficiency in this state of wear due to large shearing surfaces combined with long cutting edges for slicing hard exoskeletons of insects. The striae on the mesial and distal flanks of primary trigon and trigonid can be used to reconstruct the path of movement during mastication as they reflect the relative movement of the molars to each other. The lower molars of dryolestids are raised apically at an angle of about 45°, during their movement from buccal to lingual. The first occlusal contact during mastication occurs between the v-shaped shearing edge protocristid and the crescent antagonistic paracrista. Food items are trapped and compressed along the edges, the breakdown occurs when the two shearing edges slide past. The sliced pieces of food are transported in cervical direction. The unicuspid talonid of the lower molars with its buccally sloping hypoflexid groove has a guiding and shearing function. When the paracone slides along the groove, food items are sheared. Due to the direct contact with the paracone, the hypoflexid groove shows strong striations and fast exposure of dentine occurs. The dryolestid hypoflexid groove is homologous to the hypoflexid of the tribosphenic molar. In the studied tribosphenic molars the hypoflexid is variably inclined and less involved in the occlusal contacts. The parastylar wing mesial to the "primary trigon" of the upper dryolestid molars has additional guiding function during mastication. The linguo-bucally oriented striations that are located more apically on the shearing surfaces of the protoconid are more steeply inclined than the guiding groove of the hypoflexid. This indicates that the lower molar moves in two phases into occlusion during the chewing cycle: an initial puncture-crushing phase and a subsequent shearing phase before full centric occlusion. A grinding phase after centric occlusion as typical for tribosphenic molars does not occur in dryolestid molars. During the evolution of the talonid basin, the shearing area of the hypoflexid was displaced buccally and rotated in mesial direction. In combination with the formation of the talonid basin a functional shift in the chewing cycle from shearing to grinding occurred, and the hypoflexid lost its function as a main shearing area.

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