

Peculiar macropredatory convergences in Cretaceous marine reptiles

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Abstract

Colonization of ecological niches in the marine realm forced the evolution of profound evolutionary convergences between several clades of tetrapods, with textbook examples regarding isodonty and body shape. Craniodental details have, however, received less attention. As a result, both the depth of diet-related convergences and niche partitioning mechanisms among contemporaneous clades are poorly understood, particularly during the Early Cretaceous. Here, we analyse the craniodental morphology of new ichthyosaurs and pliosaurs that exhibit unique macropredatory adaptations. One new brachauchenine pliosaur from the Hauterivian of Russia is the first plesiosaur exhibiting complex, serrations of its carinae. This taxon appears convergent with some metriorhynchid crocodyliforms and occurs just after an important diversity drop in these taxa. Contrary to common belief, cluster analyses of diet-related craniodental measurements indicate several ichthyosaur clades colonized a macropredatory niche during the Early Cretaceous, with one extreme example in the latest Aptian of France. Inference of ecological niches or ecological parameters in updated phylogenetic datasets for ichthyosaurs and pliosaurs suggest their ecological diversity was high in the Early Cretaceous and low to very low in the Late Cretaceous, where both clades disappeared prematurely.