

Evolution of the Cretaceous shot-necked plesiosaurians

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Plesiosauria is the most diverse and probably the most disparate clade of secondarily aquatic tetrapods. The adaptive landscape of plesiosaurians has been often summarised to two global morphotypes: one for short-necked forms (pliosauromorphs) and one for long-necked forms (plesiosauromorphs). ‘Pliosauromorphs’ and especially pliosaurids are iconic marine reptiles that dominated marine ecosystems during the Jurassic and the Cretaceous. These giant predators met their demise during the early Late Cretaceous but the final chapter of their long evolutionary history remains barely documented. Prompted by the discovery of a peculiar and very well preserved new taxon from Russia (Figure 1), we compute the evolution of pliosaurid disparity from their Early Jurassic radiation to their Late Cretaceous extinction. Despite a patchy Early Cretaceous fossil record, we show pliosaurids reached their maximal disparity during the Hauterivian-Barremian interval, suggesting a strong Early Cretaceous recovery from the apparently low phenotypic disparity of Late Jurassic pliosaurids. By using cladistic and morphological data, we show that pliosaurids have repeatedly converged with another group of short-necked plesiosaurians, Polycotylidae, demonstrating a more complex evolutionary history than their traditional representation as gigantic apex predators of Mesozoic marine ecosystems suggests. The extinction of pliosaurids during the Turonian (early Late Cretaceous) and polycotylids at the KT boundary are both preceded by a marked contraction of their disparity, similar to the trajectory documented in ichthyosaurs, another successful marine reptile clade that disappeared during the Cretaceous.

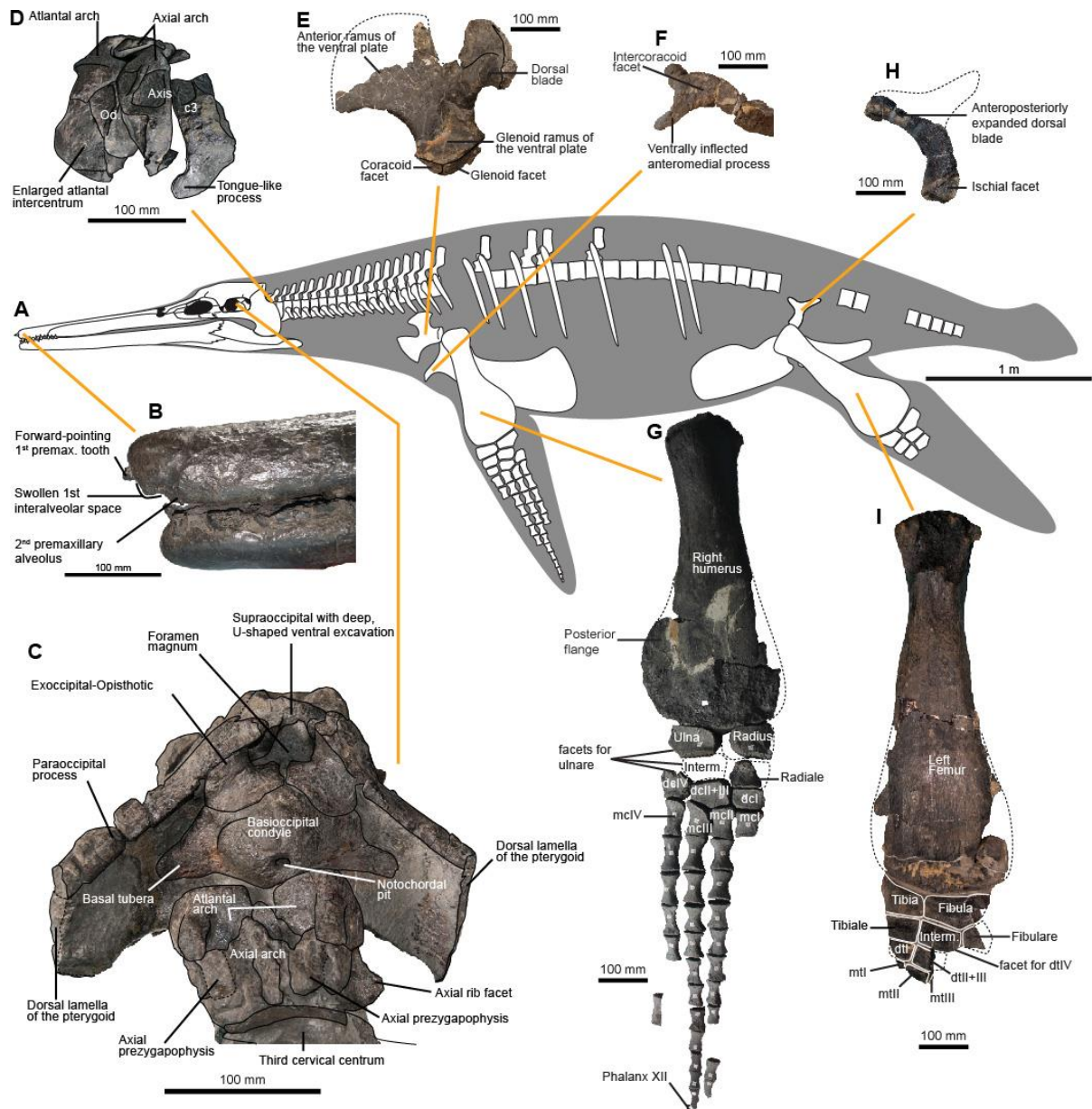


Figure 1. Morphology of the holotype of *Luskhan itilensis* (YKM 68344/1_262) from the Hauterivian of western Russia.