Thalattosaurs: their diversity, phylogeny, and evolution

Johannes Müller

Humboldt-Universität zu Berlin, Museum für Naturkunde, 10099 Berlin, Germany, e-mail: johannes.mueller@museum.hu-berlin.de

Thalattosaurs are a Triassic clade of aquatic diapsid reptiles that for a long time had not been considered in studies on diapsid phylogeny or Mesozoic marine reptiles. Typical features are the elongated premaxillae, the relatively large snout, and a strongly reduced or absent upper temporal fenestra. In addition there is a surprising morphological heterogeneity, ranging from toothless forms like *Endennasaurus* to taxa such as *Nectosaurus* or *Hescheleria*, which possessed a well-developed crushing dentition and a rostrum that was significantly downturned anteroventrally. Originally known only from North America and Europe, recent finds from the Triassic of China provide evidence of a cosmopolitan distribution; however, the thalattosaur diversity recorded so far is low in comparison to other marine reptiles such as sauropterygians or ichthyosaurs. The phylogenetic relationships within thalattosaurs, as well as their position within diapsid reptiles, are still poorly understood. Recent analyses suggest that thalattosaurs are close to the split between archosaurs and lepidosaurs, and within the clade the European taxa *Endennasaurus*, *Askeptosaurus*, and the Chinese *Anshunsaurus* form the sister group of all remaining thalattosaurs. However, the relationships within the latter are still controversial, which renders a proper interpretation of thalattosaur biogeography problematic. The recent find of a deep-tailed thalattosaur from the Upper Triassic Kössen Formation of Austria sheds new light on this issue, indicating that there are several independent, cosmopolitan radiations, and supporting the view that the European Tethys had been invaded several times by different clades of thalattosaurs. However, because of the variable morphology and the sparse fossil record thalattosaur phylogeny remains poorly understood, and further finds are needed for a better understanding.