10d) Marine reptiles: a successful story in Mesozoic ecosystems

Poster

Thalattosuchian remains from the late Aalenian Eisensandstein Formation of Baden-Württemberg, southwestern Germany

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The fossil record of marine reptiles from the Aalenian is globally poor. In Germany they are mostly limited to isolated and fragmentary remains, although at least one ichthyosaur, *Stenopterygius aaleniensis*, is known from a complete and articulated skeleton. The Aalenian thalattosuchian record has not yet been studied in detail, and a number of specimens are still undescribed. Among these unpublished fossils is cranial and postcranial material from the late Aalenian Eisensandstein Formation ("Dogger β") of Baden-Württemberg (SW Germany) that is housed at the Staatliches Museum für Naturkunde Stuttgart. Despite their fragmentary nature, this material can be attributed to both major thalattosuchian subclades, Teleosauroidea and Metriorhynchoidea. The teleosauroid material includes five incomplete rostra, one dorsal and two caudal vertebrae. Metriorhynchoids are represented by a fragmentary dentary and an isolated postorbital. Most specimens derive from localities in Aalen-Wasseralfingen and they are preserved in an iron oolite matrix. The same region yielded historical material of which some was described in the 1840s as *Glaphyrorhynchus aalensis*. These specimens, which were held in the collection of Graf zu Münster, appear to be lost and the validity of *Glaphyrorhynchus*, which was one of the first described thalattosuchians from Germany, cannot be confirmed. The material from the Eisensandstein Formation forms part of an ongoing project to describe the Aalenian thalattosuchian record of Germany. Although only fragments are preserved, their study enhances our knowledge of Thalattosuchia – particularly helping to close some stratigraphic gaps in their fossil record. Furthermore, the material offers new insight into the late Aalenian marine ecosystems.

Talk

Marine vertebrates and recovery of life from the Permian-Triassic mass extinction

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The Permian-Triassic mass extinction was devastating for life on land and in the sea, but it provided an opportunity for the establishment of new kinds of ecosystems. In the sea, there was an escalation as brachiopod-dominated faunas were replaced by those dominated by bivalves, gastropods, malacostracans, and echinoids. Neopterygian fishes were faster moving than their precursors, and new predators emerged, including marine reptiles. After the origin of the first marine reptiles, including ichthyosaurs and sauropterygians on the lepidosaurian side of the diapsids, and some archosaurian groups, the clades diversified fast in Olenekian and Anisian, occupying a range of niches, including unusual diets such as durophagy. In fact, the morphological and functional disparity of Triassic marine reptiles was never again equaled. The new evidence from Chinese Lagerstätten such as Panxian, Luoping, Xingyi, and Guangling is explored, as well as numerical approaches to macroevolution that reveal patterns and models.

Talk

The use of taphonomy and biomechanics in understanding the paleobiology of the Ichthyosauria

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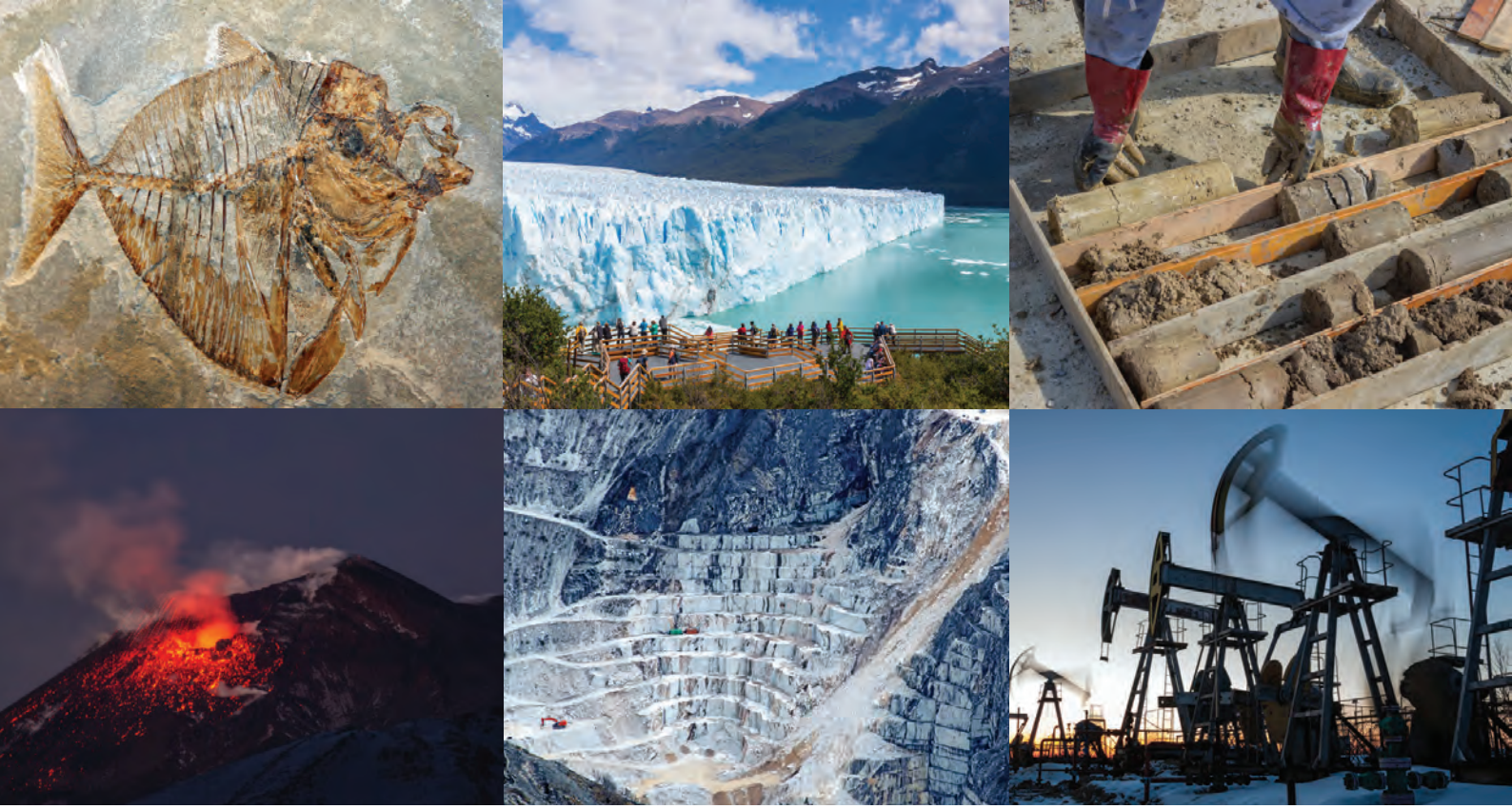
Originally, taphonomy was a descriptive science, attempting to understand the fossils and their mode of fossilization, but increasingly paleobiological information is drawn from taphonomic analyses. The taphonomy of the Ichthyosauria, a diverse group of marine reptiles that rapidly attained a cosmopolitan distribution in the Early Triassic and persisted to the early Late Cretaceous, is particularly interesting. Not only do ichthyosaurs have one of the largest sample sizes in amniote paleontology, but some specimens show remarkable preservation of both mineralized tissues and soft parts. This rich record is mostly due to the long history of research on the European localities, particularly the black shale Posidonienschiefer Formation. Thousands of articulated specimens provide evidence for viviparity, diet, appearance, and soft tissue. However, many aspects of ichthyosaur paleobiology, especially regarding locomotion, buoyancy control, and body mass, need to be revisited.

We use taphonomy for providing insights into the paleobiology of ichthyosaurs by observing the mode of carcass arrival on the sea floor ("landing mode") and carcass disarticulation patterns. Observed "landing modes" are lateral, dorsal, ventral, and anterior. The latter is generally combined with one of the three other modes. We propose that the anterior landing mode resulted from arrival of the carcass on the sea floor head-first at an angle, being caused by the heavy skull. Ichthyosaurs accordingly had an anteriorly placed center of mass.



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Abstracts