Evidence for tidal currents and benthic mass-mortality events in the Sarmatian Paratethys Sea (middle Miocene; North Alpine Foredeep Basin; Austria)

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Lower Sarmatian tidal flat deposits are documented from the Hollabrunn/Aspersdorf section in Lower Austria. The paleogeographic position of the investigated section was at the western margin of the Central Paratethys Sea which reached here about 50 km from the Vienna Basin to the west into the otherwise already dry North Alpine Foreland Basin. It represents one of the north-western most Sarmatian sections of the Central Paratethys and was part of an ancient incised valley. This unusually long and narrow embayment was prone to rapid environmental changes due to shifts in water circulation and regional sea-level fluctuations. Detailed sedimentological and paleontological analyses point to tidal influence in this part of the Central Paratethys Sea. The type of grain size distribution is similar to those described from channel sands from estuaries and tidal areas (e.g.: tidal sands of the East Frisian coast).

Aside from characteristic tidal-flat sediments, the section yields an outstanding fossil Lagerstätte with census assemblages of solenid bivalves and potentially pagurized batillariid gastropods in death position. In-situ occurrences with traces of former iron-sulfide concretions strongly suggest hypoxic events as cause for the mass-mortalities on the tidal-flats. In modern estuaries and intertidal zones, such tidal-flat hypoxia are typically occurring during green tides. Such algal blooms are responses to eutrophication due to elevated loads of nutrients and organic carbon. Subsequently, the macroalgae are washed up on the shoreface where their decay causes hypoxia in the intertidal zone. The geomorphology of the incised valley, producing a very narrow but elongated marine inlet, suggests that the water body was influenced easily by shifts in freshwater discharge being responsible for that loading. Similarly, the current system of such a shallow inlet was fragile and strongly depending on the relative sea-level, inducing periodical isolation events supporting euthrophication. The in-situ occurrence of obliquely buried batillariid gastropod shells with limonitic concretions at the apertures hints at the occurrence of otherwise completely unrecorded hermit crabs in the highly endemic fauna of the Paratethys Sea during the Sarmatian.

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Studentenpreisposter

Solving the problem with solvent

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Amber deposits containing inclusions are found almost all around the world. They offer the chance to study past terrestrial ecosystems and the evolutionary history of many lineages of arthropods, plants, microorganisms and even vertebrates.

The recently described Indian amber from Western Gujarat was deposited about 50-52 million years ago during the Early Eocene Climatic Optimum, just when the Indian subcontinent collided with Asia. It provides a new insight in the evolution of Southeast Asian tropical rainforest ecosystems. In contrast to other amber deposits, fossils in Indian amber are often completely preserved including the cuticula as well as internal structures of the embedded fauna, such as muscle tissue or the tracheal system.

The poor polymerization and crosslinking of the amber, combined with the exceptionally preserved arthropods it seemed very promising to detach the inclusions with different chemicals to study anatomical details. First experiments with chloroform and toluene obtained good results. But even with less harmful chemicals like orange oil it was possible to dissolve the amber completely without destroying the inclusion and with only minor risk for health and environment.

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