

The Toarcian Oceanic Anoxic Event (T-OAE) and the changes of diversity of the marine gastropod molluscs in western Tethys

Stefano Monari

During the early Toarcian time, the western Tethyan region, particularly the European epicontinental shelf, witnessed a period of environmental perturbations culminating with the widespread deposition of organic-rich sediments. These deposits, such as the Posidonia Shale in southern Germany, the Jet Rock Beds in the Cleveland Basin of eastern England and the Schistes Cartons in the Paris and other French basins, have been interpreted as reflecting widespread marine anoxic conditions known as the Toarcian Oceanic Anoxic Event (T-OAE). Although the controlling mechanisms and extension of the T-OAE are still debated, as are the major environmental disturbances, palaeontological lines of evidence, known from decades, show a clear correlation between the appearance and diffusion of black shale facies and an abrupt decrease of the marine biodiversity, i.e. a biotic crisis reflecting a multi-phased mass extinction of both pelagic and benthic communities. The T-OAE is well documented in the European epicontinental shelf and has been intensely studied. Recently, research efforts have been devoted to investigate the tempo and mode of the post-crisis faunal recovery focusing on entire communities or on selected groups such as, for example, benthic foraminifers and calcareous nannofossils, brachiopods, ammonites and radiolarians. Studies on the relationship between the changes of gastropod diversity and the Toarcian crisis are instead very few, the group being mostly considered as a component in analyses of multi-taxa benthic assemblages.

The great majority of marine gastropod molluscs consist of benthic groups particularly sensitive to changes of the environmental parameters. They represent today one of the most important and diversified component of the benthic communities and in Mesozoic times, particularly during the Jurassic, they were in full radiation. Consequently, episodes of rapid changes of biodiversity are well registered in the fossil record and these changes distinctly imprinted the subsequent evolution of this group. In this context, the present project aims to investigate the impact of the T-OAE on the evolution and diversity of western Tethyan gastropods and the dynamics of their post-crisis recovery. The project is inspired by recent studies on particular groups of holoplanctonic gastropods from Toarcian black shales of southern Germany which seem to point to a close relationship between the T-OAE and the origin of the holoplanctonic mode of life in gastropods. The project also focuses on the dysoxic Toarcian sediments of Luxembourg immediately following the T-OAE which bears an oligotypic fauna including suspected holoplanctonic gastropods (e.g. *Glogorilusopsis* and *Simonicerias*). The study of this fauna is a potential source of information useful to interpret the origin of the holoplanctonic mode of life in gastropods and to understand the modalities of their early recovery.

The present project is part of a larger program of collaboration on this topic recently established with the Musée National d'Histoire Naturelle de Luxembourg (Luxembourg la Ville, Grand Duchy of Luxembourg) and the Bayerische Staatssammlung für Paläontologie und Geologie (Munich, Germany) and will be developed in conjunction with these institutions.

Supervisor: Prof. Stefano Monari

Funds: ex-60%