

The paleoenvironment of the Late Jurassic fishes from the southern Franconian Alb (Bavaria, Germany)

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Abstract

Upper Jurassic fishes from the Southern Franconian Alb (Bavaria, Germany) occur in plattenkalks of at least three stratigraphic units: the Torleite Formation (Late Kimmeridgian), the Solnhofen Formation, and the Mörsheim Formation (both Early Tithonian). The plattenkalks were deposited in basins characterized by a salinity-stratification between bioherms. The fossil fish did not live in the hostile bottom waters of the basins. Their habitats were the less saline and well aerated surface waters, hardgrounds and soft bottom areas on top of ancient sponge-microbial mounds going up into the surface waters, and coral patch reefs.

Introduction

Late Jurassic fishes from the Southern Franconian Alb in Bavaria can be found in museums all over the world and are mostly labelled as coming from Solnhofen. Most of the material indeed originates from the Early Tithonian Solnhofen Lithographic Limestone, which as a stratigraphic concept should be better termed Solnhofen Formation. Stones suitable for lithography occur only in the Solnhofen area and even there they did not make up more than 1 % of the entire sequence. The outcrop area of the Solnhofen Formation extends over an area of about 80 × 30 km (Figs. 1, 2).

In older collections there might be also fish fossils from the Kelheim area whose stratigraphic position is not quite clear. They can come from the Solnhofen Formation (Malm Zeta 2) as well as from the underlying Geisental Formation (Malm Zeta 1). There are also plenty of fish originating from the Mörsheim Formation (Malm Zeta 3; some of these might also be found in older collections) and from the upper part of the Late Kimmeridgian Torleite Formation (Malm Epsilon) (Fig. 3). Thus there are at least three, possibly four, distinct stratigraphic units yielding fish.

All fish fossils are linked with plattenkalk, that means flatty-bedded micritic limestone with even bedding-planes and laterally continuous individual layers. In the following the paleogeographic-paleoecological conditions for the formation of plattenkalk are surveyed. From these considerations also the available fish habitats can be inferred.

Paleogeographic setting

In Late Jurassic times the Southern Franconian Alb was part of the Franconian-South Bavarian Carbonate Platform (Fig. 4) which was built up by the growth of sponge-microbial bioherms (compare KEUPP et al. 1993). These started to grow on submarine highs already in Oxfordian times. In the course of time they spread more and more due to a progressive shallowing forming a network of submarine elevations with basins between them (for the different stages of their development see MEYER & SCHMIDT-KALER 1983, 1989, 1990, and SCHMIDT-KALER 1979). The biohermal facies came up to its maximal extension during the late Middle Kimmeridgian, when the shallowing reached its maximum indicated by ooid and peloid sands as well as stromatolites replacing sponges. Corals began to settle on top of former sponge built-ups in the Kelheim area.

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