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BOIVIN, Simon, et al.
Eleventh Romanian Symposium on Palaeontology
Bucharest, 27-28 September 2017

Abstract Book

Edited by
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Editura Universității din București
A little walk between Liassic sponges and corals

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Keywords: chaetetids, corals, Early Jurassic, taxonomy, CT scan, convergence

Distinguishing corals from sponges is an easy task in modern specimens when soft tissues are available, but the distinction is not so easy for fossil skeletons. Over the last few decades a number of extinct taxa have been re-classified as corals or as sponges (originally identified as the other taxa). The classification issue has been a matter of debate for archaeocyaths, tabulates, stromatoporoids, and among them chaetetids.

We were challenged with a similar issue when looking at benthic organisms from carbonate platforms, and their derived oolitholiths, in the Liassic (Early Jurassic) of the Moroccan High Atlas Mountains. The discovered specimens are characterised by massive to branching bodies made of parallel closely packed tubes. These tubes are delimited by thick common walls, and each tube is typified by one major vertical plate attached to the wall and reaching the centre of the tube. In the literature, these specimens have been assigned to both sponges and corals. On the one hand, Turnsek et al. (1975) interpreted these forms like a colonial Amphiasterid coral with the vertical plate considered homologous of a major septum. She created a coral genus Hispaniastroea based on Liassic samples from Spain. On the other hand, Fischer (1970) and Beauvais (1980) interpreted these forms as Chaetetes (Pseudoseptifer), a Chaetetid sponge described by several authors in the 19th century and first half of the 20th century before the assignment of chaetetids to sponges. In this second interpretation, the vertical plate is called pseudo-septum and its growth results in the fissiporous division of the tube: one or more pseudo-septa grow progressively up to separate the tube into two new tubes. Then, the vertical plate is homologous of an incipient wall.

It must be noted that in the last decades, the study of chaetetids has highlighted significant differences between scleractinian and chaetetid skeletal microstructures. In spite of this, no well-preserved specimens of species have been found to date and so the assignment of this species remains contentious. Our study, based on all available diagnostic macrostructural characters of the Moroccan material completed with some samples from South of France, allow us to establish two groups of specimens, one with characters specific to scleractinian corals, and the other with those of chaetetids. Thus we hypothesize that there was morphological convergence between Hispaniastroea and Chaetetes (Pseudoseptifer). To our knowledge, this possibility has not been considered previously; indeed, each author described their material as either scleractinians or chaetetids using the respective homologies and vocabulary. Accordingly, we have reconsidered the literature in the light of two convergent genera with their own diagnostic characters.

Considering the new specimens discovered, it appears necessary to revise the systematics of both genera and outline clear criteria to distinguish one from the other. The study of this fauna was supported by biometrical and morphometrical approaches. Furthermore, computerized tomography (CT-scan) is used to provide a better resolution of morphological and ontogenetical differences. CT scans provide critical information about the interior structures of the specimens for example, the
region between the major septum of *Hispaniostraea* and the pseudo-septa involved in the fissiparous division of *Chaetetes* (*Pseudoseptifer*).

This work demonstrates that there were both scleractinian corals and chaetetids sponges in Early Jurassic Moroccan reefs, and so allows us to refine our understanding of peri-Tethyan Liassic reefs. Indeed, the end-Triassic crisis strongly impacted coral biodiversity. Historically, the Early Liassic has been known as a "reef gap" because reefs are uncommon worldwide and corals are always found in association with several other groups such as chaetetids and lithiotid bivalves. Despite their restricted geographical distribution, scleractinian corals quickly regained a significant position in reef ecosystems during Early Jurassic before the Pliensbachian-Toarcian boundary. The Liassic reefs found in the High Atlas of Morocco present a very interesting and unique example of biodiversity recovery between mass extinction episodes.

This contribution is part of the long-term research project on reef and carbonates build-up development (REEFCADE to RM), started in 2007 and supported by the Swiss National Science Foundation.

References