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Basal Triassic carbonate of the Tethys: a microbialite world.

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INTRODUCTION

Following the end of Permian mass extinction, primitive groups of microbial communities emerged from stressed palaeoenvironments to recolonize the normal marine area of the Tethys. The prolific upper Paleozoic skeletal carbonate factory was abruptly replaced by a non-skeletal carbonate factory [1]. With this global change occurs one the most severe carbon isotope shift (up to 6‰, studies of S. Richoz) of the marine Phanerozoic [2].
During the main step of the very rapid and large-scale basal Triassic transgression on the giant carbonate platforms of the western and central Tethys, we note in different areas (S Alps, Taurus, Turkey, S Armenia, E Elburz, Iran, Central Iran and N Oman) the growth of domal stromatolites, thrombolites or microbial mats. Similar features have been reported from the basal Triassic of the Yangtse platform of the eastern Tethys [3].

THE STROMATOLITE FACIES

The stromatolite facies consists at least of five types:

• The small-columnar stromatolites range from 3-5cm in diameter and the columnae are up to 10-15cm high. In the central Taurus (Aladag unit) they overlie a latest Permian diagenetically alterated ooid grainstone and are overlain by tabular undulose stromatolites.

• The domal stromatolites form domed bioherm up to 1m thick with a 5cm relief and a dome diameter of 10-15cm. This facies is common in the Antalya nappes of the Taurus.

• The conical stromatolites form truncated cone up to a synoptic relief of 10cm and a basal diameter of 20cm and has been found in the Pamucak section near Kemer in S. Turkey Taurus (fig. 1).

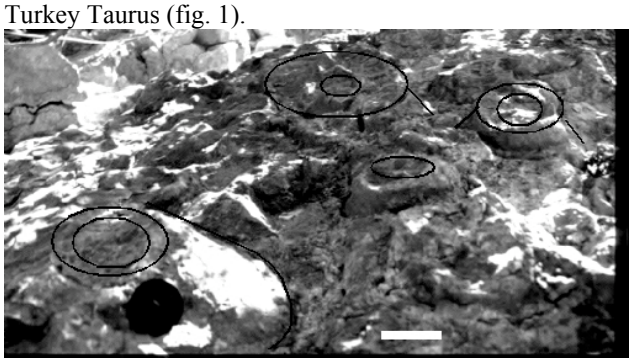

Fig. 1: The conical stromatolites of the basal Triassic, Pamucak section, Antalya Nappes, S Turkey. White scale bar is 5cm long.

• The giant domal stromatolites form huge domed structures up to 2m high and up to 10m in diameter. This facies characterize the deep carbonate ramp of the Vedi section, S Armenia, (fig. 2).

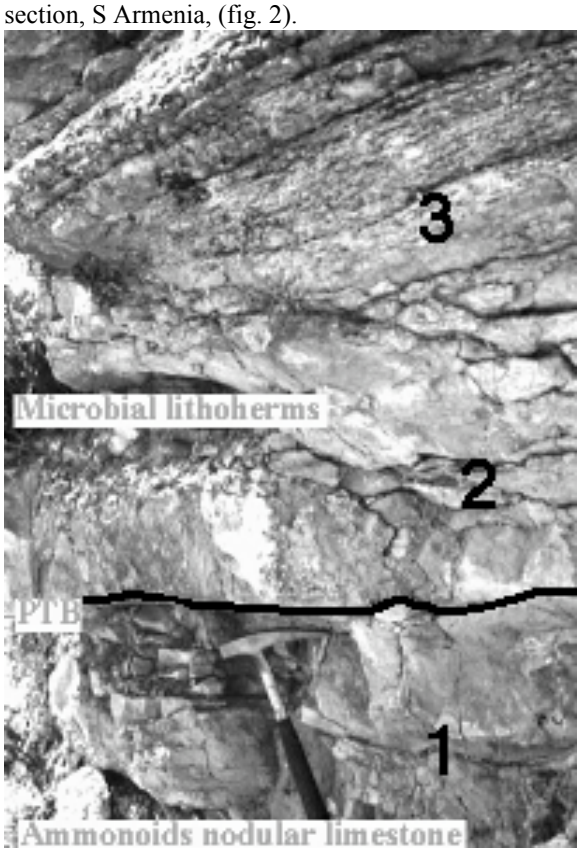

Fig.2:The Permian-Triassic boundary (PTB, black line) at the Vedi Section (S Armenia). 1- latest Permian Ammonoids nodular lime wackestones, 2- basal Triassic thrombolite, 3- lower part of the giant domal stromatolites. Scale: hammer, 30cm.

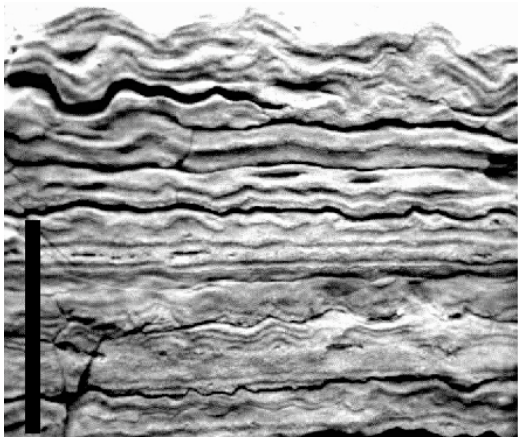

Fig. 3: the wavy-undulose stromatolites of the basal Triasssic, Maqam section, NW Oman. Black scale bar is 5cm long

• The undulose stromatolites form tabular bodies from 10 to 80cm thick and are generally laterally continuous. They are common in all the investigated area and well developed from shallow to deep carbonates of the N Oman margin (fig. 3).

THE THROMBOLITE BIOHERMS

Three types of thrombolite bioherms have been observed:

• The first one consists of domal, tuffaceous dendroidal thrombolite from 20cm to up 1m high. These unusual lithoherms have been found in only one locality, the Pamuçak section (fig. 4). This thrombolite facies look similar to the microbialite carbonate crust described at the Permian-Triassic boundary in S China [4]

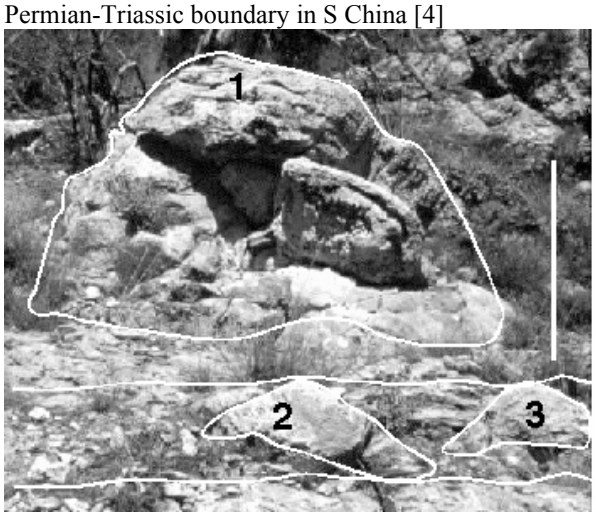

Fig. 4: the thrombolite bioherms (1, 2 & 3) of the Pamucak section . White scale bar is one meter high.

• The second one is more common and consists of massive mounds of clotted micrite from 40cm up to 2m thick and up to 10-20m of laterally extension. They are intercalated in the thinly laminated stromatolitic limestones. These thrombolites are well developed in the Curuk Dagh section near Kemer in S Turkey (Taurus) and occurs also in S Armenian (Vedi) and Central Iran (Abadeh) sections.

• The third one can occurs laterally to the second one and is called spar mound. It consists of botryoidal and spherulitic crystal masses surrounding millimetric to centimetric cavities filled by micrite or peloidal micrite and/or drusy cements (fig. 5). Some of the cavities are bordered by microspherulitic cements (Rivularia-like microbial colony).

The accompanying facies of the stromatolite or the thrombolite are oolitic grainstones and thin-bedded structure less cryptalgal micrite. An early differential lithification of the microbial lime mud is attested by the frequency of the edge-wise conglomerate beds as founded in S Armenia, E Elburz and central Iran. At the dawn of the Triassic time, the inter-tropical Tethyan carbonate platforms and ramps throw into an anachronistic microbialite world with stromatolites and thrombolites.

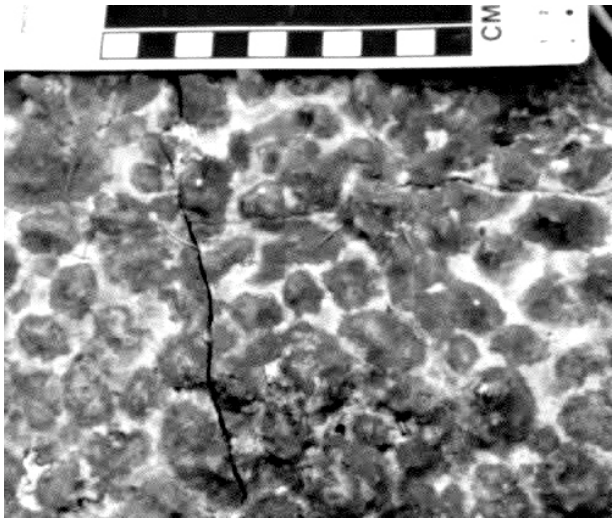

Fig. 5: the spar mound facies: spherulitic cristal masses (gray-black) surrounded by white drusy cements.

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