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The lower Triassic microbialites and precipitates: environmental control, distribution in space and time.

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Abstract.

With the end-Permian mass extinction, a major crisis occurred in Phanerozoic carbonate systems. The prolific upper Paleozoic skeletal carbonate factory was abruptly replaced by a non-skeletal carbonate factory [1]. When recorded between the two carbonate systems, a post extinction clay interval occurs (boundary clay) of latest Permian age (preparvus-meishanensis zone).
Primitive groups of microbial communities emerged from stressed palaeoenvironments to recolonize normal marine areas [2].

A first microbial episode occurs during the main step of the very rapid and large-scale latest Permian -basal Triassic flooding of the giant carbonate platforms of the western and central Tethys, We note in different areas of the shallow, low energy, post extinction carbonate ramp of the central Tethys (S Alps, Taurus, S Turkey, E Elburz, Iran, and N Oman), massive thrombolitic mounds and stromatolites. On more distal open marine ramp (S Armenia, NW and Central Iran) occur digitate thrombolites (dendrolites), large stromatolitic mound and oncoids. Sea floor Precipitates are recorded from W Taurus, S. Armenia and Central Iran. With changing conditions to high-energy environment, oolitic deposition replaces stromatolites and thrombolites. The basal Triassic microbial cap carbonate is ending with a sudden terrigenous input, late Griesbachian or Dienerian in age [3].
In the eastern Tethys, a latest Permian -basal Triassic calcimicrobial framestone have been reported from large carbonate banks occurring in the Nanpanjiang basin (Guizhou, S China) S of the giant Yangtze carbonate platform [4]. The high-energy crest of the bank is build up by oolitical shoals. A same age microbial? Carbonate crust have been described in S Sichuan [5].
Due to a main terrigenous sedimentation, basal Triassic microbialites are absent or have not been found on the western Pangea margin. In the boreal seas, stromatolitic limestone lenses as up to 4m are recorded within the Wordie creek shaly unit of Jameson Land in SE Greenland [6].
Microbial buildups have not yet been observed at high southern latitudes (Indian margin, Australian and New-Zeeland margins).
The Panthalassa Permian-Triassic seamount cropping out within the Chichibu Jurassic accretionary complex of S Japan expose Griesbachian calcimicrobial bindstone overlying Changhsingien skeletal limestones [7].

A second microbial episode appears in the late Griesbachian to lower Olenekian cyclic limestone with calcimicrobial mounds from the carbonate banks rimed by oolites of the Nanpanjiang basin [4].

A third microbial episode (lower Olenekian) is mainly recorded by oolitic shoals and accessory stromatolites and edge-wise conglomerates on the carbonate ramp of Central Tethys margins (S Turkey, N and central Iran).

Oolites, oncoids and various type of stromatolites beds occurs within the sandstone and mudstones of the middle Buntsanstein of Poland [8].
Gray calcimicrobial build-ups and fan ray carbonate precipitates grow up on red ammonoid limestone occurring on a seamount of the distal Gondwana margin in Oman (tilted block). The proximal shallow carbonate platform exports a huge amount of microbial micrite and ooids in the adjacent Sumeini slope depocenter.
On the West Pangea coast, the Union Wash Formation (S California) exposes during the Smithian black microbial concretions and fine laminted black lime mudstone [9].

The last main lower Triassic microbial episode is well recorded on the West Pangea coast in Western United State] and make his development during the last ammonoid zone of the Olenekian (Late Spathian) with thrombolites, stromatolites and calcite precipitates (Virgin limestone and Union Wash Formations [10, 11]).
On the Paleotethys complex of NE Iran (Aghdarband), late Spathian calcimicrobial mounds exhibits the first calcareous algae reef reconquest [12].

Some of the tethyan microbial meso and -microstructures will be described and illustrated.

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