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The lower Triassic microbiolites in Chaohu region, East China and their contribution to the early Triassic recovery

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Abstract: The lower Triassic is well preserved in Chaohu Region, Anhui Province, East China. It can be divided into Yinkeng Formation (80 meters thick, was formed during the Indian and early Smitian), Helongshan Formation (21 meters thick, was formed during the end Smithian) and Nanlinghu Formation (more than 157 meters thick, was formed during the Spathian) from bottom to top. It is mainly composed of carbonatites such as micrite limestones and nodular limestones, as well as shales and calcareous marls. The lower Triassic in this area has been well researched for more than a decade, and many fossils such as ammonites, bivalves, fishes, ichthyosaurus, conodonts, and ichnofossils have been found, but the microbiolites have been neglected.

Microbiolites were mainly outcropped in the Helongshan Formaiton and the lower Nanlinghu Formation. In the lower Helongshan Formaiton, tens microbial mat layers and thin bedded calcareous marl layers formed cyclothems which have been named as nodular limstones. The thin-section observation of the microbial mats indicate that many films and thin-shell bivalve fragments deposited almost horizontally. In the upper Helongshan Formaiton, six microstromatolite bioherm layers were outcropped in the thin bedded calcareous marl layers. The diameter of the stromatolite column is about 2 millimeters, the bioherms are lenticular and no more than 3 centimeters thick in the central, their diameters change from 5 centimeters to 30 centimeters, calcareous marls were deposited around the bioherms, and many ammonoids, bivalves and burrows were found in such layers. The microfacies differentiation of the stromatolites such as the basement, reef core and the capping beds can be recognised clearly in thin sections. Several microstromatolite layers were outcropped in the micritic limestones with a stable thickness of 15 millimeters in the lower Nanlinghu Formation and the stromatolite column look like the ones in the Helongshan Formation. Few microbiolites have been found in the middle and upper Nanlinghu Formation.

The macro fossil association of the lower Triassic in Chaohu region is quite different in different Formations. Ammonoids and bivalves can be found in the whole lower Triassic strata, and they are especially dominant in the Yinkeng Formation and lower Helongshan Formaiton, worms and borrowing animals can be found in the middle Helongshan Formation, fishes can be found in the uppermost Helongshan Formation and the lower Nanlinghu Formation, and the oldest ichthyosaurus in the world can be found in the upper Nanlinghu Formation.

According to the changing characters of the fossil association in this area, it is indicated that the high-level ecosystem had been formed in this area in the late early Triassic, and the appearance of the microbiolites in the Helongshan Formation might be the milestone for the early Triassic recovery. Though the global recovery process after the Permian-Triassic mass extinction might be postponed to the end of the early Triassic, regional recovery process in Chaohu region might start at the end Smithian and actualized at the middle Spathian. The microbioilites might be the original impetus for the early Triassic recovery.

Key words: microbiolites, early Triassic, regional recovery, Chaohu region

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