

Thrombolites and shelly fossils from the Cryogenian carbonate in Bahia, Brazil

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Research on the Neoproterozoic sediments in the last two decades have demonstrated the drastic climatic changes and the peculiar material cycling of this age, as well found a number of traces of life. Multicellular animals have evolved immediately after the Marinoan glaciation (635 Ma), and the most primitive sponges may have already existed before. In addition, stratigraphic range of the shelly organisms has been extended beyond the Cryogenian that includes the Sturtian glaciation (720 Ma). Thus, Neoproterozoic was the period of biological evolution. A potential linkage between the Neoproterozoic climate and evolution is a huge organic mass suspended in stratified ocean column. In order to digest organic matter in low-oxygen seawater, the unicellular and mobile suspending feeders change their ecological strategy to multicellular and immobile habits. This may have induced the animal multicellularity (Kano et al., 2011).

We found traces of life in carbonate rocks of the Cryogenian Salitre Formation in central Bahia province, Brazil. The organic-rich carbonate rocks appear lentic bodies of thrombolites, up to several meter thick and >20 m wide. The thrombolite is formed by digitate structures of ~5 mm in diameter, which consist of peroidal texture. The digitate structures could be formed by microbes, but their uniform configuration may indicate the possibility that they were lithified multicellular animals or algae. In addition, the carbonate yields spheroidal shelly fossils of ~2 mm in diameter. The shell is ~0.2 mm thick and lacks any microscopic features, such as processes or holes. Algae from California are the only known Cryogenian fossils having calcareous shell, but our specimens show a absolutely different form. Skeletal of animal is generally considered as adaptation against predation. Thus, animals that can predate organisms of ~2 mm had evolved in late Cryogenian.

At present, origins of the digitate structures and spheroidal fossils are not specified, but will be investigated with microscopic observation and chemical analyses.

Keywords: Neoproterozoic, thrombolite