

Geological characteristics of black shale series in southern Anhui Province

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The black shale series in southern Anhui are developed widely. The southern Anhui area is located in the northeast margin of Lower Yangtze block and adjacent to Jiangnan uplift zone. The occurrence of Paleozoic strata is relative complete, and the Lower Cambrian shale black shale series are relatively well developed in Hetang Formation and Huangbailing Formation that locate on both sides of Jiangnan deep-fault zone. The area developed the Sinian and Early-Middle Triassic sedimentary cover, late Yanshanian intrusions, NE Jura-type folds and a series of the NE thrusting (sliding) nappe structure, and suffered multi-stage tectonic movements with a polycyclic feature of magmatic activities.

Lower Cambrian Hetang Formation and Huangbailing Formation are the primary strata of black shale series, and they are different on lithology and thickness. Then former is divided into three parts from bottom to top on lithology: the lower part is carbonaceous siliceous mudstone member intercalating with limestone, composing of Si-bearing carbonaceous shale, carbonaceous limestone, calcipulverite and phosphatic nodule with obvious rhythm, and the middle part is carbonaceous mudstone member that comprises carbonaceous mudstone, siliceous mudstone and silty carbonaceous mudstone, intercalating with a layer of fine-grained calcipulverite, and the carbonaceous materials are enriched to form stone coal layer in the lower section of the middle part, and the upper part is mudstone member with horizontal laminar, mostly composed of gray calcareous mudstone and carbonaceous mudstone with obvious horizontal laminar. The later is also divided into three parts: the lower part is black carbonaceous siliceous shale member with lentoid stone coal layer at the bottom, and the middle part is gray medium-bedded calcipulverite and black carbonaceous shale, and the upper part is yellow green mudstone with silty shale. The thickness of Huangbailing Formation is more than Hetang Formation's.

The middle members of Hetang Formation and Huangbailing Formation both have poly-metallic enrichment layer where enriched useful elements (Ni, Mo, Au, Ag, etc.), rare elements (Cd, Se, Ti, Cs, etc.) and radioactive elements (U, Th, etc.). Therefore, the systematic study on black shale series in the area has important theoretical significance and potential economic value.

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Microbial dolomite in Cambrian stromatolites of Tarim basin, northwest China

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Microbial mediation is the only proven mechanism to precipitate experimental dolomite under Earth's surface conditions [1]. Proving a biogenic microbial origin for ancient stromatolites is very difficult, but there are dumbbell dolomite with nanoglobule texture within micritic dolomite crystal (Fig 1A) and aggregates of nanoglobules dolomite (Fig 1B) in dark stromatolitic laminae in a inter-supratidal of the lower sabkha deposits. Nanoglobules (indicated by red arrows in Fig 1A) are 50–90 nm in diameter and aggregates of nanoglobules (indicated by black arrows in Fig 1B) are 100–160 nm (large globules).

The characteristic texture, morphology and sizes in diameter are very similar to the results of dolomite precipitation in anerobic or aerobic culture experiments [2, 3]. These results reveal that these observed may be microbial signatures preserved in the rock record.

These results provide microbial tracers evidences in Cambrian dolomite stromatolites which are proposed a microbial dolomite origin.

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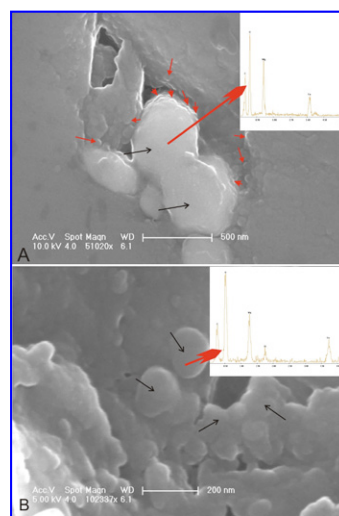


Figure 1: SEM photomicrographs of microbial dolomite

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