Xie S. et al., Cyanobacterial blooms tied to volcanism during the 5-million-year
Permo-Triassic biotic crisis

Description of calci-microbialites in South China discussed in the text

The occurrence, structures and microbial origin of the microbialites in SW China, the north of South China and central China discussed in our paper were described and documented before by Lehrmann (1999), Ezaki et al. (2003) and Adachi et al. (2004), and Wang et al. (2005). In the outcrop, the microbialites were composed of typically layered, planar or undulatory beds which ordinarily exhibit an occurrence of isolated domed, subspherical, or columnar modes (image DR1). The macrostructures of highly variable columnar forms, including parallel and dendroid branching, were observed in the north of South China such as Laolongdong and Huayingshan, but appear to be absent in other regions in South China.

Image DR1 The outcrop (a, c, d) and the polished section (b) of microbialites in the north of South China, exhibiting an occurrence of columnar modes of dendroid branching (a and b, Huayingshan) and isolated domes (c and d, Laolongdong).

Microbialites in different regions in South China almost share the comparable thrombolitic fabrics and stromatolitic laminations. Both of the two structures are of microbial origins (Lehrmann, 1999; Ezaki et al., 2003; Adachi et al., 2004; Wang et al., 2005), and comparable with the contemporaneous calci-microbialite in other regions in the world, such as Bükk Mountains in Hungary (Hips and Haas, 2006).
Thrombolites in South China are featured by varied arrangements of millimeter- and centimeter-sized, sparitic clots, showing horizontal, concentric, vertical, radial structures within interstitial limy mudstone (Ezaki et al., 2003). Spheroidal and elliptical structures with a micritic envelope are sporadically preserved in clusters (image DR2). These thrombolitic structures in South China are proposed to be of microbial origin (Lehrmann, 1999; Ezaki et al., 2003). Multilamellated spheroids and ellipsoids are thought to correspond to calcified coccolid cyanobacteria. The calcimicrobial framework was formed by these coccolid cyanobacteria. The individual mesoscopic clots reflect in situ calcification of coccolid-dominated microbial communities, and their upward and lateral accretion form distinct thrombolitic textures (Lehrmann, 1999; Ezaki et al., 2003).

Image DR2 Spheroidal and elliptical structures with a dark micritic envelope sporadically preserved in clusters in thrombolites under a light microscope. These spheroidal and elliptical structures are considered as remains of coccolid cyanobacteria. a-d are from Chongyang in central China, and e-f from Dajiang in SW China.

The stromatolite microstructure is featured by the alternation of light-dark laminae of calcified microbial remains with detrital carbonate minerals (image DR3).
Calcified coccoid cyanobacteria are usually preserved along the margin of dark laminae. Microbial colonization is broken when the deposition of detrital carbonates increased and further hampered the growing of the mats. The laminations likely formed by a pioneering microbial community, and the biofilms could evolve to complex mats during the sedimentation pause (Hips and Haas, 2006). In addition to the laminations found in this fabric, a clotted texture of a microbial genesis is also common in the microbial fabric.

Image DR3 The stromatolitic lamination from Dajiang in SW China is featured by the alternation of light-dark laminae of calcified microbial remains with detrital carbonate minerals under a light microscope. Calcified coccoid cyanobacteria are usually preserved along the margin of dark laminae. The block area in c is zoomed into d. The green arrows show the presence of coccoid cyanobacteria.

References Cited
