

PROTEROZOIC AND EARLY CAMBRIAN VENDOTAENIDS - MACROSCOPIC COLONIES OF CHEMOTROPHIC BACTERIA

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Vendotaenids are distributed worldwide in the Proterozoic / Early Cambrian (East-European Platform, Siberia, North America, Africa, Australia, China). They represent large tubular carbonaceous megafossils. Hitherto vendotaenids were considered as eukaryotic metaphyta. In contrast to this, evidences for an assignment to chemotrophic sulfur bacteria are given here. For this purpose primary Lower Cambrian Vendotaenia mats from South China are compared with recent mats of Thioploca from the marine upwelling zone off Chile for the geochemistry and the colony ultrastructure. The metabolism of Thioploca is based on the oxidation of isotopically light reduced bacterial sulfur, causing the liberation of very light sulfate. In the recent marine sediments a lowering of $\delta^{34}\text{S}$ by ca. 10 ‰ was detected within the sulfate sulfur compared to values of modern sea water. This is interpreted in terms of the formation of isotopically light sulfate by Thioploca. Samples of Early Cambrian black shales from South China indicate an approximation of the $\delta^{34}\text{S}$ values of sulfates and sulfides, caused by bacterial and abiotic reoxidation of reduced sulfur species. However, in samples containing primary mats of vendotaenids sulfate isotopes are consistently lower (ca 8 ‰) than the isotopes of the reduced sulfur pool. This indicates bacterial reoxidation processes and demonstrates the metabolic link of the vendotaenids to the sulfur cycle. Additional support for this is given by ultrastructural and biostatistical analyses of vendotaenids from South China, Namibia, and Podolia.