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Early Triassic formation of microbialites on the margins of the Neotethys

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After the most severe mass extinction at the Permian-Triassic boundary (PTB, ca. 252 Ma), the Paleozoic skeletal carbonate factory was replaced by microbial communities, which formed microbial carbonate deposits including reefs that covered wide areas on the Early Triassic ocean margins. Despite intensive research, the causes and modes of reefal microbialite formation is still enigmatic.

This study is designed to identify the involved benthic microbial communities and to unravel the formation mechanisms of laminated and thrombolitic Early Triassic microbialites. Well preserved microbialites from Iran and Turkey were microscopically characterized and stable carbon and oxygen isotopes of the carbonate as well as lipid biomarkers were analysed.

Microbialites contain abundant *n*-heptadecane, representing input from cyanobacteria. Further detected microbial fossils are pseudohomologue series of head-to-tail isoprenoids C_{21}-C_{25}, which most likely derive from halophilic archaea. Input of other prokaryotes is from anoxygenic phototrophs (farnesane, isorenieratane) and sulphate-reducing bacteria (iso-/anteiso-C_{15} and C_{17} alkanes). The clotted and peloidal microfabric and $\delta^{13}C$ ratios of the studied microbial carbonates are in accord with a flourishing benthic population of prokaryotes on the Early Triassic seafloor. Interestingly, abundant fossil evidence of oxygen-dependent foraminifera and metazoans like bivalves, gastropods, sponges, ostracods was found.