

## **MICROBIAL CARBONATE PRECIPITATION BY ANAEROBIC BACTERIA: A NATURAL EXPERIMENT IN LAGOA VERMELHA, BRAZIL**

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Lagoa Vermelha, a dolomite-precipitating hypersaline lagoon located 100 km east of Rio de Janeiro City, Brazil, is a unique natural laboratory to study the microbial mechanisms associated with authigenic carbonate precipitation. To understand biomineralization and diagenetic processes taking place at the sediment surface and subsurface, strains of marine sulfate-reducing bacteria (SRB) were isolated from Lagoa Vermelha and cultured under different conditions. Cultures, which precipitated carbonate minerals in a specific defined agar medium, were selected for further experiments. The minerals, formed at high rates during an incubation time of 30 days, were identified by XRD as calcite, monohydrocalcite, Mg-Calcite, and dolomite with up to 47 mol % Mg. The apparent precipitation rate was about 150 mg/l per month. The morphologies of the precipitates formed in the pure cultures, such as dumbbell and star shapes, are also observed in Lagoa Vermelha sediments. In situ microbial studies confirmed that dolomite precipitation occurs in the top 5 cm of the sediment. Specific inhibition experiments in ion permeable dialysis bags indicated that two major processes are involved in microbial mediation of dolomite formation: (1) metabolism of the SRB and (2) mineral nucleation by bacterial cells. These preliminary results show that sulfate-reducing bacteria do influence anoxic carbonate precipitation and early diagenesis, implying that microorganisms may have played an important role in the evolution of carbonate sedimentation throughout geological time.