Ca phosphate rich nanoglobules as a precursors for Mg rich Carbonates

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The role of microorganisms on carbonate precipitation is recognized although the exact role of bacteria in such processes remains unclear. The nucleation on surface of bacteria is suggested as a first step for carbonate precipitation (1). Here we investigated carbonate and phosphate precipitation with an environmentally enriched halophilic culture under various geochemically diverse conditions. The short term (30 days) and long term (4 months) experiments were set up to examine the effect of Mg/Ca molar ratios and salinity on the precipitation and carbonate mineralogy. In the early stage of experiments (3 days) an amorphous Ca phosphate precipitation on bacterial cell surface were observed for all the short term experimental conditions. With increasing Mg/Ca ratio this amorphous phase contained Mg in addition to Ca. Later with time (7 days) nanoglobules, sized from 70 nm to 247.5 nm were developed. Globules originated from the halophilic cell surface and were later developed into hydromagnesite, dolomite and calcite in the long term experiments With changing Mg/Ca ratios (0.05, 1, 4, 8, and 15) and salinity (8 and 15 %) carbonate mineralogy showed differences. Apatite was only determined in Mg/Ca ratio of 0.05 experiments and with increasing Mg concentration struvite became dominant phosphate mineral. In contrast to the short term experiments which Ca rich minerals were formed, Mg rich minerals such as dolomite, hydromagnesite became dominant in the long term experiments. Our results indicate that amorphous Ca phosphate can be a precursor for Mg rich minerals (1).

(1). Rivadeneyra MA *et al*. (2010) Amorphous Ca-phosphateprecursors for Ca-carbonate biomineralsmediatedby Chromohalobacter marismortui**.** ISME**,** 4(7):922-32