Influence of pH, light and salinity on element transport in calcifying tropical corals (BIOACID subproject 3.3.2)

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Corals have successfully been used as proxy recorders for a variety of environmental parameters. They are, however, known for their strong vital effects since their trace element partitioning and isotopic fractionation is significantly different from inorganic carbonates precipitated under the same conditions. We studied ion transport across biological tissues to investigate the role of the coral's epidermis in respect to element and isotope partitioning of divalent cations.

A coral culturing facility was established at the IFM-GEOMAR Aquarium (T=26°C, S=35, 12h light : 12h dark cycle) for rearing tropical reef corals of the genera *Stylophora* and *Acropora*. Patches of coral colonies were placed on perspex tiles or directly onto polycarbonate filters. They grew for several weeks until they completely and tightly covered the filters. Those "coral-filter units" were used for experiments in continuously perfused, open-circuit Ussing chambers, allowing to perform transepithelial measurements. We measured the coral potential and resistance in response to different stimuli (pH, light and salinity). The resistance is determined by the integrity of the coral tissue and the formation and permeability of tight cell junctions.

We found a resistance of ~950 Ωcm^2 for intact coral tissues. Of this only a small fraction could be allocated to the skeleton. The coral showed no active transport potential under control conditions or in response to pH and light variations. Hyposaline-isoosmotic diffusion voltages indicated cation selectivity of the tissue.

Taken together, we have established an assay for transepithelial investigation of coral tissue *in vitro* and describe the coral to form a high resistance and partially cation selective barrier between seawater and skeleton.