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Seawater temperature and salinity controls on Li/Ca ratios in Mytilus edulis (bivalvia) shells

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In this study we have investigated the effects of seawater temperature and salinity on Li/Ca ratios in newly precipitated shell calcite in Mytilus edulis shells, since this potential temperature proxy has not been widely applied beyond brachiopods and inorganic calcite. Juvenile specimens of M. edulis collected from western Greenland were cultured in laboratory aquaria using a four-by-three factorial design that consisted of four circulating temperature baths and three salinities. New shell growth precipitated during the constrained culturing experiment was identified carefully and subsequently dissected from the shells. Following acid dissolution, Li/Ca ratios were measured by ICP-MS, enabling an assessment of temperature and salinity controls on shell Li/Ca ratios. Furthermore, measurement of Li/Ca ratios in the aquaria seawaters has enabled calculation of Li/Ca ratio partition coefficients and direct comparison to Li/Ca ratio to temperature relationships observed for brachiopods and inorganic calcite. The results of this study suggest that bivalve shell Li/Ca ratios can be used as a new temperature proxy.