Geophysical Research Abstracts,
Vol. 10, EGU2008-A-04829, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-04829
EGU General Assembly 2008

Oxygen isotope equilibrium in brachiopod shells in the context of biological control

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With their long geological history and stable low magnesium calcite, Rhynchonelliform brachiopods are attractive sources of environmental data such as past seawater temperature (Auclair et al., 2003., Brand et al, 2003., Buening & Spero, 1996., Parkinson et al., 2005). The outer primary layer of acicular calcite is isotopically light in both δ^{18}O and δ^{13}C while the secondary layer calcite fibres are in oxygen isotope equilibrium with ambient seawater (Parkinson et al., 2005). The calcite fibres of the secondary layer are parallel to the shell exterior. Electron backscatter diffraction (EBSD) reveals that the fibres are effectively single crystals with the calcite c-axis perpendicular to the fibre axis (Cusack et al., 2007., Pérez-Huerta et al., 2007., Schmahl et al., 2004). The granular nature of the fibres is evident in Atomic Force Microscopy (AFM) where the addition of bands of calcite granules to the growing fibre is clear. These bands of granules are thus added over the duration of fibre growth with crystallographic orientation being maintained throughout. Although there remains much to be understood about how this precise biological control is achieved, the attainment of isotope equilibrium under such strict biological influence is counter-intuitive.

Auclair, A.-C., et al., 2003 - Chemical Geology. **202**, 59-78. Brand, U. et al. 2003 - Chemical Geology.**198**, 305-334.

Buening, N., Spero, H.J. 1996 - Marine Biology, **127**, 105-114. Cusack, M. et al. 2007 - CrystEngComm, **9**, 1215-1218.

Parkinson, D. et al. 2005 - Chemical Geology, **219**,193-235. Pérez-Huerta, A. et al. 2007 - Journal of The Royal Society Interface, **4**, 33-39.

Schmahl, W.W. et al. 2004 - European Journal of Mineralogy, **16**, 693-697.

MC & APH gratefully acknowledge financial support from BBSRC (BB/E003265/1). DP thanks the University of Glasgow for a Nielsen Scholarship. Support from the European Science Foundation (ESF) under the EUROCORES Programme EuroMinScI (BIOCALC project), through contract No. ERAS-CT-2003-980409 of the European Commission, DG Research, FP6 is acknowledged.