ACTA PALAEONTOLOGICA POLONICA

Cellular response to Ca2+ stress and its geological implications

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Acta Palaeontologica Polonica 30 (3-4), 1985: 115-135

Knowledge on transport and regulation of free calcium in the living cell is used in support of the theory (Kazmierczak et al. 1985) linking the onset of biocalcification at about the Precambrian/Cambrian boundary to a rise in Ca^{2+} concentrations in the shelf seas to levels toxic to biota. Following this event, fluctuating Ca^{1+} levels in the Phanerozoic seas are supposed to have challenged a variety of protists and in vertebrates to respond by depositing no, thin, or thick skeletons respectively. Changes in type and extent of calcification, as observed in the stratigraphical record, are interpreted to reflect the pulsating flow of Ca^{2+} ions through crust, sea, and biota. Some implications of that theory to (i) the history of sea water, (ii) the globalcarbon cycle , (iii) stable carbon isotope geochemistry, and (iv) sedimentation of suspended clays, are briefly discussed.

Key words: Cell physiology, biomineralization, calcification, calcium geochemistry, carbonate and clay sedimentation.