Nanostructural and geochemical features of the Jurassic isocrinid columnal ossicles

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Calcite isocrinid ossicles from the Middle Jurassic (Bathonian) clays in Gnaszyn (central
Poland) show perfectly preserved micro– and nanostructural details typical of diagenetically
unaltered echinoderm skeleton. Stereom pores are filled with ferroan calcite cements that
sealed off the skeleton from diagenetic fluids and prevented structural and geochemical
alteration. In contrast with high–Mg calcite skeleton of modern, tropical echinoderms, the
fossil crinoid ossicles from Gnaszyn contain only 5.0–5.3 mole% of MgCO3. This low Mg
content can be a result of either a low temperature environ– ment (ca. 10°C) and/or low
Mg/Ca seawater ratio. Both conditions have been proposed for the Middle Jurassic marine
environment. Occurrence of Mg–enriched central region of stereom bars of Jurassic
columnal ossicle of Chariocrinus andreae is consistent with the concept of magnesium ions involvement
in earliest growth phases of calcium carbonate biominerals.

Key words: Echinodermata, Crinoidea, calcite, nanostructure, geochemistry, AFM, NanoSIMS, Jurassic

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