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Lipids of the mollusks shells

B. Farre, Y. Dauphin, J.P. Cuif

Faculté des Sciences, Bat 504 UMR 8148 IDES-Geologie, 91405 Orsay cedex, France

(bastien.farre@u-psud.fr)

Present from mollusk shells to bones, biominerals are very ubiquitous crystalline materials. They are complex in terms of structural properties and chemical composition, but their formation is controlled by an organic matrix (Hatchett 1799; Grégoire et al. 1955; Beedham 1958, Simkiss 1965, Mutvei 1969, Cuif et al. 1980; Berman 1993; Kobayashi & Samata, 2006), which varies from one species to another, and, in the same organism, from one structure to another. The comprehension of the formation of the biominerals is linked to the characterization of the composition of this matrix.

Within the organic matrix driving the formation of the biominerals, all classes of molecules are represented. The most studied are the proteins (Grégoire et al. 1955, Grégoire 1961, Krampitz et al. 1976, Samata 1980, Weiner 1983, Samata et al. 2004, Miyamoto et al. 2006). Nevertheless, sugars are also present (Wada 1980, Dauphin & Marin 1995, Dauphin 2003). However, there is few information about the lipids.

The extraction of lipids in biominerals is performed using the solubility of those compounds in the organic solvents. The lipids are soluble in organic solvents and insoluble in water. The solvent-soluble part extracted from powdered mollusk shells was analyzed by thin layer chromatography according to the method of Yamashiro et al. (1999). The results were compared with commercial standards.

The first comparisons were held between two similar structures of two different Bivalve shells: the calcitic prismatic layers of *Pinctada margaritifera* and *Pinna nobilis*. This revealed that the differences between species are expressed within the composition of the lipidic mixture contained in the biominerals. However, it is still possible to identify common lipidic parts. Further analysis will be necessary to have more clues

on the exact composition of those mixtures.

The lipidic compositions of two different skeletal layers from the same shell were also compared, and more specialy the nacre and the prisms of *Pinctada margaritifera*. This shown that beyond the species related differences, the lipid composition varies from one structure to another.

Some features seem recurrent from one structure to another: waxes and phospholipids are indeed quite common in the organics of the biominerals. Further investigations will be necessary to achieve better identification of those compounds, but these features already suggest the importance of lipids in the biomineralisation process. The presence of phospholipids may suggest that cellular membranes fragments are trapped within the mineral during its formation. The waxes also suggest surface interactions between the living tissue and the biominerals.

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