Trace metals and the marine Bivalve *Venus verrucosa* : détection in the gills, using secondary ion mass spectrometry (SIMS)

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Mediterranean waters are exposed to pollution by trace metals. Mussels and other bivalves readily accumulate toxicants in their tissues which reflect ambient levels of contaminants. The Mussel *Mytilus edulis* is widely used in pollution monitoring programs (e.g."Mussel Watch"). But when this species is not found in a given area, such as Malta, it is necessary to evaluate the possibility of considering another bivalve as an indicator species. The scope of the present paper was to investigate a sublittoral species,*Venus verrucosa* (Mollusca: Bivalvia), already studied concerning accumulation of petroleum hydrocarbons (1).

Animals were collected by divers from coastal waters of Malta. Gill which is the main exchange organ, was investigated using SIMS, which enables the détection and visualization of elements on histological sections (Fig.1), with a high sensitivity (2). Low mass and high mass resolution spectra (to make the distinction between mono and polyatomic ions) were obtained, indicating the presence of fluorine 19, aluminium 27, sulfur 32, iron 56 (Fig. 2 & 3), copper 63, bromine 81, silver 107 (Fig. 4 & 5), and the rare earth elements : lanthanum 139 and thulium 169.

These preliminary data have to be followed by further investigations on other tissues of *V.verrucosa*, using SIMS and the Electron Microprobe (EMP) which allows elemental détection at the ultrastructural level.

From our present data, it appears that *Venus verrucosa* could be used as sentinel organism for monitoring trace metal pollution and, moreover, may be of ecological significance in those Mediterranean coastal zones characterised by relatively low productivity.

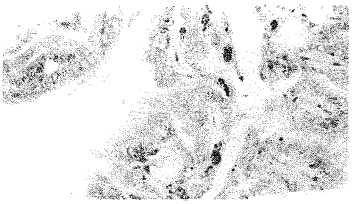

Fig.1. Venus verrucosa, gill. Photon micrograph of semithin section of filament showing epithelial cells with cilia. X 800.

Fig.2. Venus verrucosa, $^{40}Ca^{+}$ ion image showing the topography of the section with gill filaments. X 800.

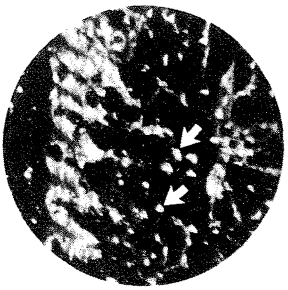

Fig.3. Venus verrucosa, $^{56}Fe^{+}$ ion image obtained from the same area as Fig.2, showing high iron emission from numerous white points of epithelial cells (arrows), X 800.

Fig.4. Venus verrucosa, $^{40}Ca^{+}$ ion image showing the topography of the section with gill filaments. X 800.

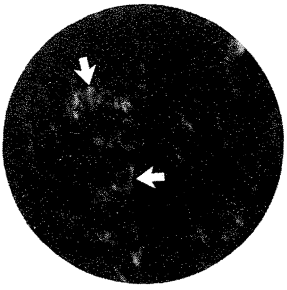

Fig.5. Venus verrucosa, $^{107}Ag^{+}$ ion image obtained from the same area as Fig.4, showing silver emission from white areas of epithelial cells (arrows), X 800.

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