

Application of mollusks in the biosensing of heavy metals in sea water

Nadia BARILE^a, Giuseppina MASCILONGO^a, Eliana NERONE^a, Sara RECCHI^a, Luca BOLELLI^b, Elida FERRI^b and Stefano GIROTTI^{b*}

^a*Center of Water Biology, Institute of Experimental Zooprophyllaxis of Abruzzo and Molise "G. Caporale", Viale Marinai d'Italia 20, I-86039 Termoli, Italy.*

^b*Department of Metallurgic Science, Electrochemistry and Chemical Techniques, University of Bologna, Via S. Donato 15, 40127 Bologna, Italy.*

Abstract. The performance of the bivalve *Mytilus galloprovincialis* as the sensing component in monitoring pollutants in the Adriatic Sea coastal water has been investigated. The molluscs were inserted into the Mosselmonitor® device, designed for the continuous monitoring of water bodies by the recording the behaviour of bivalves in contact with a volume of water under analysis. A model system, sea water contaminated by heavy metals (cadmium, lead, copper and mercury), has been used to evaluate the sensitivity of the biosensor, which resulted in the range of real pollution levels. The Lowest Observed Effect Concentration (LOEC) was: copper 5 ppb, mercury 0.01 ppb, cadmium 80 ppb, and lead 250 ppb. This study demonstrated the possibility to obtain reliable results after a period of careful evaluation of all parameters influencing the behaviour of the molluscs. The same organisms can be employed for 3-4 months continuously. The results were compared with the *Vibrio fischeri* bioluminescent test for acute toxicity, the Microtox®, which resulted less sensitive than the biosensor, showing LOEC values of 1, 0.5, 10 and 1 ppm, respectively. According to our data the tested biosensor is suitable as early warning system to be used in the monitoring of coastal sea waters.

Keywords: biosensor, bivalves, early warning systems bioassay, mosselmonitor®, heavy metals, sea water
