



Organic pollutants, selenium, methyl and total mercury in mussels from a tropical estuary

I. Moreira (1), H. A. Kehrig (1,2), A. P. Brito (1), L. A. Azevedo (1), T. G. Seixas (1), I. Brüning (1) and O. Malm (2)

1- Pontifícia Universidade Católica, Dep. of Chemistry, Rua Marques de S. Vicente, 225, CEP 22453-900, Gávea, Rio de Janeiro, Brazil, E.mail: isabel@rdc.puc-rio.br

2- Instituto de Biofísica Carlos Chagas Filho, Laboratório de Radioisótopos Eduardo Penna Franca, UFRJ, 21949-900, Rio de Janeiro, Brazil.

The study assesses the accumulation of aliphatic and aromatic hydrocarbons, chlorinated pesticides, selenium and mercury, as methylmercury in the soft tissues of the mussel, *Perna perna*, from a heavily impacted estuary, Guanabara Bay (384 km², 22° S, 43° W). This estuary, in the southeast Brazilian coast, is exposed to several contaminants derived from the intense urban occupation of its drainage basin with 11 million inhabitants and more than 10,000 industrial plants, two harbours, several shipyards, oil terminals, two airports and a marina. Its average water depth is about 6.0 m, but the central channel attains depths of 30 m. The mussels were collected at different sampling stations close to the probable pollutant inputs and also where the fishermen most frequently catch the organisms for human consumption. The organic pollutants in the dry tissues were extracted with organic solvents, concentrated and analyzed by gas chromatography (GC). The hydrocarbon extracts were separated into aliphatic and aromatic fractions by column chromatography before the GC analysis. Hydrogen flame ionization detection was used to determine the hydrocarbons whereas the chlorinated pesticides were analyzed using an electron capture detector (ECD). Total mercury (T-Hg) was determined by cold vapour AAS with sodium borohydride as a reducing agent. The methylmercury (MeHg) analysis in the dry tissues was made by digesting samples with an alcoholic potassium hydroxide solution followed by dithizone-toluene extraction and identified and quantified by GC-ECD. Biological acid digests were analyzed for selenium (Se) by a graphite furnace AAS with Zeeman background correction. The concentrations of the aliphatic hydrocarbons (C₁₀– C₃₂)

ranged from 309-1,461 ng.g⁻¹ and are among the lowest ones found for coastal systems. The aromatic hydrocarbons ranged from 68-432 ng.g⁻¹, being the fluoranthene the predominant one in all stations. Pesticide residues of hexachlorobenzene, lindane, DDT and its isomers, aldrin and dieldrin were investigated. The concentrations varied from 12.84 to 87.77 ng.g⁻¹. DDE, the resulting isomer from the DDT biodegradation, was the major pollutant, followed by DDT. Se, T-Hg and MeHg concentrations in the mussel ranged from 660.0 to 1350.0 ng Se.g⁻¹, 58.0 to 256.5 ng T-Hg.g⁻¹ and 22.5 to 105.0 ng MeHg.g⁻¹ respectively. The percentage of methylmercury to total mercury ranged from 37.1 to 48.4 %. These values varied according to the sampling point and water quality of the bay. The bioaccumulation of hydrocarbons and pesticides varied according to the seasonal influence; being the highest concentrations found in the dry period. The inputs of the contaminants into the bay and the hydrodynamics of the bay were important parameters that influenced on the bioaccumulation of the organic pollutants. The concentrations of Se, THg and MeHg found in the molluscs could not be considered high. Probably, they correspond to the eutrophic conditions of Guanabara Bay, which receives a very high load of suspended material that may be more significant than the industrial wastes.