

TRACE METAL CONTENT TREND OF MUSSEL *PERNA PERNA* (LINNAEUS, 1758) FROM THE ATLANTIC COAST OF SOUTHERN BRAZIL

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Abstract. The concentration assessment of Hg, Pb, Cd, Cu, Zn, Cr, Mn and Fe in marine mussels *Perna perna*, sampled at 15 stations along the 800 km Southern Brazilian Coast, has been carried out. Samplings were taken twice, in summer and winter of 2000. The concentrations found were lower than similar studies carried out along the Central Coast of Brazil and lower than the maximum limits permitted in bivalve molluscs designated for human consumption (Brazilian, Spanish and Luxembourg legislation sets). The data also showed lower values compared with other regions of the world. The comparison of present data with the data obtained 10 years ago at the same stations did not show significant differences, consequently the concentrations found could be used as baseline values.

Keywords: AAS, Atlantic Ocean, metals, *Perna perna*, Southern Brazil

1. Introduction

Sediment analysis alone provides little information regarding the amount of metal which enters the biomass in water. Consequently, if heavy metals in certain environments occur in increased concentrations, this does not mean that the metal concentrations are likewise elevated in organisms. There are many physico-chemical parameters which determine the bioavailability and the toxicity of metals (Forstner and Wittmann, 1979). The most important aspect of the heavy metals in the organisms suitable for human consumption is its toxicity toward humans. The criterion for indicating heavy metal contamination is the increased metal contents of the organism in respect to its natural background and not to the maximum tolerable level for human consumption. Therefore the question of baseline establishment is of special importance.

Mussels have been used to monitor the marine environment for nearly four decades. Since 1975, it has been suggested that bivalve molluscs should be used as indicator organisms for monitoring trace metal pollution of coastal marine waters on a world wide scale (Goldberg, 1975; Farrington *et al.*, 1983; Hardiman and Pearson, 1995). However, it is observed that the range of concentrations of metals in natural population of mussels is rather wide, in terms of trace metal levels, which complicates attempts to detect changes resulting from anthropogenic activity



(Gordon *et al.*, 1980). The suitability of mussels as study animals for the uptake of trace metal pollutants results from their inclusion in the human diet, their widespread distribution and favorable accessibility for collecting (Simpson, 1979).

Few studies have been undertaken in the Southern Hemisphere (Manly *et al.*, 1996) and there is little published data in existence concerning the biological monitoring of marine environment of Brazil (Avelar *et al.*, 2000; Lima *et al.*, 1986; Rezende and Lacerda, 1986).

The purpose of this study is to assess the metal concentrations in a bivalve, *Perna perna* collected along 800 km of Southern Brazilian Coast. We believe that the results reported here provide a baseline for the investigated area. Most of the coast investigated does not suffer significative anthropogenic inputs of heavy metals and the data obtained could be used to confirm the status of the environment as unpolluted. The bivalve *Perna perna* lives in the studied area and is used as a food for human consumption.

In early 1993, samples of the mussel *Perna perna* were collected from the same area and several heavy metals were analyzed in their tissue (Furley, 1993). A comparison of old and update data is also carried out.

2. Material and Methods

2.1. STUDY AREA

The Southeastern Brazilian continental shelf is the most important fishery area of the Brazilian coast. High phytoplankton biomass during winter and spring has been related to nutrient supply from subantarctic waters of the Malvinas current and from fresh discharges of the La Plata River and Patos Lagoon. The enhanced biological productivity has also been related to a complex hydrography and the existence of strong horizontal and vertical density gradients, resulting from proximity to the Subtropical Convergence (Ciotti *et al.*, 1995). Continental runoff from the La Plata River and the Patos Lagoon influences the chemical characteristics of coastal water over the shelf. In consequence, both short term and seasonal changes in volume and composition of runoff cause high variability of chemical parameters in coastal water (Niencheski and Baumgarten, 1997). The shallow and turbulent sandy bottoms of the inner surfzone, between the beach and about 2 m depth, are under the influence of regular wave action and strong currents. Frequent winter storms further increase the stressful hydrodynamic and substrate conditions. As a result only 10 of the 60 benthic inner surfzone species occur during the entire year. However, *Perna perna* could be found along the Southern Brazilian Coast and which was selected for biomonitoring the area. The studied area (from 29°19'S–49°42'W to 33°44'S–53°22'W) is few inhabited and could be regarded as a pristine environment. The studied area is dominated by sandy coast. Only Torres stations, extreme north of Rio Grande do Sul State, are dominated by rocky shore.