

# HEAVY METAL LEVELS ALONG THE IBERIAN PENINSULA AND BALEARIC ISLANDS COAST (NORTHWESTERN MEDITERRANEAN) USING CAGED MUSSELS: AN ACTIVE BIOMONITORING APPROACH (MYTILOS PROJECT)

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## Abstract

Within the framework of the INTERREG III B/MEDOC MYTILOS Project, the heavy metal (Hg, Cd, Pb, Cu, Zn and As) concentrations in cage mussels (*Mytilus galloprovincialis*) were determined. The purpose of the MYTILOS project is the development of an interregional coastal water quality monitoring network in the western Mediterranean basin based on active biomonitoring through caged mussels. In this paper, we present the preliminary results obtained during the period 2004-2006 from 36 stations located in the wastewater dilution zone along the Iberian Mediterranean and Balearic Islands coast. In general, all the levels obtained can be considered as baseline or low, except for Pb in the section of coast between Portman (Murcia) and Cabo de Gata (Almería) where the levels found were higher than 6.81 mg/Kg d. w

**Keywords :** Bivalves, Bio-accumulation, Metals, Monitoring, Western Mediterranean.

## Introduction

In the last decades, the use of the mussel has become a general method to evaluate the environmental quality of coastal waters [1]. Until now, the developed strategies are two: passive biomonitoring (using indigenous populations of wild mussels) and active biomonitoring (using individual transplants from a reference site). The MYTILOS project (<http://mytilos.tvt.fr/>) is based on the advantages of the active biomonitoring: a known period of exposure, stations selected regardless of the existence of natural populations and their distance from the coast, and the possibility of to adjust raw concentration data to a reference condition index [2], making a clear distinction between physiological factors (growth) and environmental ones.

## Material and Methods

Each 3 Kg-sample was made up of adult mussels (*Mytilus galloprovincialis*) 18-24 months old of standardized shell size (50 mm) coming from a reference site (Languedoc-Rousillon). The cages were immersed between 20 and 30 m at different stations along the Iberian Mediterranean coast and Balearic Islands (Fig. 1) during several surveys (2004, 2005 and 2006).



Fig. 1. Map of the study area and sampling sites.

After two months, the cages were recovered and pre-processed according to standardized procedures: the mortality and some biometric parameters were recorded, the soft tissue was cut out of the shells parts, weighed and frozen at - 20 °C. The condition index (ratio of dry flesh weight to dry

shell weight) was measured on 10 animals for each cage. The following techniques were used to analyses heavy metals: Pb, Cd, Cu, Zn: oven or flame Atomic adsorption spectrometry. Hg: Cold vapour. As: hydrides technique. For metals, tissue concentration is inversely proportional to the condition index.

## Results and Discussion

Results are expressed in mg/Kg of dry mussel flesh. Hg concentrations ranged from 0.002 (Tabarca I.) to 0.279 (Cartagena-Palomas I.), with a mean level of  $0.151 \pm 0.005$ . Cd levels ranged from 0.714 (Besòs river) to 3.351 (Fornells), with a mean level of  $2.151 \pm 0.068$ . Pb concentrations ranged from 1.029 (Cabo de Palos) to 8.714 (Cartagena-Palomas I.), with a mean level of  $2.831 \pm 0.21$ . Cu levels ranged from 3.222 (Ebro river) to 5.539 (Alcudia) with a mean level of  $4.284 \pm 0.049$ . Zn concentrations ranged from 38.966 (Cabo de Palos) to 272.781 (Cabrera), with a mean level of  $176.323 \pm 4.62$ . As levels ranged from 2.004 (Fornells) to 29.591 (Tabarca I.), with a mean level of  $12.742 \pm 0.52$ . Figure 2 presents raw and adjusted data of Hg concentrations in the soft parts of transplanted mussel. On the whole, mean levels of Hg, Cd, Cu y Zn were higher in the Balearic Islands stations than in the Peninsula ones. On the contrary, the average concentrations of Pb and As were higher in the Peninsula coast than in Balearic Island.

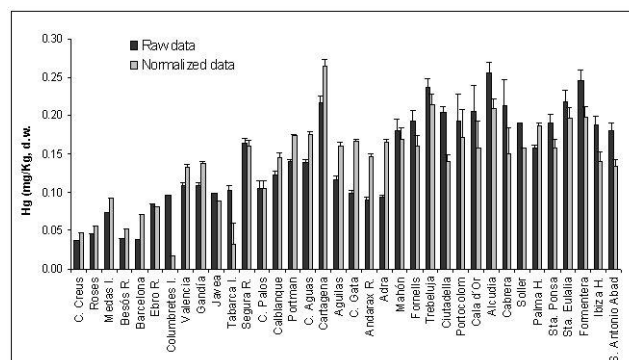


Fig. 2. Raw and adjusted data of Hg concentrations in the soft parts of transplanted mussel (Mean  $\pm$  standard error of the mean).

## References

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