

# TEMPORAL TRENDS OF TRACE METALS IN MUSSEL (*MYTILUS GALLOPROVINCIALIS*) FROM THE IBERIAN COAST (NORTHWESTERN MEDITERRANEAN), 1991-2002.

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## Abstract

Trace metal (Hg, Cd, Pb, Cu and Zn) trends at Catalonian and Valencian coast from 1991 through 2002 have been identified by the Oceanographic Center of Murcia using *Mytilus galloprovincialis* as bioindicator. The non-parametric Kendal-tau test was used to determine statistically significant correlations between trace metal concentration and year. The most common observation was that no trend was evident, but, when trends were noted, decreases greatly outnumbered increases. Lead, mercury, copper and zinc show significant downward trends in several sites, mainly located on Catalonian coast, while cadmium and copper are the only metals that show an upward trend.

**Keywords:** Trace metals, mussel watch, monitoring, temporal trends, coastal waters quality.

## Introduction

In the last years, the use of marine organisms has become general to evaluate the environmental quality of coastal waters. Ever since Goldberg E. (1) proposed the application of the "Mussel Watch" concept, based on the suitability of mussels as bioindicators of contamination, most of the national (2,3,4) and international monitoring programs of marine pollution have adopted it. In Spain, Mussel Watch is being applied by the Spanish Institute of Oceanography (I.E.O.). The Mediterranean coast is cover by the Center of Murcia (5, 6) and the North-Atlantic coast by the Center of Vigo (7). The main objective of the IEO Mussel Watch Project is to determine the status and long-term trends of chemical contamination along the Spanish coast.

## Material and methods

In order to minimise natural variability, sampling was made under standardized conditions, collecting native mussels from the same site and at the same time of the year (May-June, post-spawning period). At each site (Fig. 1), three subsamples of 50 individuals, size 3 to 4 cm, were collected by hand. Preparation of samples has been described elsewhere in detail (5). Measurements were performed by AAS (Perking-Elmer, mod 4.100). Hg was measured by cold vapour atomic absorption. Intercalibration mussel homogenate samples, from QUASIMEME, were used as a control for the analytical methods. The non-parametric Kendal-tau test (8) was used to determine temporal trends.



Fig. 1. Map of the study area with the sampling stations.

Lead and mercury are decreasing at six sites, most of them located on the Catalonian coast. Zinc is decreasing at five and copper at three. Cadmium is the only metal that presents a significant upward trend. This behaviour pattern in metals has been observed in mussels from the Andalusian coast (6) as well as from the Spanish North-Atlantic coast (7).

Table 1. Increasing (I), Decreasing (D), No Trends (NT). Significant at level 0.01 (\*\*) and 0.05 (\*), one side test. Years (Y).

| Main location     | Specific location    | Y  | Hg  | Cd | Pb  | Cu | Zn  |
|-------------------|----------------------|----|-----|----|-----|----|-----|
| Cadaqués          | Cucurucu sa Saboya   | 10 | NT  | NT | D*  | NT | D** |
| Islas Medas       | Pota del Llop Point  | 10 | NT  | I* | NT  | NT | NT  |
| Blanes            | San Francisco Cove   | 10 | NT  | NT | D** | NT | D*  |
| Barcelona         | Harbour. Jetty       | 10 | D** | I* | D** | NT | NT  |
| Vallcarca         | Morisca Cove         | 10 | NT  | NT | D*  | NT | NT  |
| Tarragona         | Harbour. Jetty       | 10 | D*  | NT | NT  | I* | NT  |
| Salou             | De las Animas Point  | 9  | D** | NT | D** | NT | D*  |
| Delta del Ebro    | Tortosa Cape         | 12 | D** | NT | NT  | D* | D*  |
| Peñíscola         | NW Papa Luna C.      | 9  | NT  | NT | NT  | NT | NT  |
| Castellón         | Harbour. Jetty       | 6  | NT  | NT | NT  | NT | NT  |
| Burriana          | Harbour. Jetty       | 6  | D*  | NT | D*  | D* | D*  |
| Puebla de Farnals | Marina. Breakwater   | 7  | D*  | NT | NT  | D* | NT  |
| Valencia          | Harbour. Jetty       | 10 | NT  | NT | NT  | NT | NT  |
| Cullera           | Pedreira Vieja Point | 11 | NT  | NT | NT  | NT | NT  |
| Cabo de la Nao    | Lighthouse           | 10 | NT  | I* | NT  | NT | NT  |
| Alicante          | Harbour. Jetty       | 7  | NT  | I* | NT  | NT | NT  |
| Isla de Tabarca   | Buoy                 | 6  | NT  | NT | NT  | NT | NT  |

## Conclusions

Data from Catalonian and Valencian coast show more decreases than increases in trace metal concentrations between 1991 and 2002. At most individual sites there are no strong correlations between concentration and year, but where correlations are found decreases outnumber increases. This tendency for contamination to decrease is occurring at the same time that our society is taking more and more steps to reduce the emissions of this type of contaminants, as much at atmospheric level as at level of industrial and urban water purification.

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