SPATIAL DISTRIBUTION OF HEAVY METALS IN MEDITERRANEAN MUSSEL *MYTILUS GALLOPROVINCIALIS* FROM SPANISH MEDITERRANEAN COAST

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In 1991 the Spanish Mediterrenanean Mussel Watch Project by the Spanish Institute of Oceanography was formed to monitor spatial distributions and temporal trends of persistent toxic substances in marine waters. 20 different stations along the spanish mediterranean coast were chosen. As suggested by some authors (GOLDBERG *et al.*, 1978; PHILLIPS, 1980) mussel was chosen as sentinel organism for indicating the levels of pollutants because this species offers most of the requisite features of a biological indicator, is a permanent resident of geographically fixed sites, common and abundant for ease of collection.

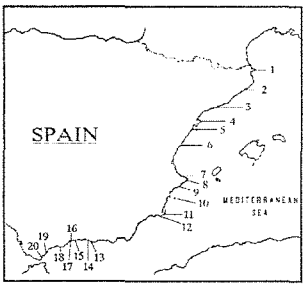
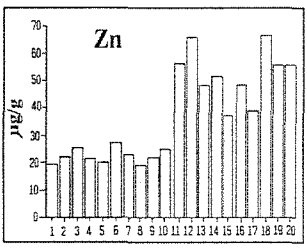
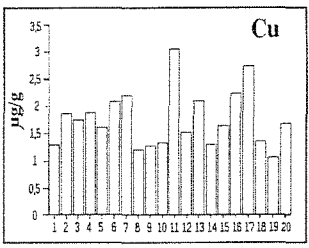


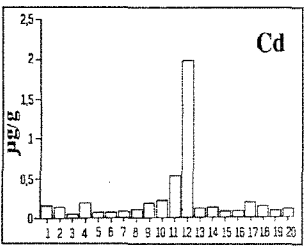
Fig. 1. Sampling locations

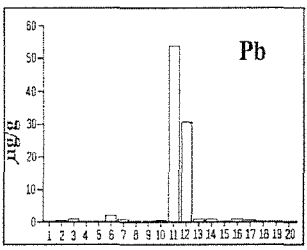
1. Cadaqués	2. Blanes
3. Cabo Salou	4. Cabo Tortosa
5. Peñíscola	6. Burriana
7. Cabo Cullera	8. Cabo La Nao
9. Isla de Benidorm	10. Isla de Tabarca
11. Portman	12. Cartagena
13. Motril	14. Almuñécar
15. Lagos	16. Málaga–Boya
17. Málaga	18. Rocas de Mar
9. Punta Chullera	20. Punta Carnero

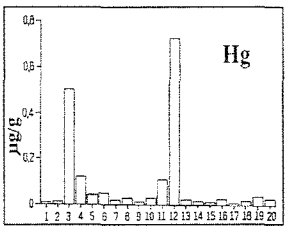
It is well known that different factors affect the heavy metal content in shellfish. In order to avoid part of the variability, sampling was made under standardized conditions. Whenever it was possible, mussels were collected from natural populations, at the same time of the year (May 1991), at the same depth, from the same substrata and of the size 3–4 cm (shell length). In the areas of Tortosa, Algameca, Tabarca and Málaga where no natural mussel beds in the coast were found, the molluscs were taken from buoys in order to cover the whole spanish mediterranean coast. The specimens were collected by divers and taken to the laboratory for measuring and preparation. They were dissected in a laminar–flow clean bench. Soft parts were used for analysis. Approximately 1gr. of lyophilized, homogenized tissue was digested with 3 ml. of nitric acid in closed teflon digestion vessels. The digested samples were cooled and transferred to 25 ml volumetric flask for dilution. Reagents blanks and the certified reference material MA–M–2/TM from the International Atomic Energy Agency were runned with each batch. Concentrations of metals were measured with an Atomic Absortion Spectrometer (Perkin Elmer 605 compiled to a HGA 76B programmer). Mercury was determined by the cold vapour method (Perkin Elmer 2380, MHS 20). In the following figures the distributions for copper, zinc, cadmium, lead and mercury in the different populations along the Spanish mediterranean coast from North to South are presented. All results are expressed in mg kg^{-1} fresh weight. A significant increase of zinc concentrations in mussels from south of the area of Portman–Algameca (32.8–75.8) than northern (17.7–30.7) was found. This should be considered due to the natural conditions and characteristics of the populations. The high levels of zinc and the extremely high peaks of Cd and Pb found in Portman and Cartagena are influenced by effluents from the industrial town of Cartagena and from the exploitation of a lead–zinc mine (RODRÍGUEZ DE LEÓN *et al.*, 1984). Mercury occurred in high concentrations in C. Salou and Algameca near the industrialized towns of Tarragona and Cartagena respectively. The elevated levels in C. Tortosa migth be due to the discharges of the Ebro river. The distribution of Cu shows a rather uniform pattern. As suggested by PHILLIPS (1976) mussels should not be relied upon as accurate indicators of copper in the marine environment. The results show that high heavy metal concentrations are found in stations located near areas receiving discharges from urban or industrial effluents or rivers. From this first study it seems that the mediterranean mussel is a good indicator of the spatial heavy metal distributions along the Spanish mediterranean coast. Results from following years would show temporal trends in the concentrations.











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