

# HEAVY METAL CONCENTRATIONS IN THE MEDITERRANEAN MUSSELS (*MYTILUS GALLOPROVINCIALIS*) COLLECTED FROM THE DARDANELLES

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## Abstract

Concentrations of eight heavy metal (As, Cd, Cr, Cu, Hg, Ni, Pb and Zn) were determined in mussels (*M. galloprovincialis*) collected in September, 2006 from 5 locations in Dardanelles, Turkey. All measurements were carried out in Atomic absorption Spectrofotometer(AAS). The heavy metal levels determined for mussel were found to be 0.032-0.048 µg As/g, 0.101-0.520 µg Cd/g; 0.141-0.78 µg Cr /g, 0.542-0.661 µg Cu /g, 0.005-0.034 µg Hg /g, 0.081-0.383 µg Ni /g, 0.220-18.474 µg Pb /g and 32.549-65.612 µg Zn /g wet weight.

**Keywords:** Trace Elements, Bivalves, Dardanelles

## Introduction

Heavy metal discharges to the marine environment are of great concern all over the world. Both essential (e.g., Fe, Zn, Cu) and non essential (e.g., Hg, Cd, Pb) metals are toxic to living organisms when subjected to high concentrations [1, 2]. Mussels of the genus *Mytilus* and related genera are useful as bioindicators because they have wide distribution on all continents from tropical to high latitudes. They are filter feeders extracting metals from water and particulate matter, and they store some metals at levels high above those in the abiotic environment [3]. *M. galloprovincialis* is wide-spread on the Dardanelles coasts and they collected from wild for human consumption in Turkey. The selected locations in the Dardanelles are especially suitable for its growth which makes it a good choice for a biomonitor of the researched area. The aim of this study was to use *M. galloprovincialis* as the biomonitor of the marine environment and bioindicator of the possible contamination.

## Materials and Methods

The study was carried out in Dardanelles at five sampling sites (Kilye, Akbaş, Suluca, Kepez, Karacaören) (Fig.1). Samplings were conducted from wild in September, 2006. About 25-30 mussels from each sampling site were selected and analysed for heavy metals. The soft tissue of samples was digested in concentrated HNO<sub>3</sub> in a commercial microwave oven. Following acid digestion, all samples were analyzed for 8 elements by atomic absorption spectrophotometry (Perkin Elmer AA 700). Zn was determined in an air-acetylene flame. Cd, Cr, Cu, Ni and Lead were analysed in a graphite furnace. Cold-vapor for analysis of Hg and hydride generation techniques were used for analysis of As. The standard addition method was used to correct for matrix effects. All acids and reagents were analytical grade (Suprapur-Merck). The detection limits for heavy metals were: As, 0.002; Cd, 0.001; Cr, 0.002; Cu, 0.001; Hg, 0.005; Ni, 0.003; Pb, 0.001; Zn, 0.08 µg/g. Results were presented as arithmetic mean values (µg/g -wet weight).

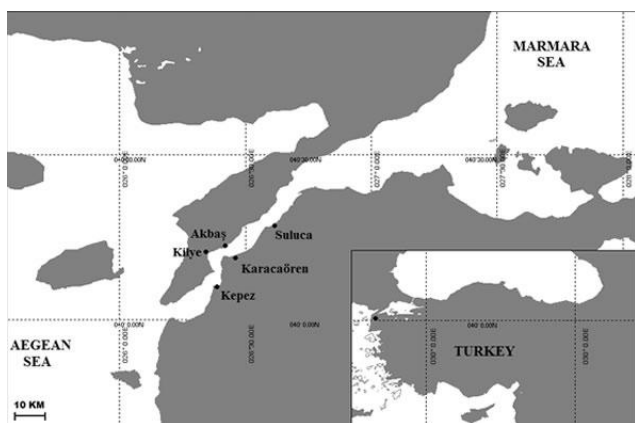


Fig. 1. Mussel sampling locations in Dardanelles

## Results and Discussion

To facilitate the analysis the results samples with a length shell of 60-70mm size, which is the most commercial mussel length, were analyzed. Metal concentrations (means ± standard deviations) in the soft tissues *M. galloprovincialis* are presented in Table 1. Hg concentrations were the lowest for all stations while Zinc was the highest mean concentrations.

Tab. 1. Metal levels (µg/g wet weight) in the tissue of *M. galloprovincialis* collected from 5 locations.

Metals (µg/g)	Locations in Dardanelles				
	Kilye	Akbaş	Suluca	Kepez	Karacaören
As	0.038±0.0079	0.032±0.0057	0.048±0.0217	0.046±0.0312	0.044±0.0298
Cd	0.520±0.0400	0.457±0.0127	0.180±0.0178	0.101±0.0501	0.152±0.0453
Cr	0.160±0.0478	0.174±0.0502	0.174±0.0523	0.178±0.0554	0.141±0.0357
Cu	0.661±0.0421	0.621±0.0402	0.542±0.0252	0.626±0.0458	0.647±0.0423
Hg	0.034±0.0057	0.005±0.0002	0.015±0.0054	0.009±0.0055	0.007±0.0048
Ni	0.350±0.0362	0.298±0.0172	0.383±0.0388	0.346±0.0361	0.081±0.0188
Pb	13.574±1.233	18.474±2.765	0.448±0.0406	0.220±0.0245	0.230±0.0333
Zn	56.923±5.678	65.612±5.976	41.420±3.347	32.549±2.997	41.739±3.466

Mussels and bivalves in general are known to be efficient accumulators of certain metals, particularly zinc, which can be stored against a concentration gradient of orders of magnitude. Other metals, particularly lead and mercury, are not bioconcentrated efficiently by bivalves [4]. In this study we observed similar results for the Zinc concentrations as the highest value in the mussel soft tissues collected from all sampling locations. By using *M. galloprovincialis* as a biomonitoring agent, the contamination of As, Cd, Cr, Cu, Hg, Ni in the Dardanelles was not found to be serious. However Zn and Pb levels in the samples collected from Kilye and Akbaş were above the legal limits set by national Standards of Turkish Governments. Future studies should concentrate on the relative importance of water, sediment and food in the accumulation of metals by the mussels. From the human public health point of view, these results seem to show no possibility of acute toxicities of As, Cd, Cr, Cu, Hg and Ni if the edible mussels are consumed.

## References

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