THE COMPARISION OF THE HEAVY METAL LEVELS IN TWO DIFFERENT BARNACLE SPECIES FROM THE LEVENT MARINA, IZMIR

Sinem Aydin-onen 1, Ferah Kocak 1 and Filiz Kucuksezgin 1*
1 Dokuz Eylul University Institute of Marine Sciences and Technology - filiz.ksezgin@deu.edu.tr

Abstract

The biomonitoring study presents the comparison of distribution of heavy metals in seawater and the soft tissues of two major fouling species Amphibalanus amphitrite (Darwin, 1854) and Amphibalanus eburneus (Gould, 1841) collected from Levent Marina (Izmir) in Autumn 2008 and in Spring 2009. The results showed that two studied species of barnacles are excellent biomonitors and have the ability to accumulate Cu, Fe and Zn in a higher degree than seawater.

Keywords: Metals, Bio-accumulation, Bio-indicators, Izmir Bay

Introduction

The relative contamination of coastal environments can be measured by using suitable biomonitor. Especially mussels and barnacles, key components of the local sublittoral benthos, are used to address the question of metal bioavailabilities [1]. To the best of our knowledge following a literature survey, no previous monitoring of metal contaminants has been carried out in barcode species from the Aegean coast. The main aim of the present study is to compare the heavy metals using seawater samples and the soft tissue of barnacles, A. amphitrite and A. eburneus. Materials and Methods Seawater, A. amphitrite and A. eburneus were collected from the intertidal zone at Levent Marina in Autumn 2008 and Spring 2009 (Fig. 1). For water samples analyses were performed by flame AAS (Varian Spectraa-300 plus) for Cd, Pb, Cr, Cu, Mn, Zn and Fe and by anodic stripping voltammetry (ASV) at the rotating gold electrode for Hg and for barnacle analyses were performed by flame (Cu, Fe, Mn and Zn), cold vapour (Hg) and graphite furnace technique (Cd, Cr and Pb) in AAS by using the manufacturer’s conditions and with background correction according to UNEP [2,3].

Results and Discussion

Among the heavy metals, Cu, Mn, Zn and Fe levels were found higher in the tissue of A. amphitrite and A. eburneus as compared to seawater samples during autumn (2.41, 1.81, 7.06, 14.10 µg/l) and spring (0.94, 2.31, 0.81, 4.60 µg/l) periods, respectively. Availability of high autumn and spring metal concentrations in the soft tissues of A. amphitrite was foundas following ranking Fe>Cu>Zn>Mn. Furthermore, measured high autumn and spring metal levels in A. eburneus decreased in the following order Fe, Cu, Zn, Mn and Zn, Fe, Cu, Mn, respectively. Comparing the concentrations of heavy metals in the tissue for each species, A. amphitrite was accumulated Cu (208.33 µg/g) in a higher degree in autumn. In contrast, A. eburneus was accumulated Fe (389 µg/g), Zn (321.48 µg/g). Concerning the detected metal levels in spring period, higher Cu (378.76 µg/g) and Fe (317.47 µg/g) were recorded in the tissue’s of A. amphitrite while higher Zn level (494.11 µg/g) was measured in A. eburneus.

Conclusions

In conclusion, Zn, Cu and Fe were the most abundant elements in the soft tissues of A. amphitrite and A. eburneus. The high levels of metal recorded in the water samples of Levent Marina confirmed the presence of high concentrations of heavy metals in barnacle tissue. These accumulations of heavy metals may relate to their very efficient storage detoxification systems and/or due to the biological needs of animals. The present study concluded that both barnacle species are suitable candidates to be used in biomonitoring surveys for Cu, Zn and Fe particularly at the Aegean coast.

References