

# Bioaccumulation of Heavy Metals (Zn, Pb, Cu and Cd) by *Tympanotonus fuscatus* var. *radula* (L.) exposed to Sublethal Concentrations in Laboratory Bioassays

A. A. Otitoloju<sup>1</sup> and K. N. Don-Pedro<sup>2</sup>

<sup>1</sup>Department of Zoology, Marine Biology and Fisheries, Ecotoxicology Laboratory, University of Lagos, Akoka, Lagos, Nigeria (Corresponding author); Email: bayotitoloju@yahoo.com)

<sup>2</sup>Department of Zoology, Marine Biology and Fisheries, Insect and Environmental Toxicology Laboratory, University of Lagos, Akoka, Lagos, Nigeria

## Abstract

The exposure of the edible periwinkle, *Tympanotonus fuscatus* var. *radula* to sublethal concentrations (1/100<sup>th</sup> and 1/10<sup>th</sup> of 96 h LC<sub>50</sub> values of zinc, lead, copper and cadmium compounds, respectively) of heavy metals resulted in the bioaccumulation of the test metals to varying degrees that was dependent on the type of metals and concentration of the metal compound in the test media. Post treatment analysis of the body tissues of the animals revealed that the exposed animals accumulated higher concentrations of Zn and Pb ions that were about 2-6 times higher than the levels accumulated in control animals. With regards to Cu ions, it was observed that the concentration of Cu ions accumulated by the exposed animals fluctuated significantly over the 30-days exposure period while there was little differences between the concentrations of Cd ions accumulated by animals exposed to the treated media and control. Comparisons between the concentration of heavy metals in whole body tissues of *T. fuscatus* and the sediment of the media showed that the concentration of the metals accumulated in tissues of *T. fuscatus* were about 2-729 times higher than that in the sediment. The significance of these results and the need to include bioaccumulators of heavy metals such as *T. fuscatus* in monitoring programmes aimed at establishing the environmental levels of such pollutants in aquatic ecosystems were discussed.

## Introduction

Industrial wastes or effluents are a complex admixture of several classes of pollutants such as synthetic chemicals of various types, hydrocarbons and heavy metals (Van-Den-Heever & Frey, 1994). Some of these pollutants, particularly the heavy metals, are non-degradable hence they persist in the recipient environment for a long period of time. Although these metals may occur at levels below their toxic thresholds in natural bodies of water (Oyewo, 1998), the low concentrations may still pose risk of damage *via* uptake and subsequent bioaccumulation by organisms which cannot effectively metabolize and excrete the

absorbed metals. Due to the high risk of biological damage, e.g. Minamata and Itai-Itai diseases posed by heavy metals from industrial and domestic sources over long period in aquatic and terrestrial ecosystems, a lot of research on metal pollution has taken place in the industrialized countries of Europe, America and Asia (Panigrahi & Misra, 1980; Khangarot *et al.*, 1982; Bryan & Langston, 1992).

In Nigeria, however, most studies on heavy metal pollution have concentrated on levels of occurrence and distribution of these pollutants in sediment and water column of aquatic resources (Fodeke, 1979; Bhalerao & Adeeko, 1981; Akinola *et al.*,