

## **Similarities and differences of metal distributions in the tissues of molluscs by using multivariate analyses.**

### **Abstract**

Multivariate analysis including correlation, multiple stepwise linear regression, and cluster analyses were applied to investigate the heavy metal concentrations (Cd, Cu, Fe, Ni, Pb, and Zn) in the different parts of bivalves and gastropods. It was also aimed to distinguish statistically the differences between the marine bivalves and the gastropods with regards to the accumulation of heavy metals in the different tissues. The different parts of four species of bivalves and four species of gastropods were obtained and analyzed for heavy metals. The multivariate analyses were then applied on the data. From the multivariate analyses conducted, there were correlations found between the soft tissues of bivalves and gastropods, but none was found between the shells and the soft tissues of most of the molluscs (except for *Cerithidea obtusa* and *Puglina cochlidium*). The significant correlations ( $P < 0.05$ ) found between the soft tissues were further complemented by the multiple stepwise linear regressions where heavy metals in the total soft tissues were influenced by the accumulation in the different types of soft tissues. The present study found that the distributions of heavy metals in the different parts of molluscs were related to their feeding habits and living habitats. The statistical approaches proposed in this study are recommended for use in biomonitoring studies, since multivariate analyses can reduce the cost and time involved in identifying an effective tissue to monitor the heavy metal(s) bioavailability and contamination in tropical coastal waters.

**Keyword:** Multivariate analysis; Metal distribution; Different tissues; Molluscs; Biomonitor.