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The ACCUMULATION and STORAGE of SELENIUM in *ANADARA TRAPEZIA*.

by

Dianne F. Jolley B.Appl.Sci (Hons) (UCAN)
Applied Ecology Research Group
University of Canberra ACT 2601

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Abstract

This study examines the occurrence, distribution and storage of selenium in seagrass communities of Lake Macquarie, which is a heavily industrialised area of NSW, where notably high trace metal concentrations have been reported previously. Initially a suite of organisms was collected from a seagrass bed (*Zostera capricornia*) in the south-eastern section of the lake to investigate the bioaccumulation and biomagnification of selenium. All organisms contained selenium, with sediment-dwelling organisms containing the highest Se concentrations. No consistent pattern of significant Se-metal correlations with Cu, Zn and Cd was found. Biomagnification of Se was evident, as concentrations increased from sediments and water to flora (algae and seagrass) to bivalves to crustacea. However, this trend was not continued to the higher trophic groups of invertebrate predators and teleost fish.

The bivalve *Anadara trapezia* was further studied. Intrinsic and extrinsic factors affecting the accumulation of Se were examined. Gender and mass were assessed in a single day study, followed by a temporal investigation of the effect of gender, reproductive cycle, temperature and salinity on Se accumulation. Gender had no effect on the accumulation of Se in *A. trapezia*. Se was present in all tissues (adductor, blood, foot, gills, intestine and mantle) and not immobilised or stored in a specific tissue, indicating that it plays a structural role in the tissues of *A. trapezia*. Se burden increased relative to size (shell length and dry mass) suggesting that Se is metabolically controlled within the organism. Se concentrations were found to fluctuate temporally because of: food availability in response to water temperatures; the reproductive cycle; and associated metabolic activities responding to temperature changes and food availability.

Subcellular selenium associations in *A. trapezia* were examined to assist in the understanding of the fate of Se in marine tissues. Most of the Se was associated with proteins, suggesting that Se has a metabolic role in this marine organism. Proteins

are intrinsically associated with the lipid bilayer of the cell membranes. A number of proteins (94, 85, 43, 36.5, 30, 23.4, 17.4 and 15 kDa) were separated by SDS PAGE from ethanol fractions. Determination of the Se concentration within individual proteins was not possible because the ratio of Se to protein was too low for further analysis.

These findings indicated that Se plays a metabolic role in the tissues of the marine organism *A. trapezia*. The biochemical regulatory mechanism responsible for maintaining Se concentrations within the tissues is currently unknown.

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Peters G.M., Maher W.A., **Jolley D.,** Carroll B.I., Gomes V.G., Jenkinson A.V., McOrist G.D. (in press). Selenium contamination, redistribution and remobilisation in sediments of Lake Macquarie, NSW. *Organic Geochemistry.*

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