J Geol Geophys 2018, Volume 7
DOI: 10.4172/2381-8719-C1-018

Morphological variations of *Ammonia tepida* (cushman) tests in response to heavy metal pollution in Manzala lagoon, Egypt

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Sources of heavy metals pollution in the Manzala lagoon include phosphate fertilizers, sewage and oil spills from fishing boats. The benthic species identified in this lagoon are *Adelosina carinata striata* (Wiesner), *Quinqueloculina bosciana* (d'Orbigny), *Quinqueloculina seminulum* (Linnaeus), *Ammonia tepida* (Cushman), *Elphidium excavatum* (Terquem). A. tepida is the most dominant species in the lagoon. It constitutes more than 97% of the total benthic foraminiferal assemblages reflecting tolerance to the very low salinity in the Manzala lagoon. The intensity of deformation was severe exhibiting a peculiar change in the coiling direction in A. tepida with increase in cadmium concentration. A. tepida exhibited a great morphological variability and the recorded morphological abnormalities show high spire giving the spiroconvex test, additional chamber, aberrant chamber shape and size, twisted tests with elongated axes of rotation and complex deformities. X-ray analyses were made to determine heavy metals within the deformed foraminiferal tests. Care was taken to avoid edges and pores of specimens to minimize the possibility of contamination in the data obtained. Ca, Mg, S, Cl and Al were measured along with the heavy metals Cu and Fe.

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