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Research article

Nilonema gymnarchi (Nematoda: Philometridae) and trace metals in *Gymnarchus niloticus* of Epe lagoon in Lagos State, Nigeria

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Abstract

The presence of trace metals in the sediment, water, and biota of the Epe lagoon has been recently linked to oil exploration and municipal perturbations around the lagoon. The study was aimed at assessing the concentrations and associated health risks of Fe, Zn, Cu, Ni, Pb, Cd, Cr, Mn, Co and V in the water, sediment, and *Gymnarchus niloticus* of Epe lagoon and to evaluate the role of the enteric parasite *Nilonema gymnarchi* in bioaccumulation of the metals in the fish. The temperature, pH, redox potential, conductivity, turbidity, dissolved oxygen (DO), total dissolved solids (TDS), and salinity were determined in-situ using a handheld multi-parameter probe (Horiba Water Checker Model U-10). The concentrations of Fe, Zn, Cu, Ni, Pb, Cd, Cr, Mn, Co, and V were determined in the surface water, bottom sediment, *Gymnarchus niloticus*, and its enteric parasites, *Nilonema gymnarchi* in Epe lagoon using the Flame Atomic Absorption Spectrometer (Philips model PU 9100). The bioaccumulation factors and target hazard quotients of the trace metals in the infected and uninfected fish were estimated and compared. The intestinal tissue sections of the infected and uninfected fish were examined using a binocular dissecting microscope (American Optical Corporation, Model 570) using hematoxylin and eosin (H&E) stain. Biochemical markers such as reduced glutathione (GSH), superoxide dismutase (SOD), catalase (CAT), and lipid peroxidation (MDA) were determined in the liver of the infected and uninfected fish. The SOD level was higher in the uninfected fish than the infected ones supports the indications deduced from the bioaccumulation analysis. Strong positive correlations between SOD and most of the metals- Fe (0.916), Zn (0.919), Cu (0.896), and Ni (0.917) suggests that the metals may have inflicted more toxicity in the uninfected. The histopathological comparisons made between the uninfected and infected fish showed consistency with the outcomes of other comparisons made in this study. These evidence were marked by tissue alterations in the infected fish ranging from no observed changes to mild alterations, while the uninfected exhibited more severe tissue injuries such as hemorrhagic lesions, severe vascular congestion, edema, the increased connective tissue of the submucosa, and vascular congestion. The condition factors of the infected (0.252) and

uninfected (0.268) fish indicated slenderness and unfitness possibly due to environmental stressors such as trace metals. The parasitized fish showing better-coping potentials than the uninfected, coupled with the significant bioaccumulation interferences exhibited by the parasite *Nilonema gymnarchi* is an indication that the parasites may be a good metal sequestration agent for the fish and can be used to forestall the significant health hazard quotient posed by the current level of iron and the synergy of all metals analyzed in the lagoon.

[Previous article in issue](#)

[Next article in issue](#)

Keywords

Environmental analysis, ; Environmental assessment, ; Environmental impact assessment, ; Environmental pollution, ; Environmental risk assessment, ; Environmental toxicology, ; Toxicology, ; Zoology, ; Bioaccumulation, ; Trace metals, ; Health risk, ; Toxicity, ; Histopathology, ; Enteric parasite, ;

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