

# **Biomarkers of toxicity in *Clarias gariepinus* exposed to sublethal concentrations of polycyclic aromatic hydrocarbons**

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## **ABSTRACT**

Physiological, biochemical and histological indices in *Clarias gariepinus* broodstock, and teratogenic indices in embryos exposed to sublethal concentrations of naphthalene, phenanthrene and pyrene were investigated in 2014 using a static-renewal bioassay protocol. Phenanthrene (1.41 mg l<sup>-1</sup>) was the most toxic, followed by pyrene (1.53 mg l<sup>-1</sup>) and naphthalene (7.21 mg l<sup>-1</sup>), based on 96 h LC50 values. Hepatosomatic indices were significantly higher in naphthalene- and pyrene-treated males compared with solvent controls, whereas fecundity in females was significantly lower by factors of 2.4 (naphthalene), 2.8 (phenanthrene) and 2.4 (pyrene), compared with controls. Catalase levels were lower in female phenanthrene-treated fish compared with controls. Histological alterations observed in PAH-treated fish include oedema, inflammatory cells, epithelial lifting and hyperplasia in the gills, vacuolation, haemosiderin pigments and sinusoidal congestion in the liver, and degenerated zona radiata in the ovary. Teratogenic effects were not observed, as evidenced by the lack of histological alterations in embryos spawned from pre-exposed broodstock. Sex-specific responses and the utility of biomarkers at cellular and individual levels of organisation are therefore demonstrated for holistic evaluations of polycyclic aromatic hydrocarbons in ecotoxicological studies.

**Keywords:** African sharptooth catfish, biochemical indices, biological responses, histological alterations, naphthalene, phenanthrene, physiological indices, pyrene

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