



# ABSTRACT BOOK

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**Immunocellular Oxidative Stress in *Astropecten euryacanthus* Exposed to Polystyrene Microplastics****Abhinandan Barua<sup>#</sup>, Arunodaya Gautam\***

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**Abstract**

Microplastics have emerged as ubiquitous contaminants across global ecosystems, including estuarine and coastal environments, raising increasing concern regarding their biological impacts on marine organisms. In particular, the immunophysiological disruption of marine and coastal invertebrates by microplastics remains poorly understood. The present study provides the first evidence of cell-mediated oxidative stress responses induced by polystyrene microplastics in the coelomocytes of the seastar *Astropecten euryacanthus*, a benthic suspension-feeding echinoderm native to the coastal waters of the Bay of Bengal. Specimens were exposed to environmentally relevant concentrations of polystyrene microplastics (0.25, 0.5, and 1 mg L<sup>-1</sup>) for exposure periods of 7 and 14 days. The physical characteristics of the microplastics were examined using microscopy, while their chemical composition was confirmed through micro-Raman and Fourier transform infrared (FTIR) spectroscopy. Exposure to polystyrene microplastics resulted in a significant increase in total coelomocyte counts, indicating immunomodulatory cellular responses. Oxidative stress and cytotoxic effects were assessed by measuring reactive oxygen species (ROS) production using 2',7'-dichlorodihydrofluorescein diacetate (DCFDA). After 14 days of exposure, elevated ROS generation, characterized by increased fluorescence intensity, was particularly evident in filopodial phagocytes. Prolonged exposure also led to a significant increase in superoxide anion production accompanied by suppression of nitric oxide synthesis, reflecting oxidative imbalance at the cellular level. Antioxidant defense mechanisms were adversely affected, as evidenced by reduced activities of superoxide dismutase and catalase, while glutathione-S-transferase activity was significantly elevated, suggesting altered cytotoxic defense pathways. Collectively, these findings demonstrate that *A. euryacanthus* exhibits marked immunophysiological sensitivity to polystyrene microplastic exposure. Given its benthic feeding behavior and ecological significance, this species shows promise as a bioindicator for microplastic contamination in tropical coastal ecosystems. The study underscores the potential long-term ecological risks posed by microplastic pollution and highlights the urgent need for effective mitigation strategies to safeguard coastal marine biodiversity.