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# EFFECTS OF POLYETHYLENE MICROFIBERS ON MUD CRAB *PANOPEUS HERBSTII* THROUGHOUT LARVAL DEVELOPMENT

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## Abstract

The emerging threat of marine microplastics (mp) has quickly led to a growing body of research seeking to understand their biological impacts. In a crucial step towards understanding the effects of microplastic exposure on larval development, mud crab larvae (n=90/treatment) were reared through their five developmental stages (z1, z2, z3, z4 and megalopae) under four treatment levels of 50  $\mu\text{m}$  polyethylene terephthalate fibers (0, 0.1, 1, and 10 mp/mL). Three experiments were conducted, each with a unique duration of microplastic exposure: (i) full exposure (z1-megalopae), (ii) early exposure (z1-z3), and (iii) late exposure (z3-megalopae). These exposure durations allowed us to assess the vulnerability of specific developmental stages and differentiate between acute and chronic effects of microplastic exposure. Survival, body size, and stage duration were recorded throughout each experiment. Our research findings indicate a decrease in body size as microplastic concentrations increased. Furthermore, results indicate that the time spent at each developmental stage increased in treatments with higher microplastic concentrations. Both effects occurred throughout all developmental stages. Decreases in body size were observed while plastic was present and disappeared upon the subsequent molt after microplastics were removed. However, stage duration delays remained consistent after larvae were exposed to high levels of microplastics. These results lend additional evidence to the hypothesis that microplastic exposure may impact an organism's energy budget. Ingestion rates of microplastic fibers were low, suggesting that the cause of these effects cannot be explained by ingestion alone. Future research will concentrate on identifying the specific causes behind these effects.

**Keywords:** invertebrate, physiology, biology, toxicology, developmental effects, zooplankton, crustacean

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