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RESEARCH ABSTRACTS - 2025

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Plastics Exposure Alters Olfactory Responses to Food, Social, and Alarm Cues in Fathead Minnows

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Plastic pollution has emerged as one of the most pervasive threats to aquatic ecosystems, with microplastics (<5 mm) and nanoplastics (<1 µm) infiltrating freshwater and marine environments worldwide. Microplastics are plastic particles that persist in aquatic environments and can accumulate in the tissues of organisms. Nanoplastics are even smaller particles that can cross biological membranes and cause intracellular damage. Because fish rely extensively on olfactory cues to locate food, identify conspecifics, and detect predators, their sensory systems represent a critical but vulnerable target of plastic exposure. To investigate these impacts, we exposed male and female fathead minnows to polystyrene MPs (30 µm) and NPs (0.5 µm) for 28 days at concentrations of 0 mg/L (control) and 1 mg/L. Motion tracking analysis will be conducted to quantify avoidance and preference responses to ecologically relevant odorants including L-alanine (food), taurocholic acid (social), and conspecific alarm cue. Given their smaller size we do anticipate that the fathead minnows exposed to nanoplastics will experience more severe olfactory deficits compared to those exposed to microplastics. By understanding the impacts of plastic exposure on the olfactory system and impairments in olfactory-driven behavior, this study will provide insights into how micro- and nanoplastics may jeopardize fish survival.

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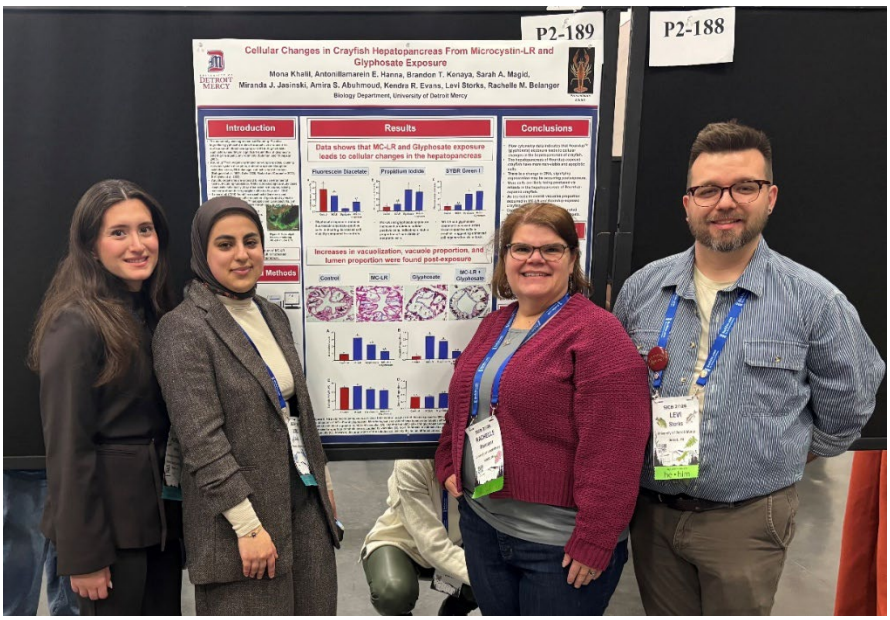
CELLULAR CHANGES IN CRAYFISH HEPATOPANCREAS FROM MICROCYSTIN-LR AND GLYPHOSATE EXPOSURE



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Aquatic environments are frequently exposed to both natural and anthropogenic stressors, that can negatively impact the ecosystem health. Chemical pollutants, in particular, raise concern because of their persistence and widespread distribution. We investigated the individual and combined effects of the widely used agrochemical Roundup® (active ingredient glyphosate) and the algal toxin microcystin-LR (MC-LR) on crayfish hepatopancreas cells using flow cytometry and morphological analysis. Assessing exposures to both glyphosate and algal toxins in combination enables evaluation of potential additive morphological effects of these stressors. Crayfish (N= 6per treatment) were exposed for 7 days to 10 µg/L MC-LR, 10 µg/L glyphosate, or a combination of 10 µg/L MC-LR and 10 µg/L glyphosate). We found that exposure to MC-LR and glyphosate decreased fluorescein diacetate labeling and increased propidium iodide labeling, indicating reduced cell viability and elevated apoptosis. These data were compared with morphological analyses of hematoxylin and eosin–stained hepatopancreas tissues. Histological analysis showed that hepatopancreas tubules of exposed crayfish displayed epithelial degeneration, increased vacuolization, and dilated lumens, although combined exposure to MC-LR and glyphosate did not produce additive effects. Taken together, our findings emphasize that monitoring and regulating environmental contaminants is critical for maintaining the health of freshwater ecosystems and the organisms that rely on them.