Investigating the Impacts of Arsenic Exposure on Chinese Mystery Snail Behavior and Gut Microbiome

Jose Hueso, Jaydee Navos, My Le, Marc Nahmani, Sarah Alaei

The Chinese Mystery Snail (CMS), found in freshwater ecosystems, feeds on periphyton and can bioaccumulate arsenic through diet and water exposure, making it a valuable organism for understanding contaminant effects in aquatic ecosystems. The gut-nervous system connection in invertebrates may further our understanding of how gut microbiota composition impacts neurological function. While snails lack a centralized brain, they possess a distributed nervous system of ganglia that coordinate behavioral responses. Our research utilized the CMS to investigate the relationship between arsenate-induced microbiome changes and neurological function. We hypothesize that increased arsenate exposure would disrupt CMS gut microbiota composition, leading to neurological and consequent behavioral changes related to movement and feeding activity. Lab-acclimated snails were exposed to 0 ppm and 0.2 ppm arsenate over seven weeks; a 2.0 ppm group was excluded due to high mortality. Behavioral assays analyzed time spent out of shell, time in contact with food, and quadrant preferences within a food-containing beaker. Snails exposed to 0.2 ppm arsenate exhibited a significant decrease in feeding and a trending, though non-significant, decrease in motility. Gut tissues were dissected for DNA extraction to characterize the gut microbiomes using 16S rRNA. Initial PCR attempts were unsuccessful, requiring protocol modifications. Ongoing experiments have successfully amplified 16S rRNA. Initial *arsB* amplification was detected across both treatment groups, indicating the presence of arsenic-metabolizing bacteria in the CMS gut microbiome, though further sequencing and replication may draw more meaningful results. Future directions could include light and physical stimuli responses to further characterize arsenate-induced behavioral changes.