The Effect of Arsenic Contamination on the Behavior and Microbiome of Chinese Mystery Snails

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In the South Puget Sound area, there has been legacy contamination of arsenic, a naturally occurring metalloid found in local lakes, from the former ASARCO smelter. Chinese Mystery Snails (CMS) are an invasive aquatic snail species that are native to East Asia. CMS consume periphyton, aquatic biofilm, that live attached to surfaces, which is a primary cause of bioaccumulation of arsenic in CMS. Exposure to arsenic has been reported to induce alterations in the gut microbiome's composition and metabolic functions in numerous vertebrates and some invertebrate species. This change can disrupt the interconnected communication pathways within the microbiota-gut-nervous system-axis, a network connecting the gut and central nervous system. These alterations in the gut can lead to changes in neuronal function and consequent behavior. Based on this, we hypothesized that the CMS gut microbiome undergoes alteration after arsenic exposure which results in altered behaviors such as decreased feeding behavior and mobility. To test this, our lab conducted behavioral assays on lab-acclimated CMS and extracted gut DNA to analyze their gut microbiome after being exposed to 0 ppm and 0.2 ppm arsenic for about 7 weeks. The results from the behavioral assay showed a trend towards decreased mobility and a significant difference in feeding behavior in arsenic exposed CMS compared to control CMS. This suggests that exposure to arsenic leads to changes in feeding behavior, potentially due to alterations in the CMS microbiome. After extracting DNA from CMS guts, ongoing work will utilize different primers to amplify and analyze microbiome DNA.