Arsenic Bioaccumulation and its Effect on the Microbiome and Behavior of Juvenile Chinese Mystery Snails

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Chinese Mystery Snails (CMS) are a benthic aquatic snail ubiquitous in freshwater lakes in the Puget Sound region. CMS, as primary consumers, contain high concentrations of arsenic, which is a toxic metalloid readily taken up through ingestion or absorption in aquatic organisms.
Our research aims to understand how arsenic exposure shapes microbial communities of the CMS microbiome and whether exposure to arsenic may influence behavior. We hypothesize that when exposed to waterborne arsenic, there will be substantial accumulation in CMS tissues, a shift in the community structure of the CMS microbiome, and altered feeding and mobility patterns. To investigate this, we exposed juvenile CMS to waterborne arsenic for four weeks at concentrations of 0 ppm, 20 ppb, 200 ppb, and 2 ppm. We then conducted feeding and mobility assays and recorded the time spent out of the shell and in contact with food. At the end of the 4-week period, CMS were sacrificed and were either used to measure arsenic bioaccumulation via ICP-MS or reserved for DNA/RNA extraction. Our initial results show a high survival rate across groups. Additionally, ICP-MS data indicates that arsenic bioaccumulation increases with exposure concentration. Taken together, this suggests uptake and potential biotransformation. The remainder of the snails will be used for microbiome analyses, including the abundance and expression of bacterial arsenic metabolism genes using qRT-PCR, and 16s rRNA gene sequencing to profile microbial community composition. This work will help us understand the contributions of primary consumers and their microbiota to ecosystem level arsenic dynamics.