Arsenic Exposure Leads to Behavioral Impairment in Chinese Mystery Snails

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High levels of arsenic have been detected in a cluster of lakes and shore sediments in South King County in recent years. Arsenic is enriched in the periphyton, a polymicrobial biofilm, subsequently consumed by Chinese Mystery Snails (CMS). CMS are decomposers that are very abundant in the lake and bioaccumulate arsenic within their digestive tract through their diet. Recent studies suggest that exposure to a toxic environment can lead to dysbiosis in vertebrates, however, less is known about how environmental toxins impact the microbiome in mollusks. We hypothesize that arsenic exposure alters the CMS guts' microbiomes, which can alter neuronal function and ultimately the behavior of the snails. To begin to test this hypothesis, we first observed the feeding behavior and mobility of the snails for two weeks to examine if there is a difference in the feeding behaviors of healthy, control snails and arsenic-exposed snails. One control tank with non-arsenic-exposed snails and one experimental tank with snails exposed to 0.2ppm arsenic for seven weeks were tested for food seeking and general mobility. Arsenic-exposed snails showed a trend toward being less active and were significantly slower in response to food compared to controls. Building on these behavioral results, ongoing work is focused on sequencing DNA extracted from CMS guts to characterize microbiome shifts. Future analyses will compare microbial community composition between treatments and reveal the causation between arsenic exposure, microbiome alterations, and potential neurobehavioral impacts.