Arsenic-induced physiological stress in snails

Miguel Bibaoco, Victoria Puryear, Avisha Sharma, Dr. Sarah Alaei

The ASARCO copper smelter found near Tacoma, Washington has been inoperational for over 30 years, however in its 100-year long use, it has released high amounts of arsenic and lead into the surrounding environment. Previous studies have indicated that shallow lakes in the area such as Steel Lake and Lake Killarney show moderate to high amounts of arsenic (v) contamination in their water columns, respectively. This arsenic contaminates the underwater flora and fauna, such as periphyton, which is then ingested by other animals, dispersing the contaminant up the food chain. To assess the physiological effect that chronic arsenic exposure has on local aquatic fauna, heat shock proteins (HSPs) can be utilized due to their nature of being produced in response to stressful stimuli. This study aimed to determine if snails that were fed periphyton from each of these three lakes have a difference in expression of heat shock protein 70 (HSP70) due to the increased arsenic levels. We have hypothesized that Lake Killarney snails will have higher expression of HSP70 due to the higher amount of arsenic contamination than Steel Lake (medium arsenic) and Lake Meridian (no arsenic). Frozen tissue from the head region of Chinese mystery snails exposed to Killarney, Steel and Meridian periphyton was used to conduct SDS-PAGE electrophoresis and subsequently a western blot, allowing us to quantify HSP70 expression and note differences between snails from lakes containing varying arsenic levels. HSP70 expression was highest in snails that were fed periphyton collected from Lake Meridian. Additionally, the findings concluded that there was a low expression of HPS70 within the Killarney samples and overall no expression among the Steel samples. These results do not support our initial hypothesis that arsenic (v) exposure increases HSP70 expression. Possible future experiments could include comparing mystery snails with other fauna such as shrimp or crustaceans or testing for other heavy metal contamination.