

Detecting Physiological Stress in Snails from Arsenic Contaminated Lakes

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Introduction

Puget Sound was home to the ASARCO smelter plant for over 100 years, spewing arsenic, lead, and other heavy metal contaminants into the surrounding areas' soil and lakes through the deposition zone plume. Arsenic exposure over time causes oxidative stress in living organisms, including the Chinese mystery snail (*Bellamya Chinensis*). The arsenic and metals are absorbed through the soil of plants of base-level food chain organisms that are consumed by the snail that then make their way up the food chain.



Figure 1. ASARCO Smelter in Tacoma, Washington

https://i.ytimg.com/vi/mVPRL_Ie_hs/maxresdefault.jpg

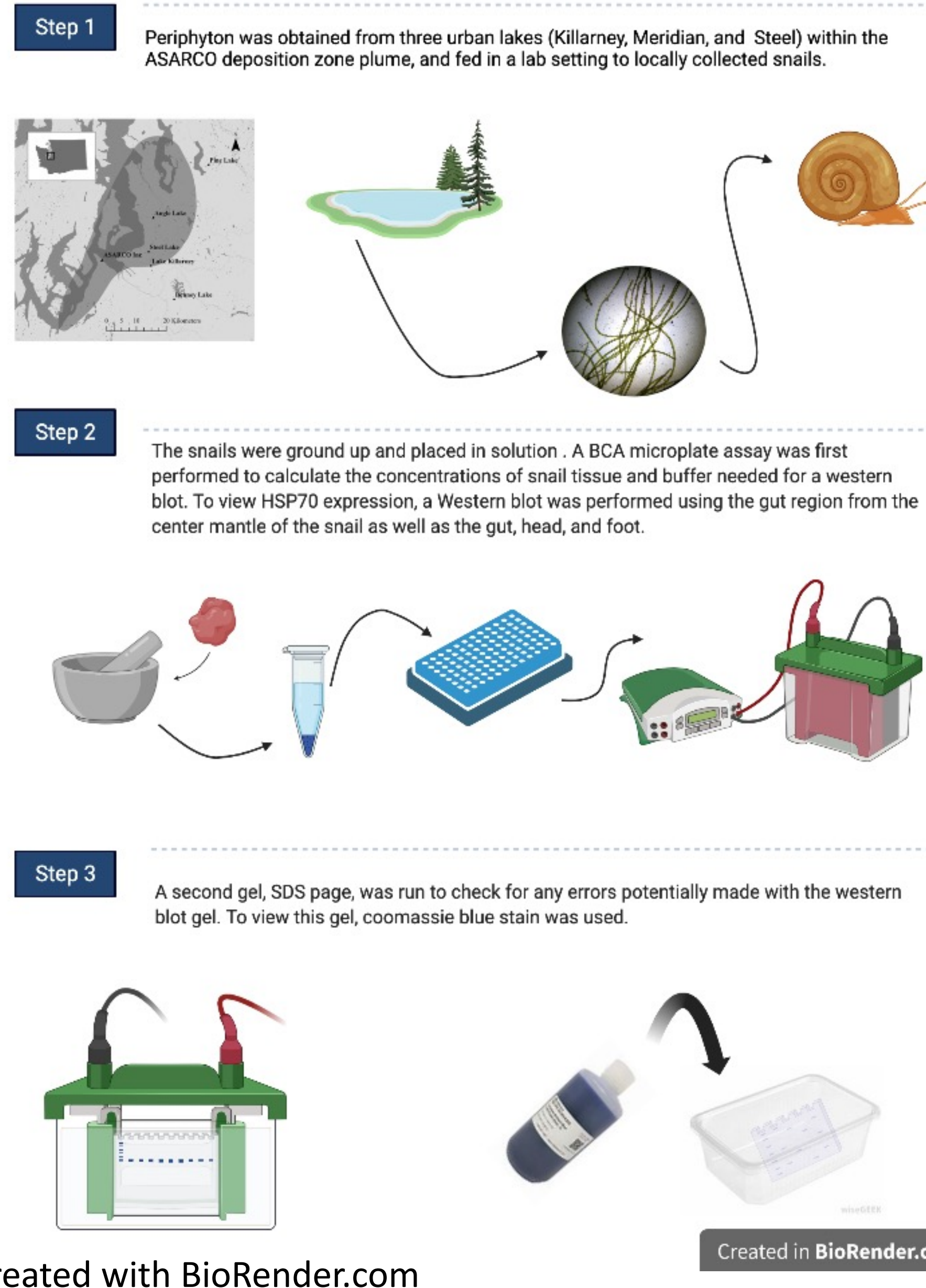
Objective

The purpose of this study was to observe differences in HSP70 expression due to arsenic exposure to the Chinese Mystery snails consumed through plants from the three urban lakes with varying levels of arsenic.

Hypothesis

We hypothesized that if feeding on arsenic exposed plants and microbes from Lake Killarney induces physiological stress, then an increase in HSP70 expression will be detected in the snail gut region from central mantle.

Materials & Methods



RESULTS

The results demonstrated that there was no HSP70 expressed in the gut mantle region sample. It was concluded that much of the sample was from the mantle and not the gut section, which explained why there was no HSP70 expressed. This was supported by no expression found in the foot region. In addition, high HSP70 expression levels were found in the head sample and high levels in the main gut region for Meridian samples.

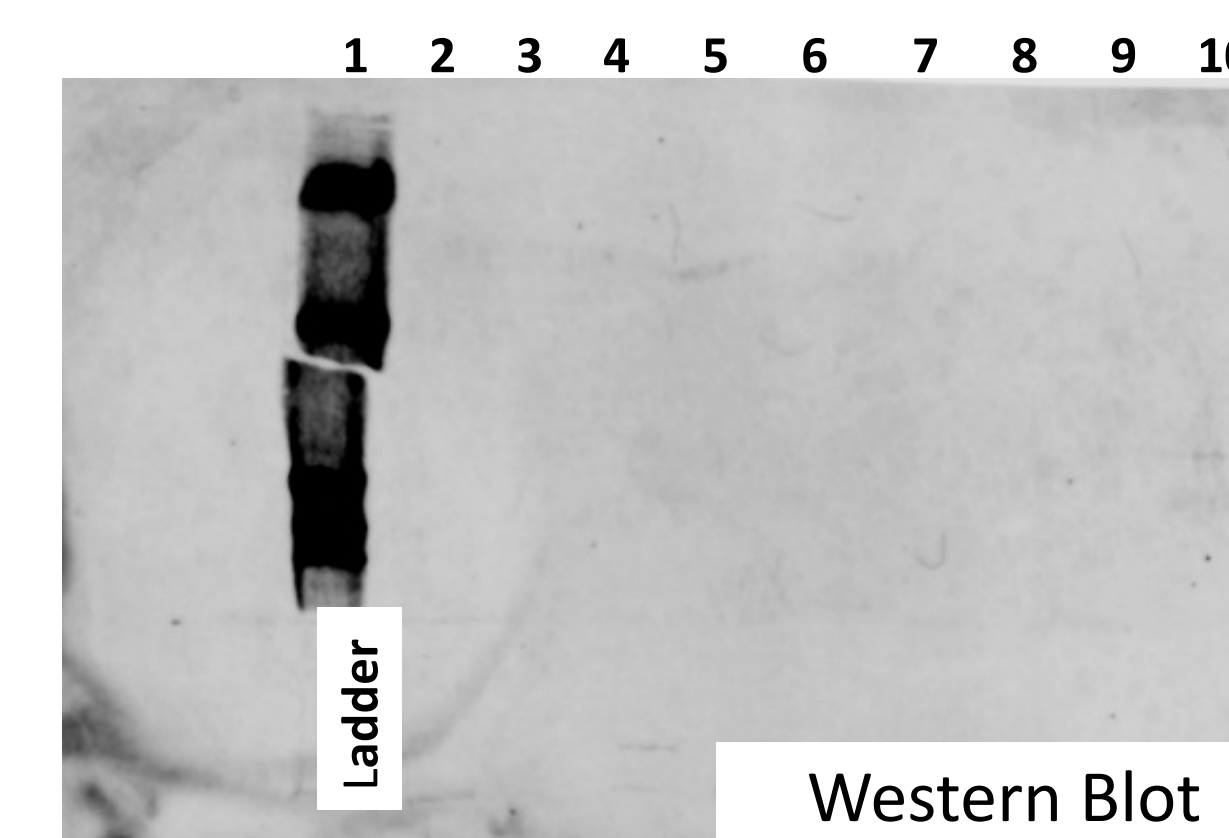


Figure 2. Gut Mantle region sample HSP70 expression western blot. Western blot results showed that there was no HSP70 expressed in the gut mantle region of the Chinese mystery snail. Well 1 is the DNA ladder. Wells 2-4 contain Steel Lake fed tissue samples. Wells 5-7 contain Lake Killarney fed tissue samples. Wells 8-9 contain Lake Meridian-fed tissue samples. Well 10 contained 1X sample buffer.

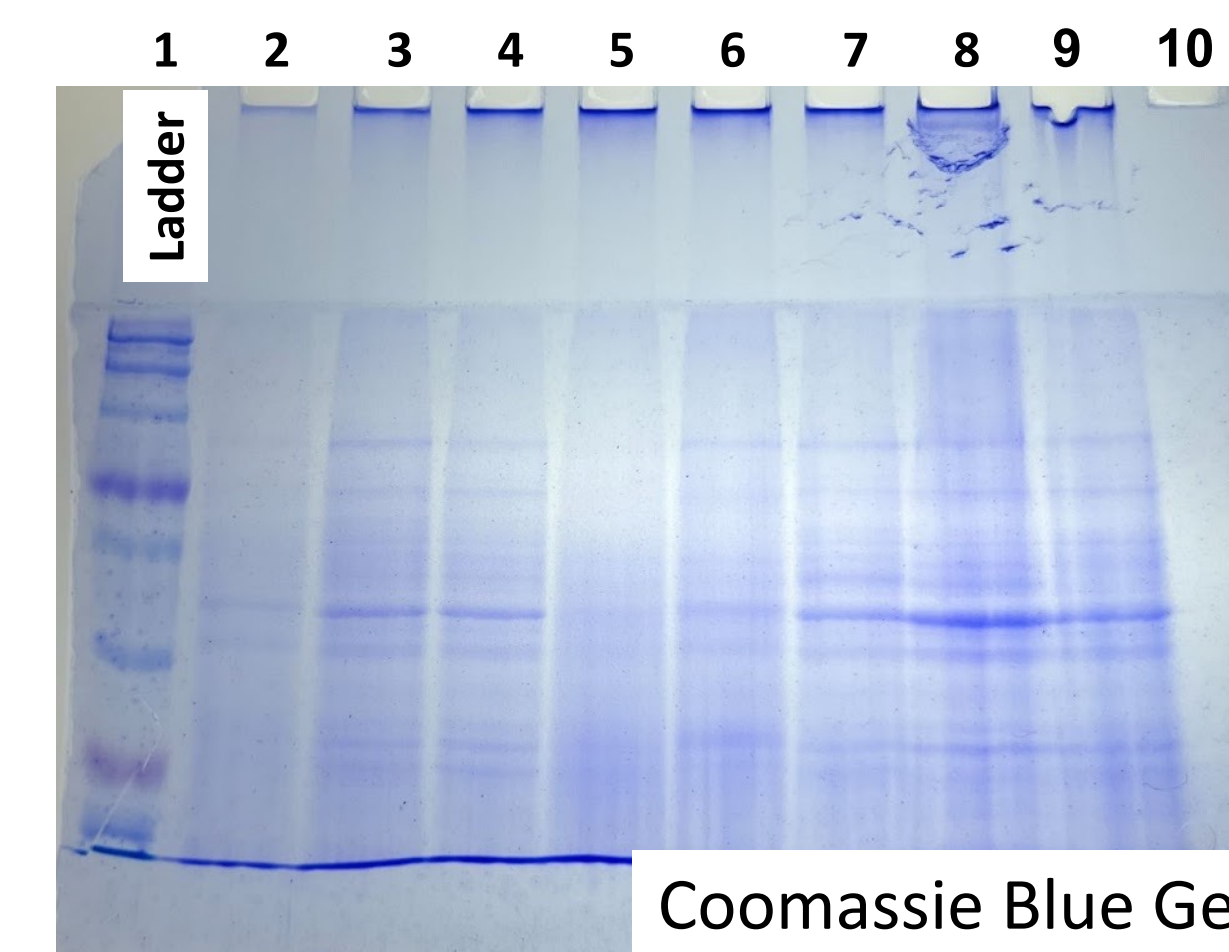


Figure 3. Secondary gel to act as a control. Created to use as a comparison to original western blot to check for loading errors. Well 1 is the DNA ladder. Wells 2-4 contain Steel Lake fed tissue samples. Wells 5-7 contain Lake Killarney fed tissue samples. Wells 8-9 contain Lake Meridian-fed tissue samples. Well 10 contained 1X sample buffer. Lanes 1 and 5 are lacking high molecular weight bands. This could be due to a lab error. Organelles broke apart during preparation, and protease inhibitor (functional activity goes down) did not work. This could be a result of not being on the ice in between petting and running.

Periphyton (Plant) Location	Relative HSP70 Expression in Snails (0, *, **)
Lake Killarney (high arsenic)	0 (gut, mantle, foot), * (head)
Steel Lake (medium arsenic)	0 (mantle, foot, head), ***(gut)
Lake Meridian (low arsenic)	0 (mantle, foot), *(gut), ***(head)

Table 1. Completed data of HSP70 expressions in the gut, mantle, foot, and head regions of the snails that were fed periphyton from three lakes with different levels of arsenic.

ACKNOWLEDGEMENTS

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Next Steps

Retry this experiment in a more controlled lab setting. Using lab-grown snails, to remove any potential bio contaminants from the previous environment. Testing different antibiotics on snail gut tissue to test for resistance As well as to understand the microbiome better.