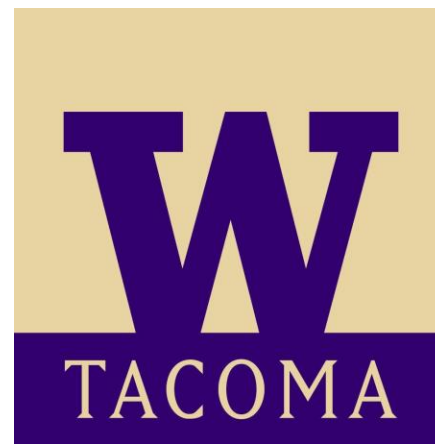


Arsenic Bioaccumulation in Chinese Mystery Snail (CMS) Tissues

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INTRODUCTION

The American Smelting and Refining Company (ASARICO) in Ruston, Washington was active from 1890 to 1986. High concentrations of Arsenic and other heavy metals were released into the environment by the smelter.

Lake Killarney is known to have higher concentrations of Arsenic (As) than other nearby lakes.

Chinese mystery snails (CMS), an invasive species originating from China, are primary consumers in these local lakes.

As is known to bioaccumulate in CMS from these lakes. However, it is unclear where As bioaccumulates in the snail. The aim is to determine where As accumulates in the snail.

Hypothesis: More As would bioaccumulate in CMS gut collected from Lake Killarney than in CMS collected from Trout Lake



Photo by: Hull et al. 2023

Figure 1: The triangle is the ASARCO smelter, and the circles are the different nearby lakes. The shaded area represents the disposition zone of As from the plume.

RESULTS

Arsenic bioaccumulates in viscera tissue of CMS from Trout Lake

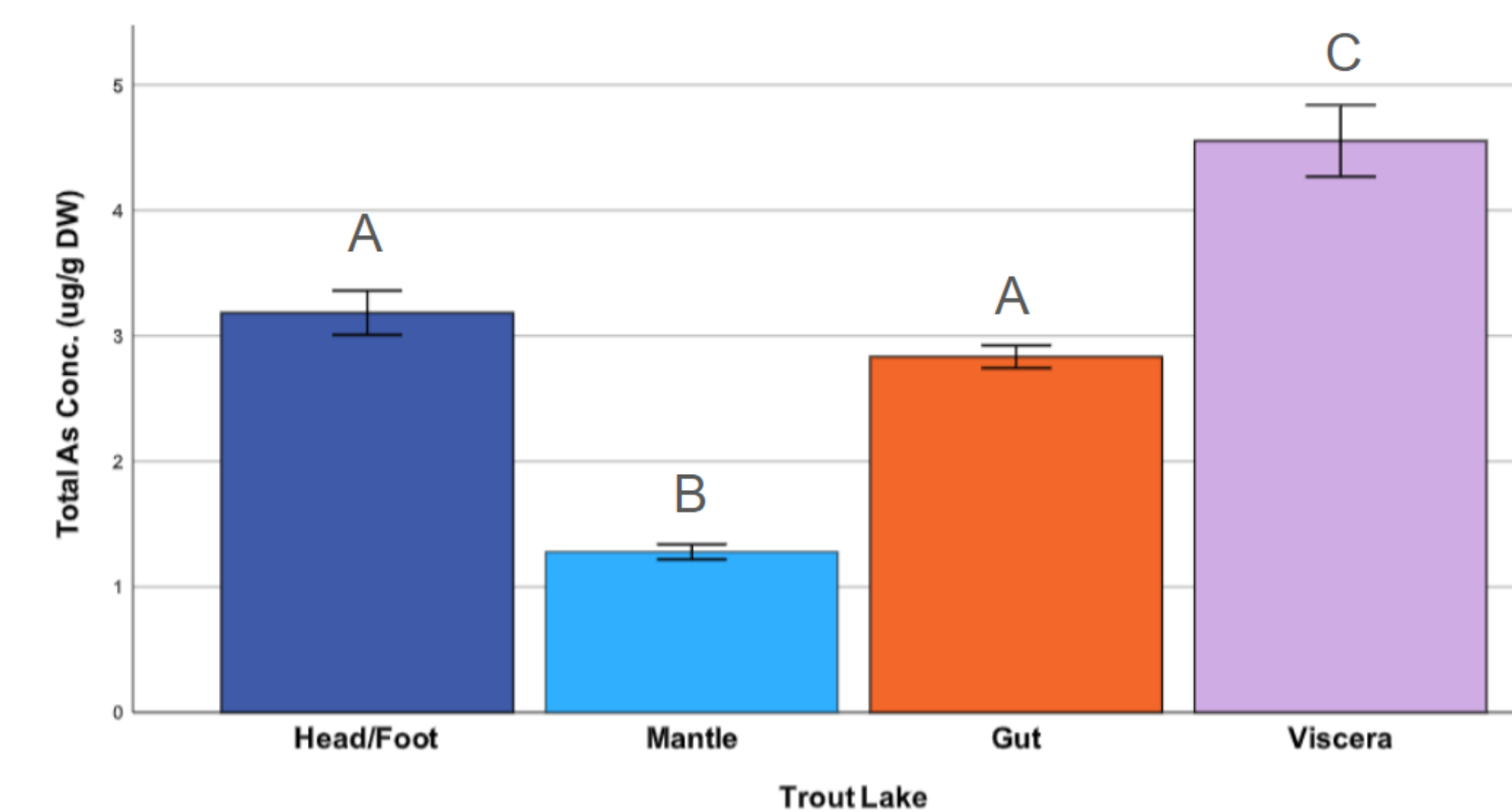


Figure 2: As Total concentration of Chinese Mystery Snails (CMS) from Trout Lake. ICP-MS was performed on various CMS tissue. Results show higher As bioaccumulation in visceral tissue of CMS (n = 5 for all samples). Error bars represent +/- standard error from the mean. Statistical analysis was performed using one-way ANOVA, P < 0.001. Tissues not sharing any letter are significantly different by the Post-hoc Tukey Test.

CONCLUSIONS

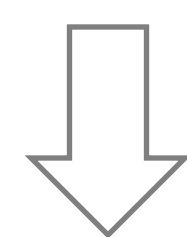
- Higher amounts of Total As in the Gut from CMS from Lake Killarney
- CMS from Trout Lake have higher amounts of Total As in Viscera tissue
- Lake Killarney CMS guts had 13x more As bioaccumulation than the guts from Trout Lake

Next Steps

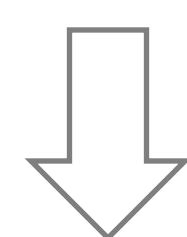
- Quantification of different As species in the different CMS tissues groups
 - As(V) vs. As(III)
 - Organic vs. Inorganic Arsenic
- Results gives insight into microbiome biotransformation processes in relation to toxicity

METHODS

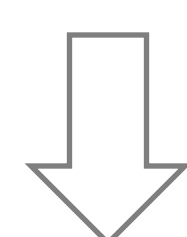
Collected 5 Adult Male CMS from Lake Killarney and Trout Lake



Head/Foot, Mantle, Gut, and the Viscera were dissected from each individual snail

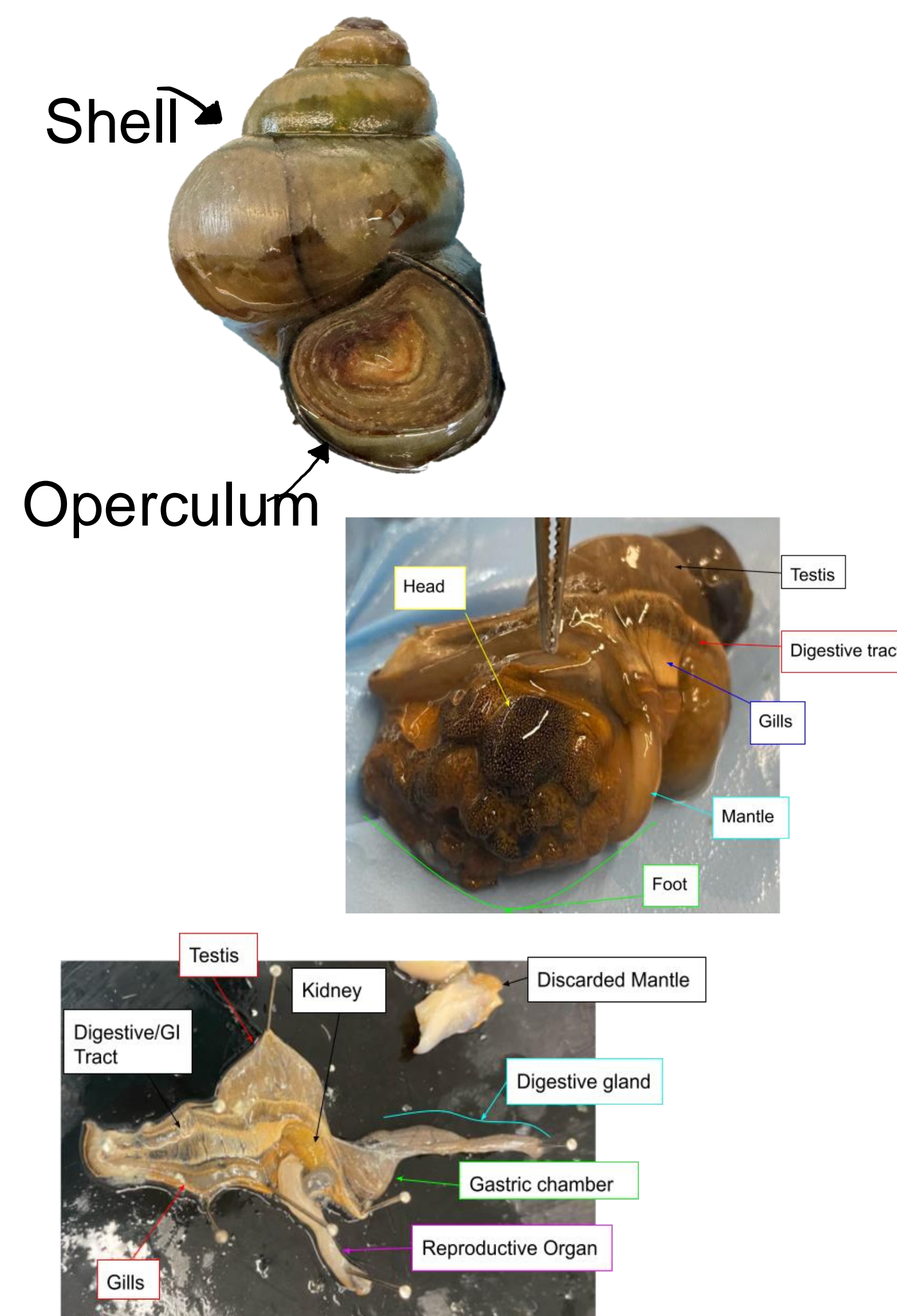


Different Tissue groups were homogenized and dried before being acid-digested using 10% nitric acid



Inductively Coupled Plasma Mass Spectroscopy (ICP-MS) was performed to get total Arsenic concentration in the tissues

Chinese Mystery Snail Anatomy



Photos by: Renee & Jules

Arsenic bioaccumulates in the Guts of CMS from Lake Killarney

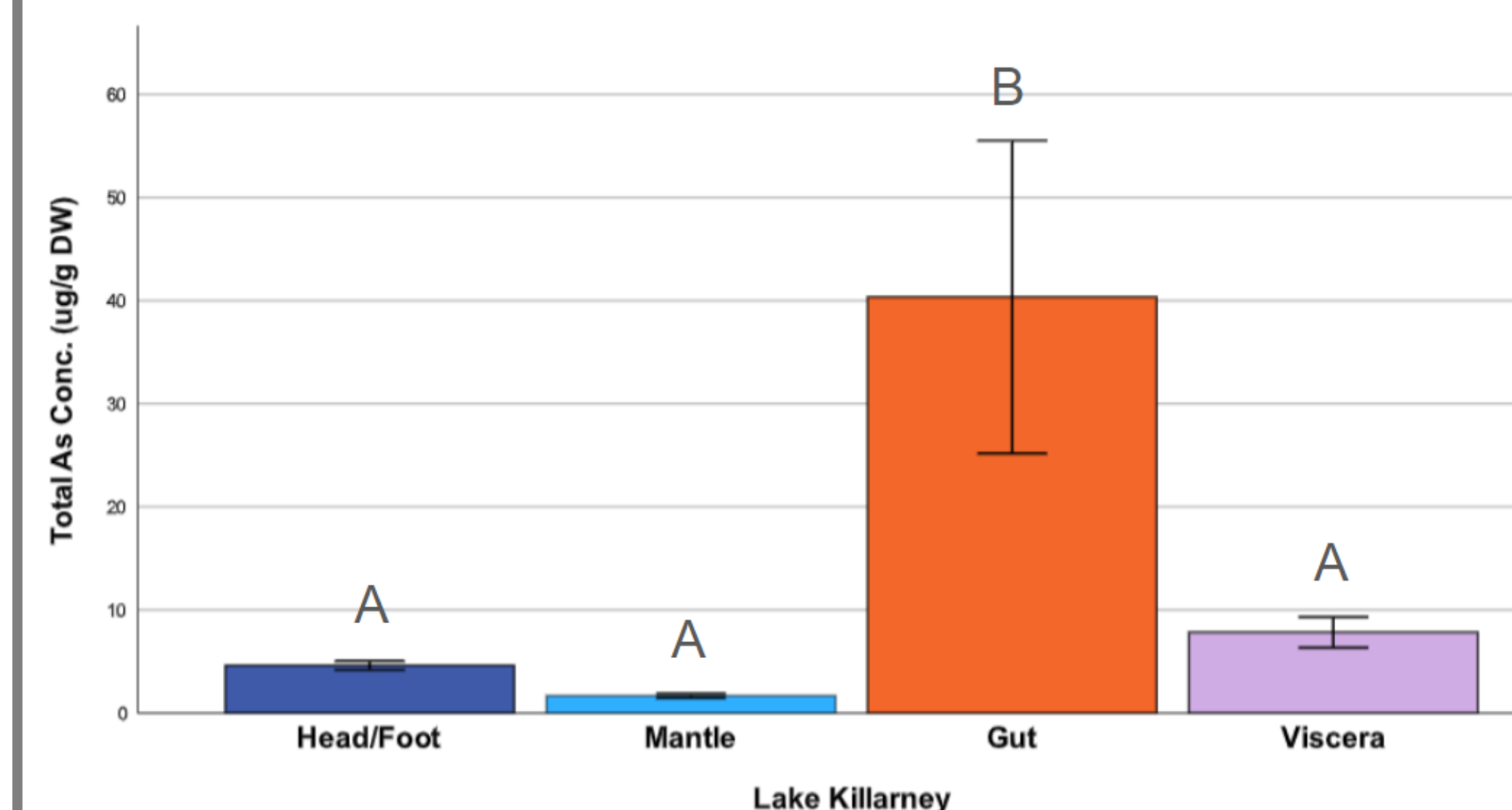


Figure 3: As Total concentration of Chinese Mystery Snails (CMS) from Lake Killarney. ICP-MS was performed on various CMS tissue. Results show higher As bioaccumulation in gut of CMS (n = 5 for all samples). Error bars represent +/- standard error from the mean. Statistical analysis was performed using one-way ANOVA (p-value > 0.01). Tissues not sharing any letter are significantly different by the Post-hoc Tukey Test.

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