A Laboratory Analysis of Faunal Artifact Water Retention and Diagenesis

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Introduction

- Experiment preformed in Florida, United States, with bone samples excavated from South Inlet Park in the years 2018-2019.
- Water table elevations in the areas where the samples were collected have been increasing (Lecher & Watson, 2021).
- Capillary fringes above the water table have also been increasing moisture in the areas around where the excavations were done (Lecher & Watson, 2021).
- Bones have natural pores that allow for fluid movement through its structure (Corwin, Galiani, et. Al., 2009).
- The experiment will be preformed after the artifacts have been properly cleaned, identified, sorted, and labeled.
- Hypothesis: The bones' weight will significantly increase after being submerged in water.

Methods

- Twelve categories of already-identified bones were chosen.
- The bones were all assigned an ID and their initial dry weight in grams was taken.
- Afterwards, the artifacts were submerged in a tub of water for 48 hours.
- The wet weight of all of the bones was recorded after the culmination of the first 48 hours.
- Then, the bones were left out to dry for another 48 hours and their final dry weight was recorded.
- A paired T-test and percent difference calculations were done with the data.

Table 1: Porosity percentages based on known bone types from references.

Bone Type	Porosity	Reference
Turtle external cortical bone	3.20%	(Pinilla, et.al., 2019)
Turtle middle trabecular bone	55.70%	(Pinilla, et.al., 2019)
Turtle internal cortical bone	3.10%	(Pinilla, et.al., 2019)
General fish	9.17%	(The bodies of some fish..., n.d.)
Human general	3.50%	(Renders, et.al, 2019)
Human femur	5.50%	(Thomas, et.al, 2005)
Human vertebrae	16%	(Rodriguez, et.al, 2015)

Results

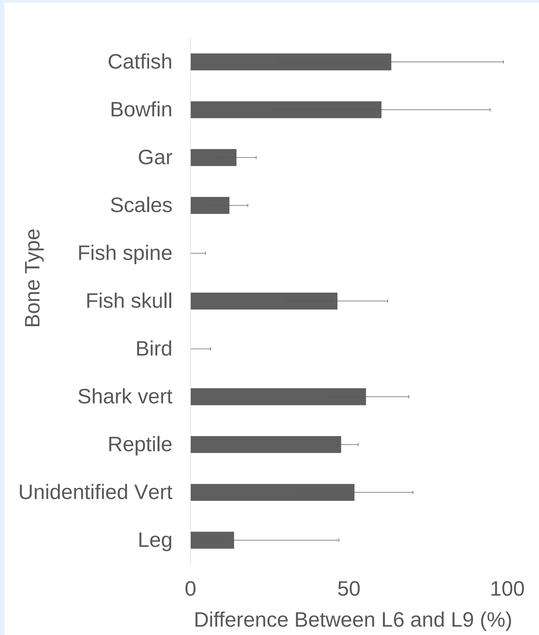
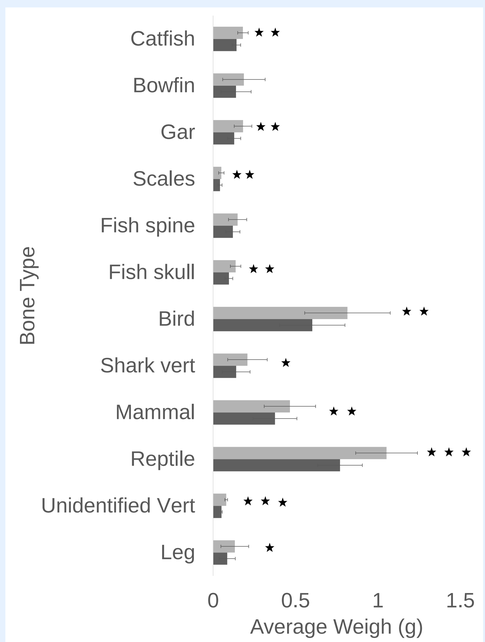
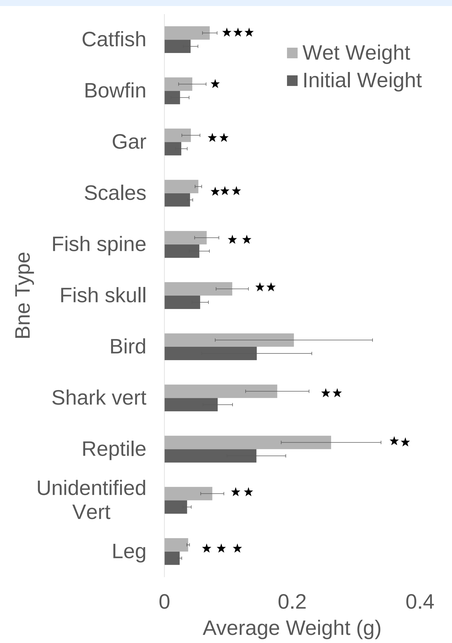


Figure 1: Percent differences between levels 6 and 9 (e.g. a 50% indicates the bone type in level 9 absorbed 50% more water than the same bone type in level 6. Standard error is displayed as error bars.



Figures 2: The average initial (dry) and wet weight for each bone type. For level 6. Significance is indicated by stars, * = p < 0.1, ** = p < 0.05, *** = p <0.01



Figures 3: The average initial (dry) and wet weight for each bone type. For level 9. Significance is indicated by stars, * = p < 0.1, ** = p < 0.05, *** = p <0.01

Conclusions

- There was a significant absorption from the majority of the bones after being soaked in water for 48 hours.
- The data proves the hypothesis because the bones' weight increased significantly after being submerged in water.
- Bone preservation is complex as depending on the type of bone, some degrade more quickly than others (Eriksen, et. Al., 2018). Porosity among other factors affect this.
- A factor that significantly can alter and degrade archeological artifacts, including bone, is water.

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