

The Effect of Parasitism on Coquina Clam (*Donax* spp.) Burial Behavior



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Introduction

Parasites can have a variety of consequences for their hosts, including changes to host behavior. In some cases, host behavioral modification can be adaptive and can increase the likelihood that a parasite is transmitted to its next host. Coquina clams (of the genus *Donax*) are filter feeding bivalves that host trematode parasites of the genus, *Lasiotocus*. The clams acquire infections through filter feeding and encysted stages of the trematodes (called "metacercariae") occur in the clam's inhalant siphon and muscular foot. The trematodes are then transmitted when infected clams are consumed by fish hosts.

Coquina clams are known to rapidly bury to avoid predators, but it is **unknown whether infection has any effect on clam burial behavior**. If an infected clam does not bury, or cannot bury deep in the sediment, that may increase its vulnerability to predators (benefiting the parasite). We observed burial in Coquina clams naturally infected with two species of *Lasiotocus* to determine whether the presence or intensity of infection was associated with changes to clam behavior.



Figure 1: Coquina clam with siphon and foot extended

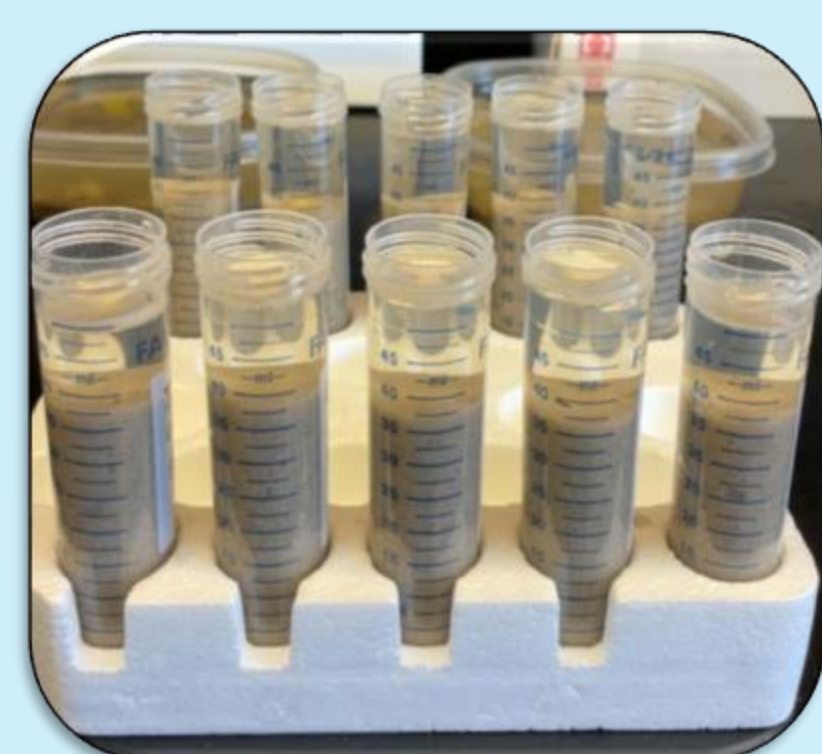


Figure 2: Experimental test tubes for clam observations

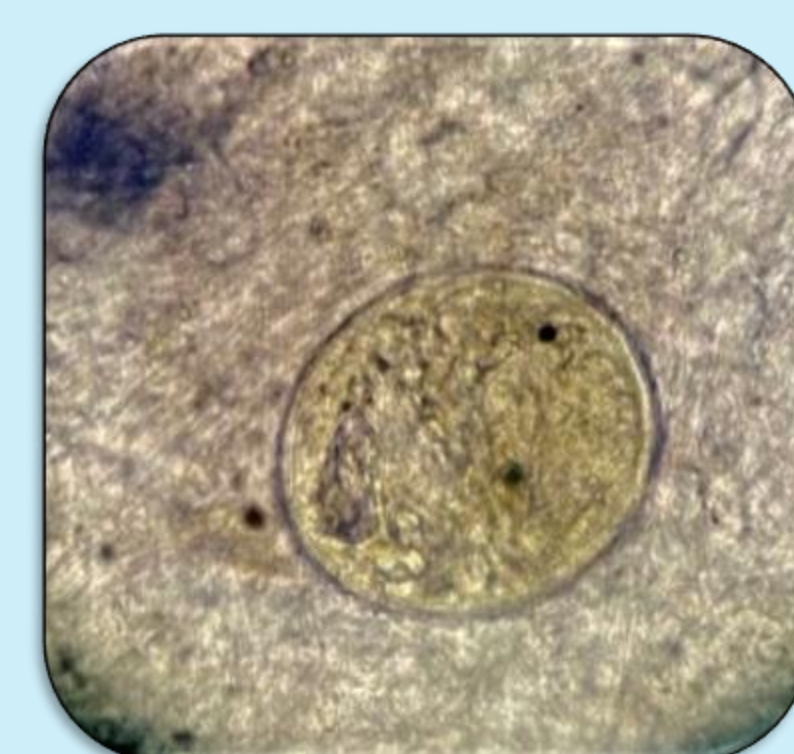


Figure 3: Metacercaria of the trematode parasite, *Lasiotocus*

Methods

- Coquina clams (Fig. 1) were sampled from Carabelle Beach, FL, in the upper intertidal zone (UIZ) using a clam extractor. Following collection, clams were acclimated in a water table.
- To observe clam burial behavior, we created experimental test tubes containing sand and seawater (Fig. 2). One clam was inserted into each test tube and observed for three minutes, and we noted whether the clam buried and when it initiated burial.
- At the end of three minutes, we measured the depth to which each clam had buried as well as its length, width, and height (in mm).
- We dissected each clam and examined the siphon and muscular foot for trematode metacercariae (Fig. 3) under the dissecting microscope, noting the number of metacercariae occurring in the tissue.

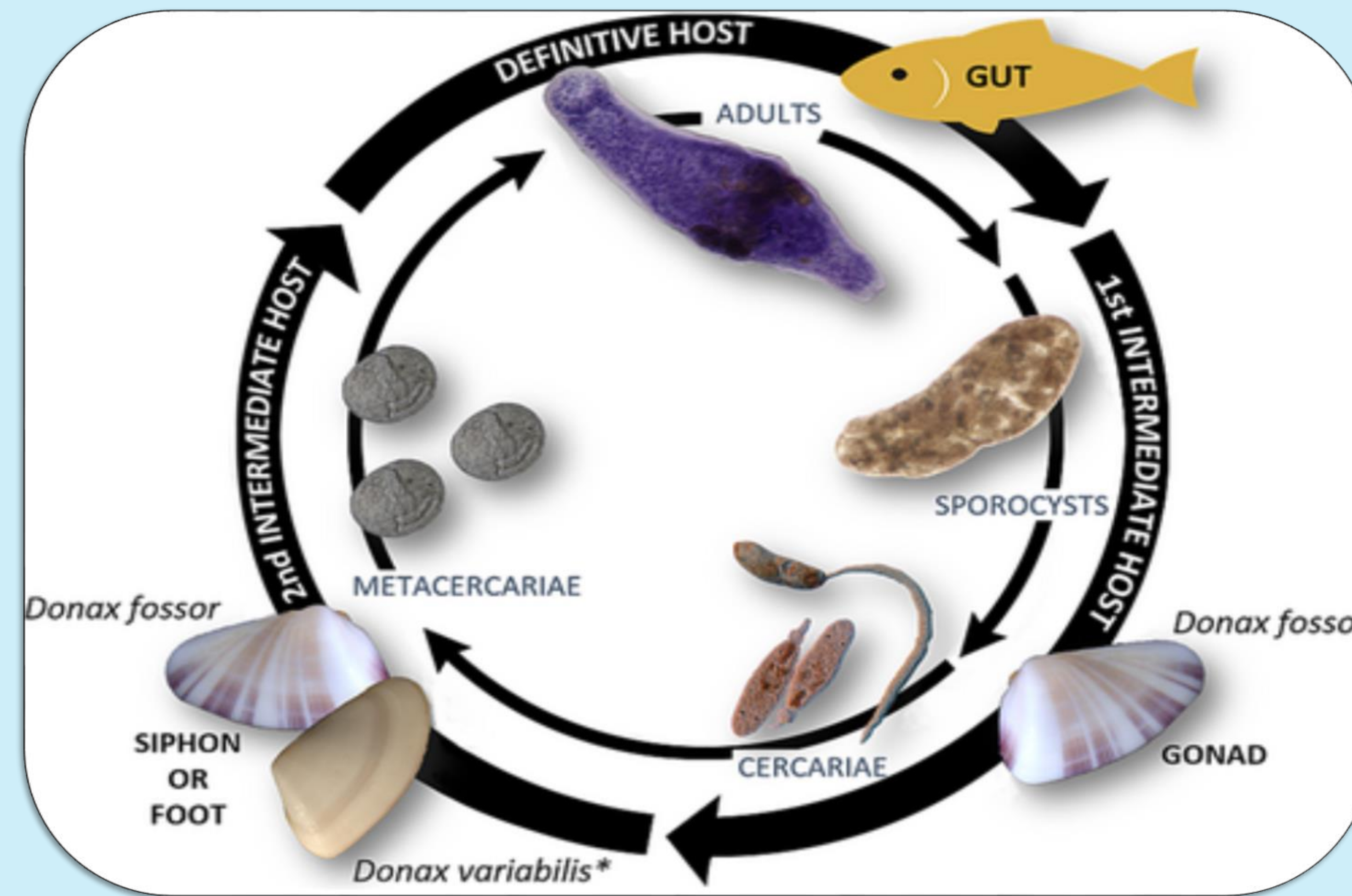


Figure 4: Life cycle of the trematode, *Lasiotocus* (figure provided from Elroy et al. 2023)

Results and Discussion

In preliminary trials, we did not detect a relationship between the number of trematode metacercariae infecting a clam and its burial depth ($p = 0.458$; Fig. 5). This study is ongoing and additional replicates will provide better statistical power to test for an association between infection and behavior. Clam shell height was positively, but not significantly, associated with intensity of infection ($p = 0.142$; Fig. 6). Larger clams may be more likely to be infected because of their higher filter-feeding rates. Again, higher replication planned for the coming weeks will allow us to further investigate this possibility.

Differential behavior of uninfected and infected clams may strengthen or weaken important links in the *Lasiotocus* life cycle (Fig. 4). Further assessment of how clam burial speeds and depths are associated with infection will improve our understanding of this parasite's natural history, and its ecological importance.

Preliminary Results

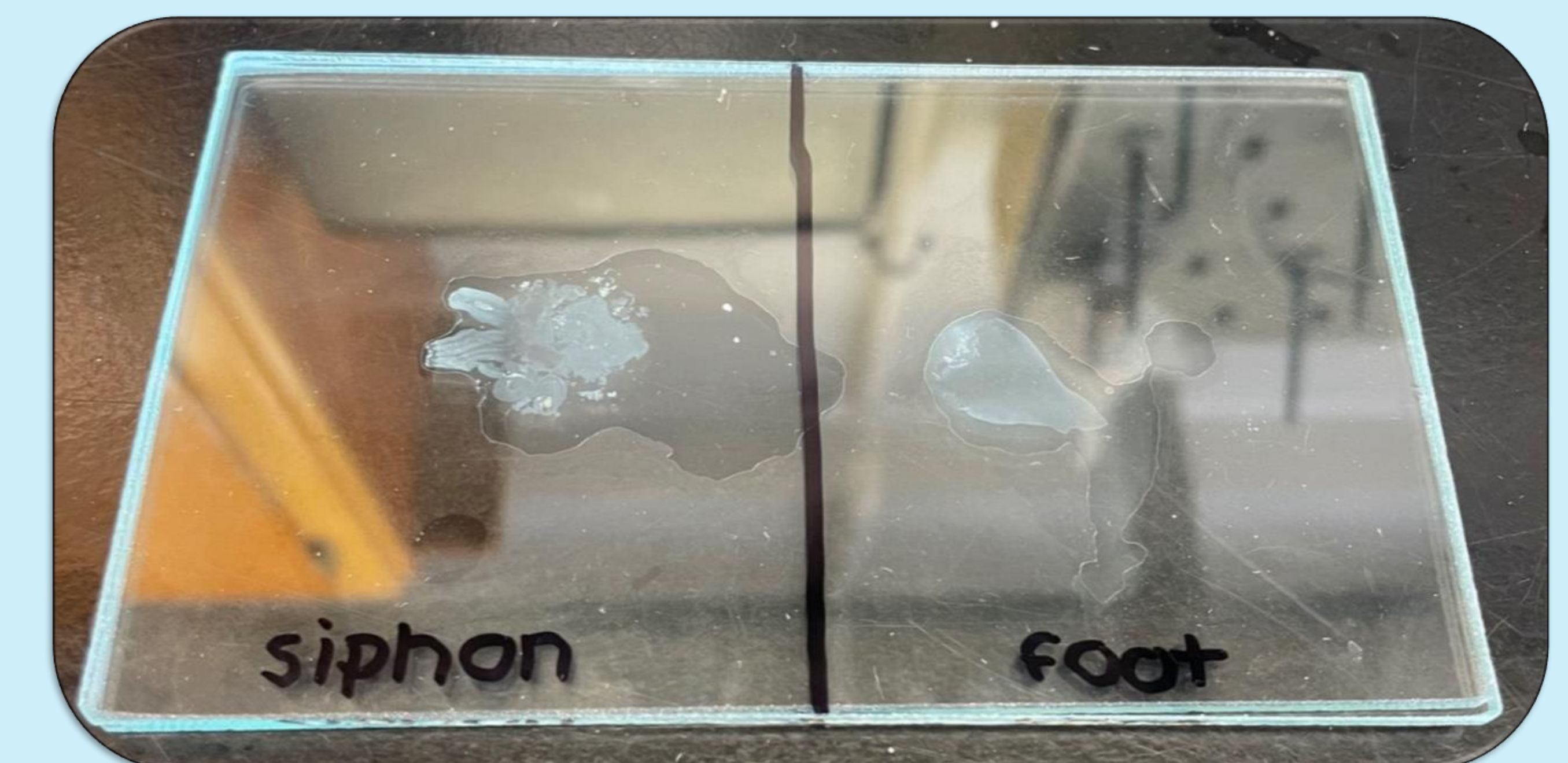
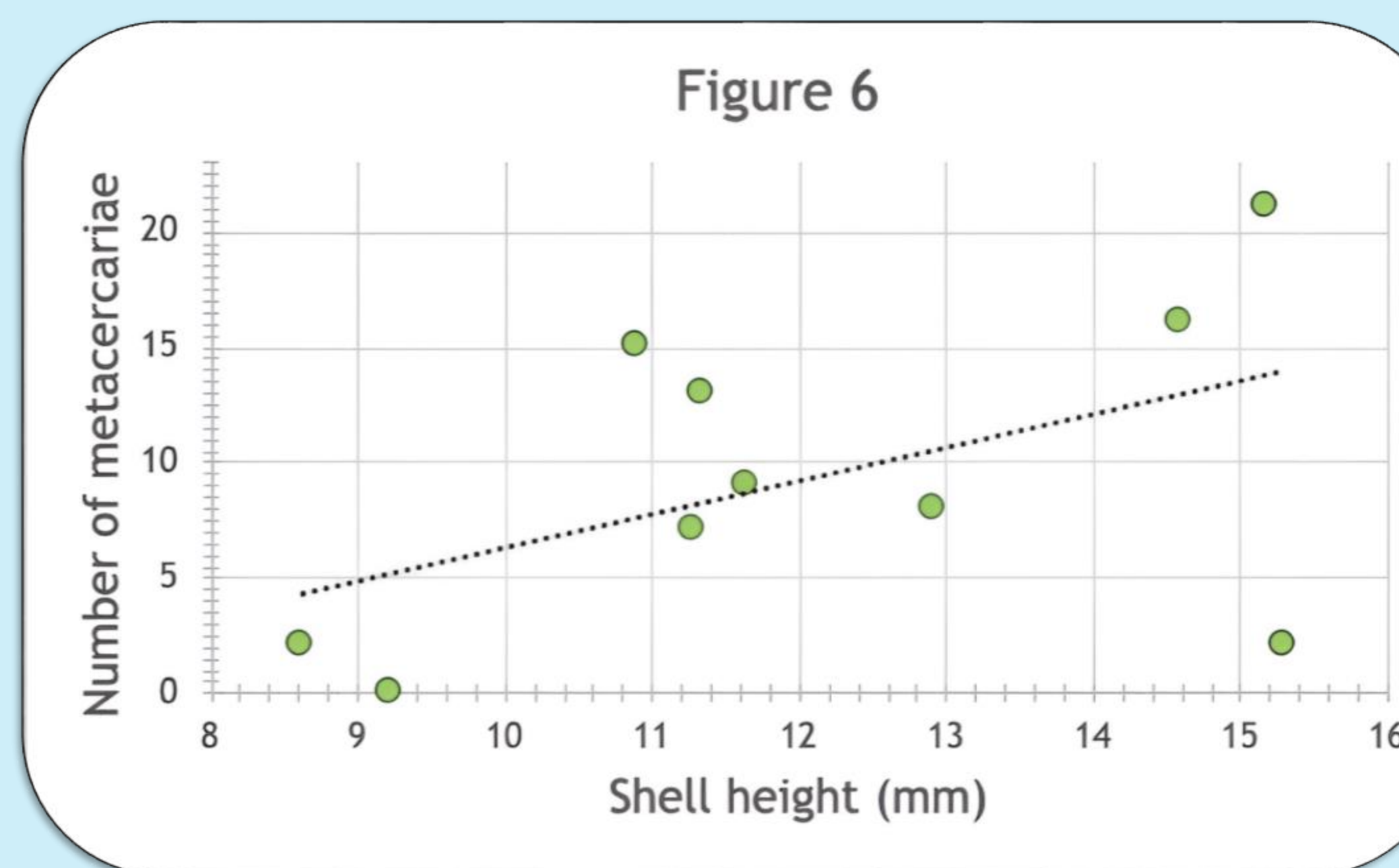
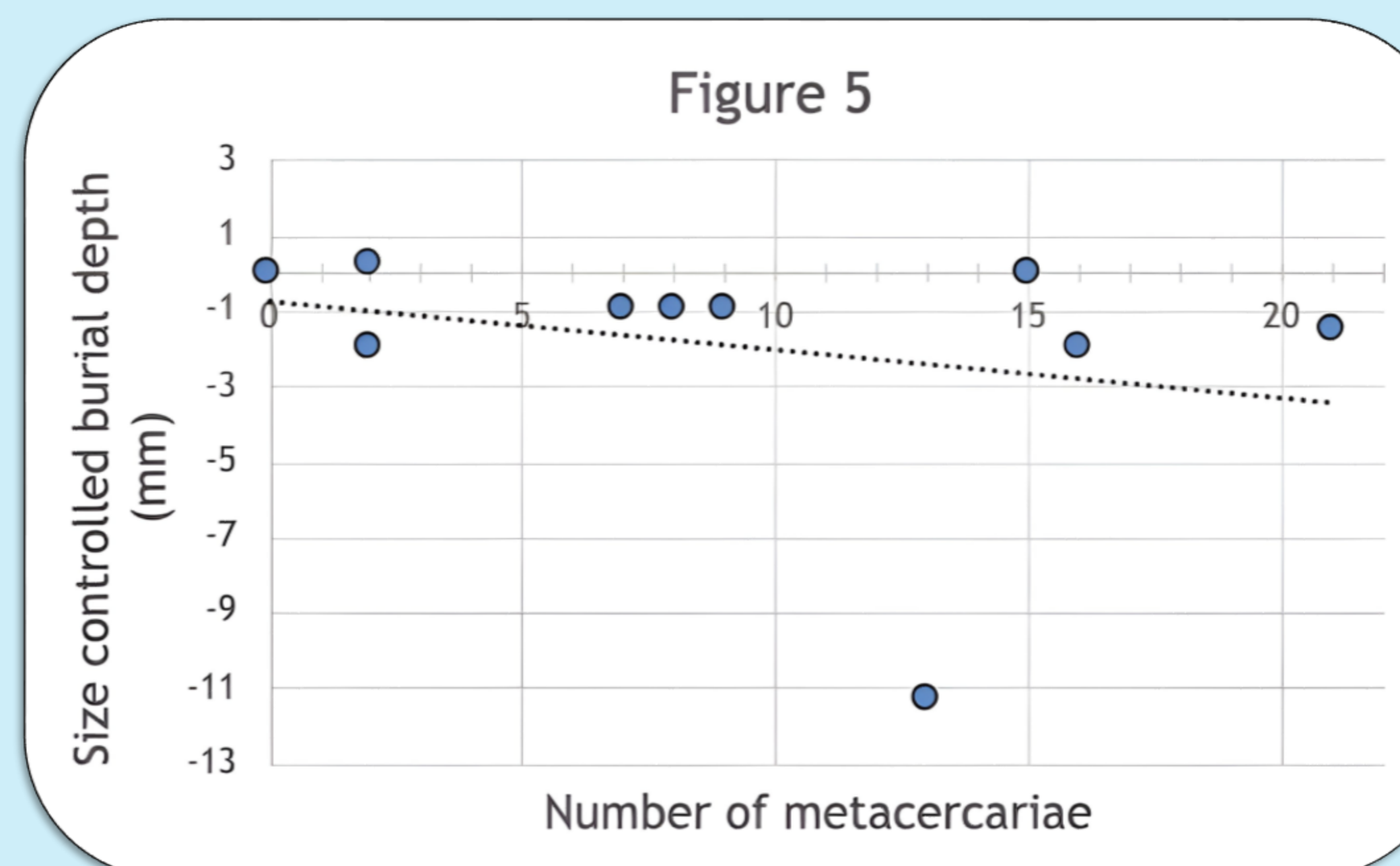


Figure 7: Siphon (left) and foot (right) tissue prepared for detection of *Lasiotocus* metacercariae. Each tissue was squashed into a thin and transparent section allowing for microscopic detection of encysted stages.

References

1. Elroy, E.J., Hill-Spanik, K.M., Connors, V.A. & de Buron, I. 2023. Epibiosis and parasitism of coquina clam *Donax* spp.: location, location, location! *Invertebrate Biology* 142:e12399.
2. Combes, C. 2001. *Parasitism: The Ecology and Evolution of Intimate Interactions*. Chicago (IL). University of Chicago Press.
3. Lafferty, K.D. & A.K. Morris. 1996. Altered behavior of parasitized killifish increases susceptibility to predation by bird final hosts. *Ecology* 77:1390-1397.