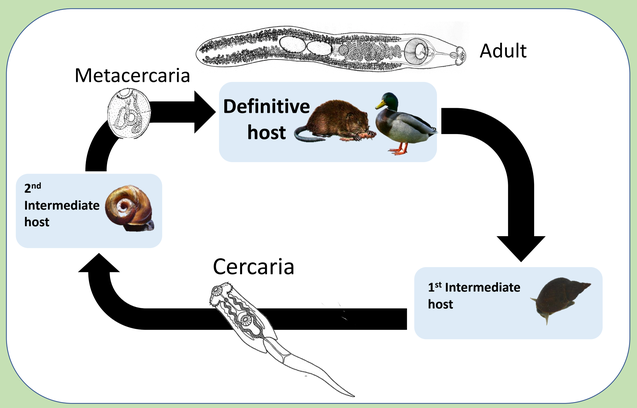
Exploring host-parasite compatibility between *Echinostoma trivolvis* and *Planorbella duryi*

Emily Slicer & Dr. Jillian Detwiler

Background

- Some parasites have life cycles that involve >1 host. One advantage of using a 2nd intermediate host is that the parasite may have higher survival and dispersal, thereby increasing its chances of transmission.
- However, transmission success will vary depending upon host specificity (the number of host species used by a parasite).
- Host specificity could be affected by several factors related to the co-evolution of hosts and parasites. Host behavioral defenses may reduce the likelihood of penetration by the parasite, whereas host immunity may reduce encystment.
- *Echinostoma trivolvis* is a trematode parasite native to North America and can be recognized by its 37 collar spines (Fig 1).[1]
- *E. trivolvis* uses snails as 1st and 2nd intermediate hosts and small mammals and waterfowl as definitive hosts (Fig 1). [2]
- *Planorbella duryi* is a freshwater planorbid snail native to Florida but is now widely dispersed due to the aquarium industry.[3]
- There are no previous records of *E. trivolvis* utilizing *P. duryi* as a second intermediate host.
- It is presumed that *E. trivolvis* can infect *P. duryi* due to echinostomes broad preference of 2nd intermediate hosts.[2]
- Due to changing geographic ranges it is beneficial to know if the invasive *P. duryi* can serve as a vector for the native *E. trivolvis*



Objective

- To determine whether native *E. trivolvis* lineage A cercaria can successfully penetrate and encyst in invasive *P. duryi* snails.
- To determine whether metacercaria impact the growth of snails and whether parasite dosage has an impact.

Hypothesis

- *E.trivolvis* will be able to utilize *P. duryi* as an 2nd intermediate host.
- A snail exposed to more parasites will show less growth over a period of time compared to snails with less or no parasites.

Results

- No difference in penetration success among the snails exposed to 50 and 100 cercaria ($F_{(1,24)} = 0.21$, $P = 0.65$).
- No difference in encystment success between the dosage groups ($F_{(1,24)} = 0.13$, $P = 0.72$)

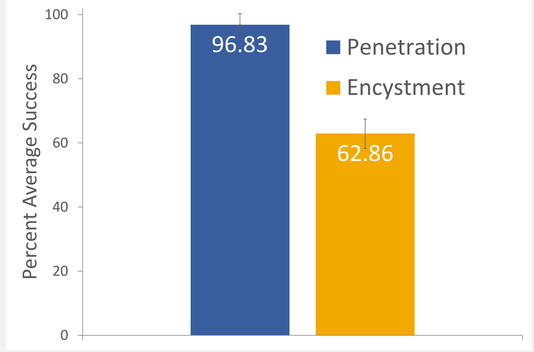


Figure 1: *P. duryi* confirmed as a suitable 2nd intermediate host for *E. trivolvis.* Between the 50 cercaria and 100 cercaria groups penetration success was an average of 96.83%. Average Encystment success for the same groups was 62.86%.

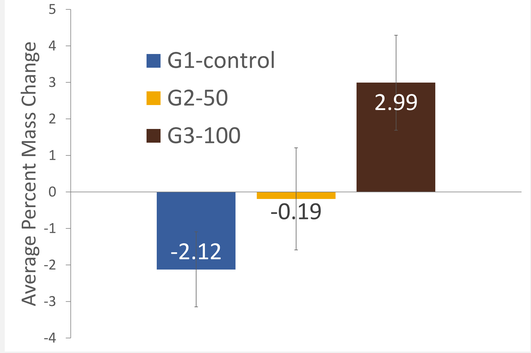
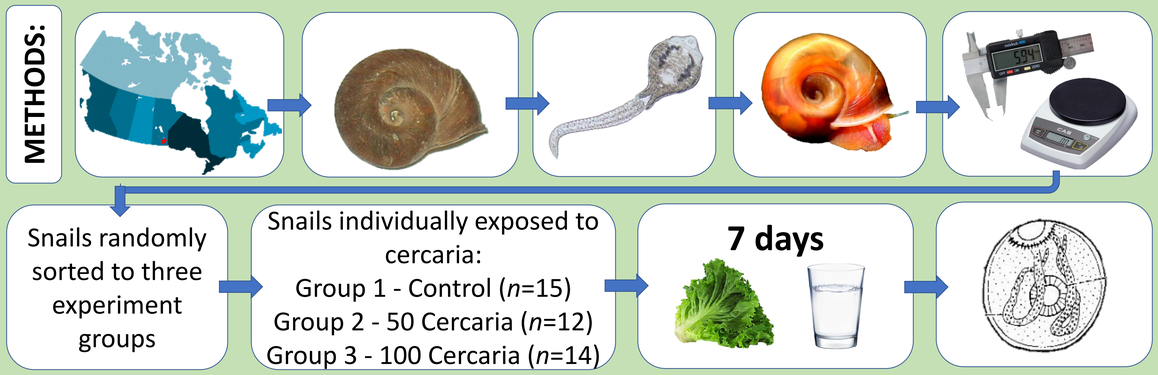


Figure 2: Among the three exposure groups there was a significant difference in end mass between control snails and those exposed to 100 cercaria (ANOVA, $F(2,38) = 4.5541$, $P = 0.0169$), However there were no significant differences between the control and G2, or between G2 and G3.



Conclusions

- Non-native *P. duryi* snails can successfully serve as second intermediate hosts for a local trematode parasite *E. trivolvis*.
  - Demonstrated by the average 96.8% penetration and 62.9% encystment success of cercaria
  - Cercaria dosage has no apparent affect on penetration or encystment success of the parasite
- At higher doses, metacercaria impacted the mass of snails demonstrating a consequence of infection.
- Potential future work:
  - Investigate whether there are additional costs of infection to the host (e.g. reproduction).
  - Compare the difference in costs from single exposure to multiple exposures to parasites.

References

1. Kanev, I. et al. 1995. Redescription of Echinostoma trivolvis (Cort, 1914) (Trematoda: Echinostomatidae) with a discussion on its identity. Barker & Laughlin. Systematic Parasitology **32**: 61–70.
2. Johnson, P. T. J., and McKenzie, V. J. 2009. Effects of environmental change on helminth infections in amphibians: Exploring the emergence of *Ribeiroia* and *Echinostoma* infections in North America. *In* The Biology of Echinostomes: From the Molecule to the Community. p 249–280.
3. Rader, R. B. 1994. Macroinvertebrates of the Northern Everglades: Species Composition and Trophic Structure. Winter/Spring. Florida Scientist **57**: 22–33.