

Diversity of Parasite Populations in *Gambusia affinis* and *Cyprinella lutrensis*

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Introduction

Gambusia affinis (Western Mosquitofish) and *Cyprinella lutrensis* (Red Shiner) are two commonly found species of fish at Timberlake Biological Field Station (Fig. 1) in the Colorado River in Central Texas. The different species of fish fit into different niches of the Colorado River ecosystem. Mosquitofish thrive in the shallow pools of water adjacent to the river while Red Shiners live in the faster flowing portions of the river. Based on the differences of food sources as well as their primary living environment, there may be a difference in the expected parasite communities found in the fishes.

Objectives

- Study the diversity of the parasites in both *G. affinis* and *C. lutrensis*
- Compare the variation in the parasite communities in the different species

Methods

- Fish were collected from Timberlake Biological Field Station (Fig. 1), *G. affinis* ($n_{2018}=20$, $n_{2019}=9$) were collected via dip net and *C. lutrensis* ($n_{2018}=24$, $n_{2019}=35$) were collected via seining
- Fish were then euthanized and necropsied where all tissues were analyzed for presence of parasites
- If parasites were found, the parasites are identified, imaged, and preserved
- The prevalence and abundance were calculated compared from the 2018 data versus 2019 data



Figure 1. Shoal Collection Site at TBFS.

Results

There were six different species of parasites found in the fish including a Trematode (*Posthodiplostomum* sp.), a Cestode (*Schyzocotyle acheilognathi*), Nematodes (*Rhabdochona* sp. and *Contracacecum multipapillatum*) and an Arthropod (*Lernaea cyprinacea*). There was no significant difference in prevalence or abundance between the two years of study or the different species of fish except for abundance of *Rhabdochona* sp. varying between years ($F=7.961$; $p=0.022$), *Lernaea cyprinacea* differed between years ($F=11.150$, $p=0.001$) and between species ($F=6.168$, $p=0.015$) (Fig. 2A), and the prevalence of *Posthodiplostomum* sp. greater in *G. affinis* in 2018 ($\chi^2=7.059$, $p=0.013$) and 2019 ($\chi^2=9.119$, $p=0.011$) (Fig. 2B).

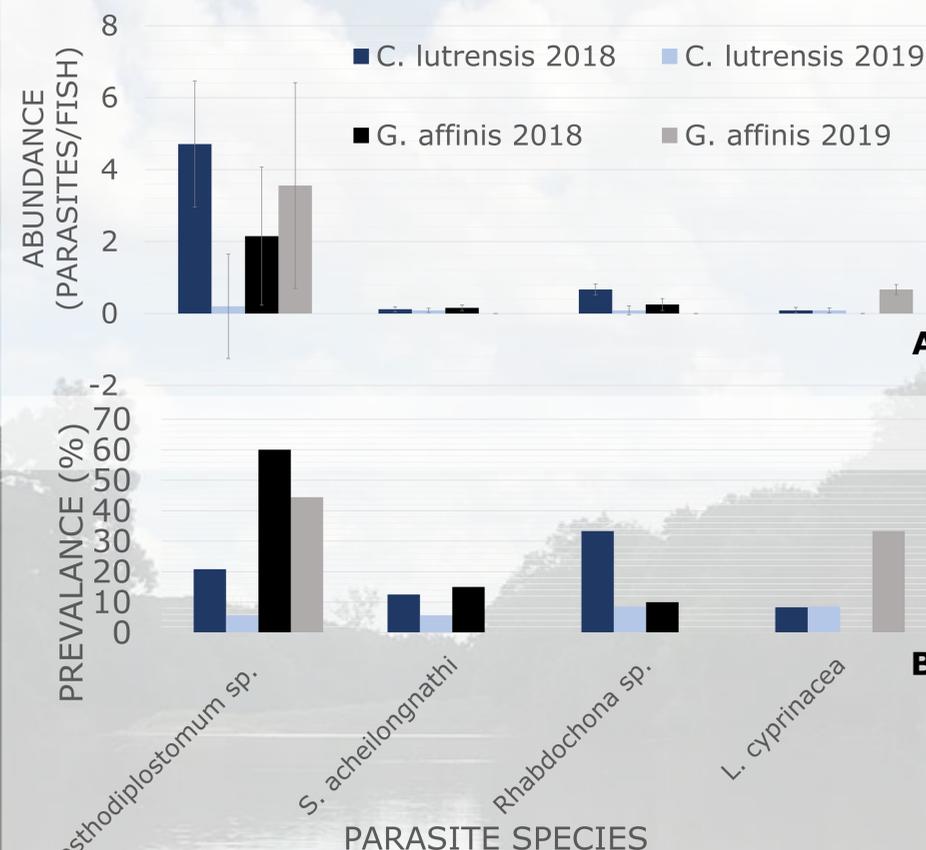


Figure 2. Statistical Analysis of Parasite Abundance and Prevalence. (A) Mean Abundance (B) Prevalence

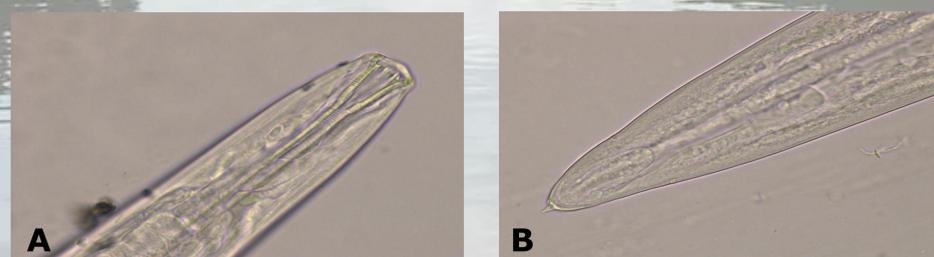


Figure 3. Microscopic images of *Rhabdochona* sp. (A) Anterior end (B) Posterior end

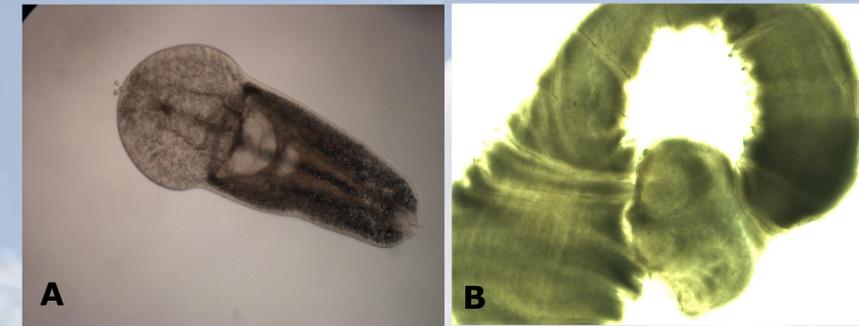


Figure 4. Commonly found Trematode and Cestode in both species of Fish. (A) *Posthodiplostomum* sp. at the life stage of metacercariae. (B) The scolex and anterior end of an adult *S. acheilognathi*.

Discussion

Gambusia affinis is found in the shallow, warm, slow moving waters which could explain why there is a significant increase the abundance of *L. cyprinacea* and prevalence of *Posthodiplostomum* sp. Both species of parasites are considered free-living to then infect the host¹ which in a slower moving water would be easier than in the faster water that *C. lutrensis* thrives in. The significant difference in *Rhabdochona* sp. between 2018 and 2019 may be explain by factors of their life cycle² that were not analyzed by this study.

Future Directions

- Expand the data set in the Summer of 2020 to create a better understanding of the changing parasite communities
- Have interdisciplinary discussions on why the parasite communities are changing
- Investigate the possibility isolating bacteriophages from the parasites of the Colorado River

References

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