Temporal variation of the parasite community in *Gambusia affinis*

Heizel K. Acosta-Vilanova[1], Megan E. McGraw[2], Hannah N. Bauman[2], Kristin K. Herrmann, Ph.D.[2]
[1]University of Puerto Rico – Mayagüez; [2]Department of Biological Sciences, Tarleton State University

Introduction

Gambusia affinis (western mosquitofish) is a common species of fish at Timberlake Biological Field Station in the Colorado River in Central Texas and usually live in shallow, slow-moving freshwater streams. They can survive in salt water, though, and have been introduced in coastal marshes to help control mosquitoes. *Gambusia affinis* serves as a host for a variety of larval and adult parasites due to their role as a predator of a variety of food items and their role as prey of many species. Parasite communities often vary in time due to factors such as changes in host density, temperature and rain fall (Violante-González et al. 2008).

Objectives

- Study the diversity of the parasites in *G. affinis*
- Compare the variation in the parasite communities in *G. affinis* from 2018, 2019 and 2021

Figure 1. Shoal Collection Site at TLBFS

Methodology

- Fish were collected via dip net from the Colarado River at Timberlake Biological Field Station (Fig. 1), *G. affinis* (n_{2018}=27, n_{2019}=9, n_{2021}=16).
- Fish were then euthanized with MS-222, measured (Fig. 2) and necropsied.
- All tissues were search for presence of parasites.
- If parasites were found, the parasites are preserved, imaged and identified.
- The prevalence and abundance were calculated compared among years with Chi-square and ANOVA, respectively.

Results

There were six species of parasites found *G. affinis* collected over the three years, 2018, 2019 and 2021. Two larval trematodes (*Posthodiplostumum* sp. and *Diplostomum* sp.), an adult cestode *(Schyzocotyle acheilognathi),* a larval nematode (*Rhabdochona cascadilla*), an ectoparasitic arthropod *(Lernaea cyprinacea*) and a gill *monogenean* (*Salsuginus fundulus*). Prevalence and abundance of the anchor worm, *Lernaea cyprinacea*, varied among years (X^2=8.85, p=0.012; $F_{(2,49)}$=6.295, p=0.004; Figs. 3, 4). For all other species, neither prevalence or abundance varied across years (all p>0.05).

Figure 2. Female G. *affinis*

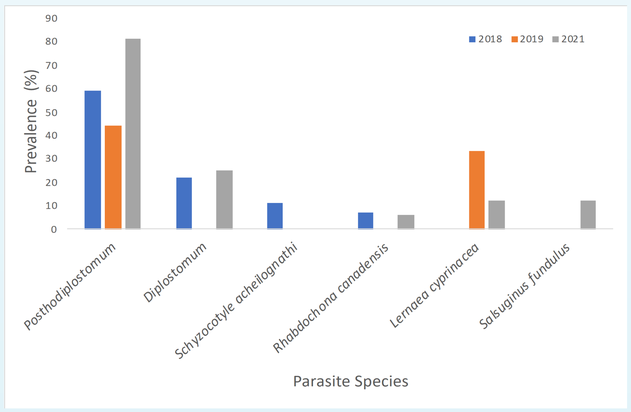

Figure 3. Parasite Prevalence in *G. affinis*

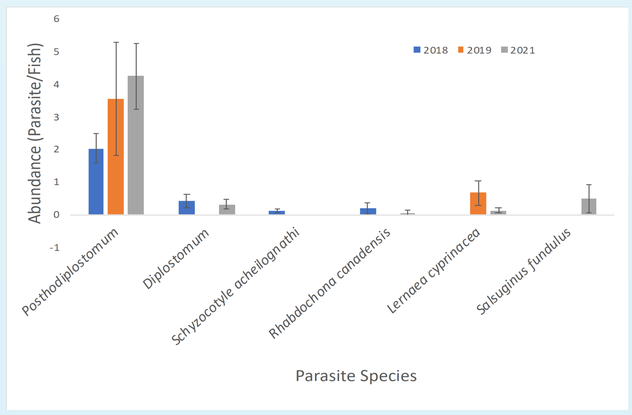

Figure 4. Parasite Abundance in *G. affinis*. Error bars represent standard error.

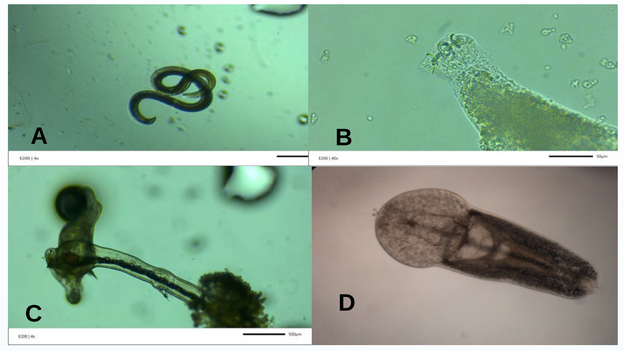

Figure 5. Commonly found parasites in *G. affinis*. (A) *Rhabdochona canadensis* (B) *Salsuginus fundulus* found in the gills of *G. affinis* (C) *Lernaea cyprinacea* (D) *Posthodiplostomum sp.* at the life stage of metacercariae.

Discussion

We did not find variation among years in prevalence and abundance of most parasites, likely due to fish being captured at the same time of year. *Gambusia affinis* is found in the shallow, warm, slow-moving waters which could explain high prevalence and abundance of *Posthodiplostumum* sp. (Fig. 5D). The previous larval stage of *Posthodiplostomum* resides in snails and then swims through the water to infect fish, which is more efficient in calmer waters (Woo and Leatherlan 2006). *Diplostomum* sp. was not identified in 2019. *Lernaea cyprinacea* (Fig. 5C) prevalence and abundance were higher in 2019, during which environmental conditions may have been optimal for this ectoparasite (Hossain et al. 2018).

Future Directions

- Investigate genetic differences in all *Posthodiplostomum* from a single fish host.

Acknowledgements

This research was funded by NSF program (Award#1658984). I would like to express my thanks to Tarleton State University, Timberlake Biological Field Station and my REU classmates Jose Martinez and Graham Derzon-Supplee. This research would not have been possible without the exceptional support of Maddison Morris and Adriana Perrucci.

References

Hossain, MM, Ferdoushi, J, Rupom, AH. 2018. Journal of Entomolyg and Zoology Studies 6:910-917.

Violante- González et al. 2008. Journal of Parasitology 94(2):326-34.

Woo, PTK, Leatherlan, JF. 2010. *Fish Diseases and Disorders.*