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Parasite Communities in Sunfish (Centrarchidae) from the Olentangy River

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Abstract

Parasites are common in freshwater fishes, and sunfish (Family Centrarchidae) in particular have been found to have diverse parasite communities in North America. We have been studying parasite communities that are found in sunfish (Family Centrarchidae) in three different localities (Delaware Run, River Run Park, and William Street Bridge) along the Olentangy River in Delaware, Ohio. The presence of multiple species of sunfish in the Delaware Run and nearby Olentangy River has given us an opportunity to compare parasites among them. A total of 212 fish were collected August 2022 through April 2023 and examined for parasites. We found a total of seven species of parasites overall, with bluegill (*Lepomis macrochirus*) having a larger abundance of parasites than green sunfish (*Lepomis cyanellus*). Other species such as rock bass (*Ambloplites rupestris*), orange-spotted sunfish (*Lepomis humilis*), northern sunfish (*Lepomis peltastes*), white crappie (*Pomoxis annularis*), black crappie (*Pomoxis nigromaculatus*), and redear sunfish (*Lepomis microlophus*) were also investigated and found to have fewer parasites. Metacercariae (flukes) and *Spinitectus* sp. (nematodes) were the most common parasites recovered. Preliminary results indicate that the parasite community was more diverse in the most rural collection site (River Run Park) than the more urban collection sites (Delaware Run and William Street Bridge). This calls for the need to investigate factors that are affecting parasites in the urban portion of the river.

Introduction

This project offered an opportunity to study sunfish (Family Centrarchidae) parasite communities in three different sites (one urban and two non-urban) in a river system with multiple species of sunfish. Parasite communities in sunfish are a good model for studies in parasite ecology. A healthy ecosystem can be based on the richness of parasite species, due to them being able to alter an ecosystem's energy flow and food web dynamics (Blanar et al. 2009; Sures et al. 2017). Ashmawy et al. (2018) reported that at the less polluted sites in their study, they found that there was a higher parasite diversity. Based on previous research, urban and non-urban sites along the Olentangy River could pose a difference in parasite dispersal due to different environmental influences, including pollution. Although a considerable number of sunfish species are common throughout the Olentangy Watershed, no studies have investigated whether there is a difference in parasite communities in these species. Three sites were examined along the Olentangy River: Delaware Run (urban), William Street Bridge (urban), and River Run Park (non-urban). The most prevalent species that were used for comparison are bluegill (*Lepomis macrochirus*) and green sunfish (*Lepomis cyanellus*). Between these two species, it was hypothesized that there will be a difference in the intensity of infection of the given parasitic species due to the difference in diet and physiology. It is also hypothesized that there will be differences in parasite communities in green sunfish between the non-urban and urban sites of the Olentangy River. The urban sites are predicted to have a lower abundance of parasites than the non-urban localities.

Results: Current Trends

- So far we have examined 212 sunfish belonging to 8 different species.
- River Run Park had the largest amount of parasites (1,733), with Delaware Run having 955 and William Street Bridge having 401.
- Currently, a total of 3,089 parasites have been recovered (Figure 1).
- A total of 10 Leeches, 225 Acanthocephala, 54 Cestodes, 574 Nematodes, 169 Trematodes, 2,057 Metacercariae, and 1 Monogenean was harvested.
- Delaware Run had the largest abundance of Acanthocephala (148) and Trematodes (106). River Run Park had the largest abundance of Nematodes (277) and Metacercariae (1388) (Figure 2).

	Green Sunfish	Bluegill	Rock Bass	Orange-spotted	Northern	White Crappie	Black Crappie	Redear	Hybrid
Delaware Run	188	658	3	0	21	0	0	14	0
River Run	54	1542	0	33	0	7	4	46	47
WSB	71	165	122	0	29	0	0	0	13
Total	313	2365	125	33	50	7	4	60	60

Figure 1. Number of parasites per sunfish species at each site.

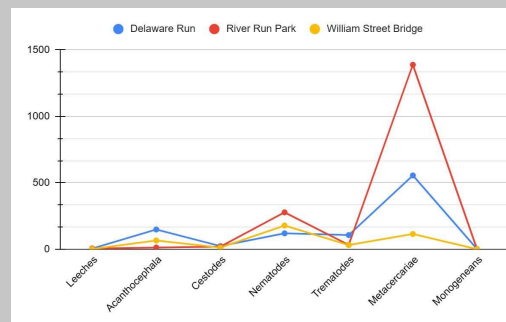
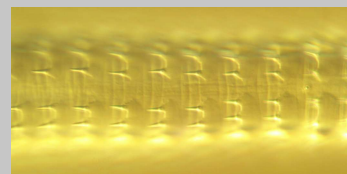
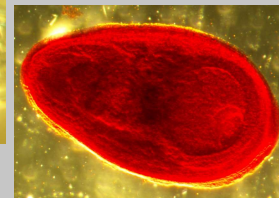


Figure 2. Number of parasites per species found at each site.



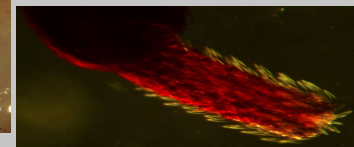
Spines on *Spinitectus* sp., an intestinal nematode



Prototremella sp. Trematode from stomach



Flukes (*Prototremella*) attached to bluegill stomach



Head of *Acanthocephalus dirus*, an intestinal parasite

Methods

The fish were collected using an electrofishing backpack at the three localities. The fish collected were kept in separate buckets according to site until necropsy. Each fish was then externally examined for external parasites. Fish were then dissected and the guts were removed from the body cavity. Dissection of guts occurred in 0.8% saline solution, with parasites being removed and placed in a separate petri dish of 0.8% saline solution for later examination. Parasites were preserved in vials with either 95% ethanol solution (for DNA extraction) or 4% formalin solution (morphological study) as a preservative.

Discussion

Preliminary results indicate that the non-urban locality (River Run Park) has the most diverse community of parasites compared to the urban localities (Delaware Run and William Street Bridge). A possible cause for the decrease in the number of parasites being found at urban versus non-urban sites is pollution. The difference in occurrence of parasite species between localities could prove useful in further studies for identifying specific types of pollution since parasite taxa are affected differently in susceptibility (Blanar et al. 2009). Moving forward, future studies can be done in order to test the water quality and other aspects of the sites in order to make future connections. There are several future directions in this study in order to further interpret the results. The correlation of size difference between fish and parasite intensity, and also seasonal differences of parasite loads and intensity are to further be examined. Differences between parasite abundance between species will also be analyzed. Future testing of the water quality will also occur as to determine whether or not pollution is affecting the health of each site (and therefore, the parasite intensity at each locality). Final parasite identification of each species will be determined. Statistical analysis will also be run in order to further depict the data. Another future direction includes comparing current parasite communities to previously collected data from previous studies of Delaware Run sunfish.

Literature Cited

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