

BIOL 103L: Environmental Biology Sample Lab Report

The Effect of Protozoan Parasites on Growth Rates in Tadpoles

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Abstract: This study tested the hypothesis that parasite-infected tadpoles grow slower than uninfected tadpoles. In the laboratory, uninfected (control group) bullfrog tadpoles (Rana catesbeiana) grew faster than tadpoles infected with protozoan parasites. These results suggest that wild tadpoles infected with protozoan parasites are at a disadvantage compared to uninfected tadpoles, and that parasites in general might have negative effects on their hosts.

Introduction: Tadpoles serve as hosts for many different types of parasites. These parasites include bacteria, protozoa, and nematodes (Pryor, 2003). These parasites could impact the health of tadpoles. For example, parasites that are located in the tadpole gut presumably feed upon the tadpole's gut tissue or on undigested food within the host gut. This, in turn, might reduce the ability of tadpoles to digest their food, or reduce the amount of nutrients available for digestion by the tadpole hosts.

The hypothesis of this study was that parasite infection can slow the growth of tadpoles. Specifically, the effects of protozoan parasite infection on bullfrog tadpole (Rana catesbeiana) growth rates were investigated.

Materials and Methods: Bullfrog (Rana catesbeiana) eggs were collected from a pond on the Francis Marion University campus. The eggs were hatched in an aquarium located in the lab, and the tadpoles that hatched from these eggs were raised on a fish food diet. One group of 20 tadpoles was isolated in a separate aquarium and infected by raising them in water that was contaminated with protozoan parasites. Another group (the control group) of 20 tadpoles was isolated in a different aquarium and raised in clean water, and thus prevented from coming in contact with protozoan parasites. Every day, for two weeks, the body masses of tadpoles in each group were measured and recorded. The averages for each group were then calculated and plotted on a line graph, as described by Pike and Krebs (2004).

Results: Protozoan parasite infection had a detrimental effect on growth in tadpoles (Fig. 1). Tadpoles infected with protozoan parasites grew much slower than the control (uninfected) tadpoles over the two week long experimental period.

Discussion: The results of this study support the hypothesis that parasite infection slows down growth rates in tadpoles. However, it remains undetermined exactly why protozoan parasites have a negative effect on their tadpole hosts. One possibility is that these parasites use nutrients that the host needs for proper growth. Another possibility is that protozoa in the gut prevent a tadpole from eating as much food as an uninfected tadpole, or prevent an infected tadpole from properly digesting its food.

The results described here suggest that wild tadpoles will be at a disadvantage when they are infected with parasites, relative to uninfected tadpoles. For instance, if protozoan-infected tadpoles require more time to develop into frogs, they will experience prolonged exposure to aquatic predators such as fish and snakes. The infected tadpoles will also face a greater risk that the pond they live in will dry up before they can emerge as frogs.

Similar to the protozoan parasites examined in this study, other types of parasites (such as bacteria and nematodes) inhabiting the gut regions of tadpoles might also have negative effects on their hosts' growth rates. Parasites in other host species, such as mammals and birds, might also reduce the growth rates of those hosts. However, more studies investigating the effects of parasites on host growth rates are needed.

Literature Cited:

Pike, L. and J. Krebs. 2004. Appendix 2 Scientific Method: Review of Graphing. pp. 149-150 in Biology 103L Environmental Biology Laboratory, 6th edition. McGraw-Hill custom publishing, Boston, USA.

Pryor, G.S. 2003. Homepage. <http://www.zoo.ufl.edu/gpryor/tadpole_research3.html> Accessed 2004 Sept 1.

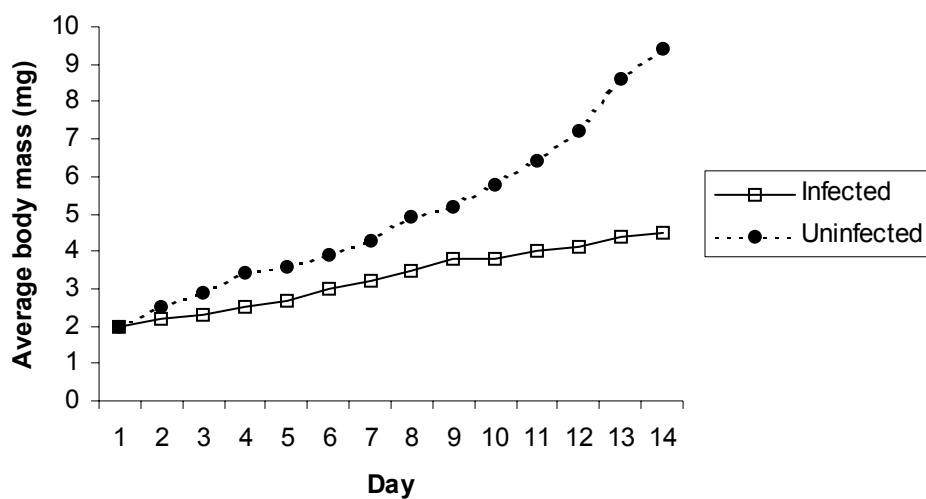


Figure 1. Growth rates of protozoan-infected and uninfected (control) tadpoles under laboratory conditions. Average daily body masses for the 20 tadpoles in each group are presented in milligrams (mg).