Ecology of Stormwater Ponds: Environmental Factors That Affect The Abundance of Larval Mosquitoes

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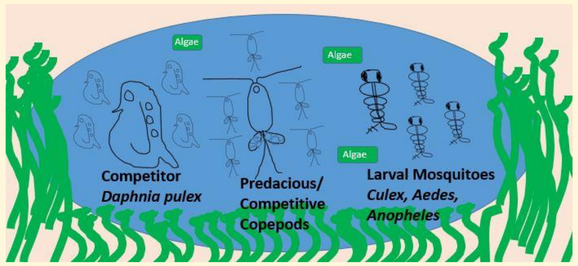
Background

The development of stormwater infrastructure causes an increase in available aquatic habitat for mosquito breeding and larval development, posing drastic human health consequences. It has been observed that a diverse community of predators have been found to decrease mosquito abundance[1]. Multiple species coexisting with mosquitos was found to decrease the percentage of mosquitoes in wet water communities, strongly highlighting the role that zooplankton play in the assembly of aquatic communities[2]. Studying stormwater communities will help determine the main contributors to why mosquitoes oviposit in certain urban stormwater ponds.



Methods

Stormwater ponds were categorized as either detention ponds, retention ponds, or drainage ditches in the Champaign-Urbana area. Zooplankton and insects were collected, preserved in 95% EtOH, and later counted and identified. Measurements of Chlorophyll a (Chl a) was taken for each pond.

Hypotheses

- **If zooplankton compete and prey on larval mosquitoes, then we predict that an increase in zooplankton abundance will result in a decrease of larval mosquito abundance.**
- **If chlorophyll a, a proxy for measuring algal biomass, determines the amount of available resources for larval mosquitoes, then we predict that chlorophyll a concentrations will be positively correlated with mosquito abundance.**
- **If retention ponds are designed to hold rainwater runoffs permanently, then we predict that it will have higher concentrations of chlorophyll a.**

Results

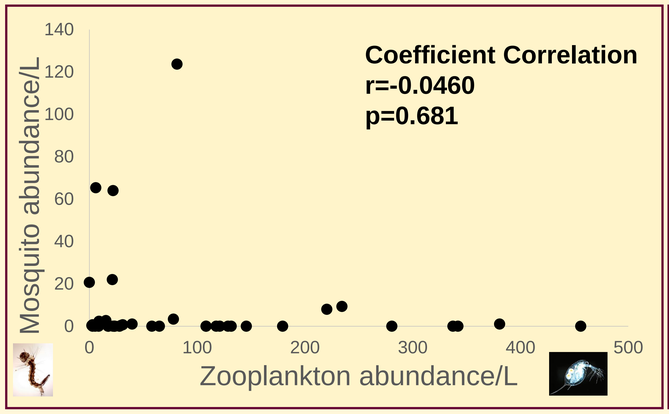


Fig 1. There was little to no correlation between mosquito and zooplankton abundance in the given samples.

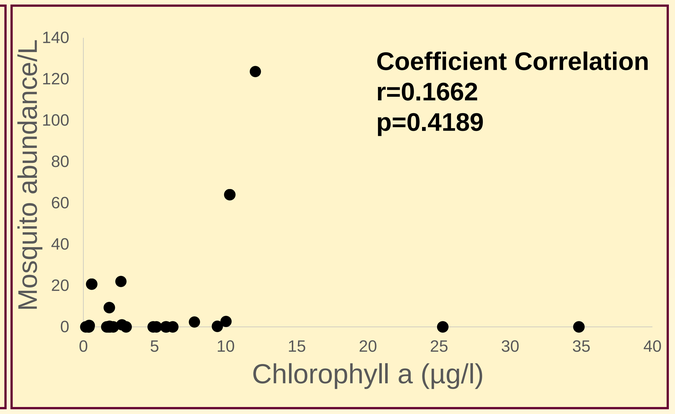


Fig 2. Chlorophyll a concentrations were not significantly correlated with mosquito abundance.

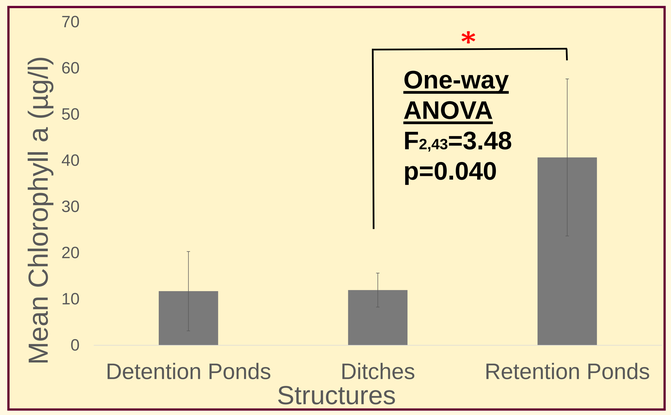


Fig 3. Mean Chlorophyll a concentrations only differed significantly between drainage ditches and retention ponds.

Discussion

- Potentially decreasing the abundance of mosquito further decreasing the spread of disease
- Ecological cost of decreasing mosquito abundance
- Pesticides vs. zooplankton
- Understanding aquatic community assembly

Future Directions

- In the future, this project will continue to sample ponds for zooplankton abundance and insect communities. Chlorophyll a abundance will continue to be measured.
- There will be a focus on land use (roads, agriculture, residential) surrounding stormwater ponds and their effects on community assembly.
- Experimental mesocosms will be set up to test the effects of nutrients on the assembly dynamics of zooplankton and mosquito communities.

Acknowledgments

Special thanks to Dr. Carla Cáceres, Christopher Holmes, Sana Khadri, Lynette Strickland, Cáceres Lab, SROP, grants from the Department of Animal Biology, and (Odum-Kendeigh and Banks Memorial) awarded to CJH.

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