



The Effects of *Nymphaea sp.* Extract on *Daphnia sp.* Movement



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Biology 1406, 2011

ABSTRACT

It has been observed that, in some cases, chemicals released by aquatic macrophytes upon experiencing tissue damage can be harmful to zooplankton inhabiting the area. In particular, water lily is believed to have negative effects on zooplankton. This experiment was designed to test the effects that *Nymphaea sp.* extract has on the movement of *Daphnia sp.* The hypothesis that *Daphnia sp.* would move away from the water lily extract was rejected. No significant net movement away from the plant extract was observed in the water lily trials, and the water lily trials did not differ significantly from the controls.

INTRODUCTION

In a phenomenon known as diel horizontal migration (DHM), zooplankton have been observed to migrate from the pelagic to the littoral zone of a body of water. Factors that have been hypothesized to affect this phenomenon are predator/prey relationships and possible harmful chemicals released by macrophyte tissue damage, particularly water lily (Burks et al., 2002). The objective of this experiment was to observe the effects that water lily (*Nymphaea sp.*) extract has on the movement of *Daphnia sp.* with the hypothesis that *Daphnia sp.* would move away from the extract.

ACKNOWLEDGMENTS

Marty L. Harvill, Ph.D.; Baylor University Biology Department; Nora Schell, Lake Waco Wetlands; Staff of the Baylor University Statistics Lab; Amy Maddox, Ph.D.; Alex James; Dan Daugherty; Baoqing Ding.

MATERIALS & METHODS

- Three *Nymphaea sp.* trials and three controls were performed.
- Collect 30 *Daphnia sp.* for each trial from the Lake Waco Wetlands.
- For the *Nymphaea sp.* trials, weigh out 7.5 g of water lily from the Lake Waco Wetlands for each trial, dice, put in a fine mesh bag (FMB) and crush to create the extract.
- For the controls, place extra mesh inside the FMB.
- Tie off the FMBs and tape one to the center of both ends of a 25 L (58.4X39X15.6 cm) clear plastic container filled with approximately 10 L of water. (Figure 1)
- Place *Daphnia sp.* around the FMB in one end of the container.
- Observe *Daphnia sp.* for 8 minutes. At the end of that time, record the position of each one using a grid paper system.

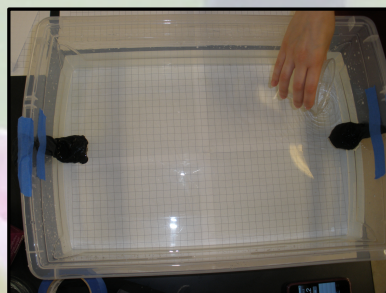


Figure 1- Experimental Setup

RESULTS

Combination of the data from the three trials of *Nymphaea sp.* and combination of the data from the three control trials yielded the following results.

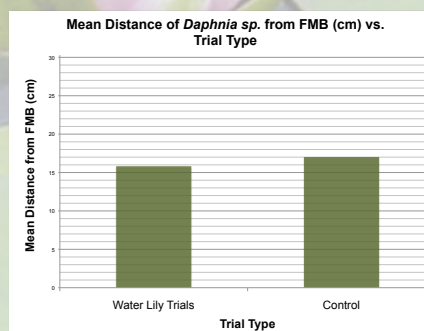


Figure 2

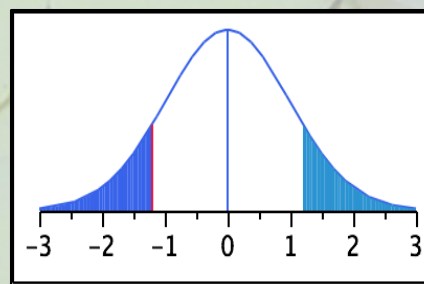


Figure 3

Difference	-1.2006	t Ratio	-1.21794
Std Err Dif	0.9857	DF	177.9806
Upper CL Diff	0.7447	Prob > t	0.2249
Lower CL Diff	-3.1458	Prob > t	0.8876
Confidence	0.95	Prob < t	0.1124

CONCLUSION & DISCUSSION

Contrary to the hypothesis, *Daphnia sp.* showed no overall tendency to avoid the *Nymphaea sp.* extract. The p-value of 0.1124 indicated that the difference between the water lily trials and the controls were statistically insignificant. In light of the discussion of DHM, this might indicate that the chemicals released by water lily upon experiencing tissue damage do not influence the DHM of *Daphnia sp.* Increasing the number of trials in the experiment would help to validate this data and supports its conclusion, and increasing the number of *Daphnia sp.* observed might improve the dependability of the results as well. No distinction was made between different species of water lily or *Daphnia*; therefore, the experiment could be repeated with single species to see if this difference is relevant. *Daphnia sp.* were collected from the Lake Waco Wetlands; use of cultured *Daphnia sp.* might alter the results of the experiment. Most research concerning the effects of chemicals released by macrophytes on DHM of zooplankton has dealt with the long-term consequences (mortality and reproduction rates) of exposure to such chemicals. Because only the short-term movement of *Daphnia sp.* was considered here, the results did not contradict previous findings.

LITERATURE CITED

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