

Size selection in precopulatory pairs of *Hyalella azteca*

Brittany Brewers and Hailee Mills

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Abstract

The amphipod, *Hyalella azteca* (hereafter *H. azteca*), is abundant in Midwestern USA, where it produces many broods in one breeding season. Two different samples of *H. azteca* were collected from Lake Itasca, MN and stored in the lab for at least 24 hrs. Precopulate pairs were then measured and a linear regression was performed. No significant linear correlation was found, showing that they pair with no size selection. Five precopulatory pairs were observed where one female was presented with two males of differing size. The larger male was included in the precopulatory pair only 3 out of 5 times, suggesting little to no male competition.

Introduction

Hyalella azteca (hereafter *H. azteca*), is a fresh water amphipod that feeds on detritus material (Othman et al., 2001). Along with *Gammarus lacustris*, *H. azteca* is the most abundant amphipod found in Midwestern USA. During long breeding seasons *H. azteca* can produce multiple broods and has a short life cycle (Anteau et al., 2011; Othman et al., 2001). Mate guarding is present during these breeding seasons in the form of precopulatory pairs. These pairs are formed by the males grasping the females so that they align longitudinally beneath them. The males will keep hold of the females until the female molts, at which point copulation occurs and the pair separates. Females will carry their eggs until they molt, releasing the active young (Wen, 1993).

Generally the precopulate pairs are homogamous for size; small males pair with small females and larger males pair with larger females. Larger males also may have a competitive

advantage allowing them to pair with larger females more often than smaller males (Wen, 1993). The purpose of this study was to evaluate whether there is a correlation present between male and female size in precopulate pairs, as well as determine if females, when presented with two males of differing sizes, more often pair with the larger male.

Methods

We collected one sample of *H. azteca* from Lake Itasca, MN using medium sized hand nets. The samples sat in a clear plastic bin for 48 hrs, covered to block light, and 20 precopulate pairs were removed from the sample. All pairs were separated, measured individually and recorded. We then computed a regression to find any significant linear correlation in regards to the size of paired *H. azteca*.

Another sample was collected and sat for 24 hrs under the same conditions. Then 20 new precopulate pairs were collected and separated into male and female containers. One larger male and one smaller male were chosen, relative to the female's size, and placed into containers. This gave us 10 sets of two males and one female to observe. These 10 pairs acclimated for over 24 hrs before observations. We observed each container for pairing; only finding 5 paired containers. Due to small sample size, no statistical analysis could be performed.

Results

There was no statistical significance between the male and female size after they paired together ($F_{1,25}=0.892$, $P=0.35$; Fig. 1).

The female *H. azteca* that were placed with two different sized males paired with the larger male 3 out of the 5 times and with the smaller sized male 2 out of 5 times.

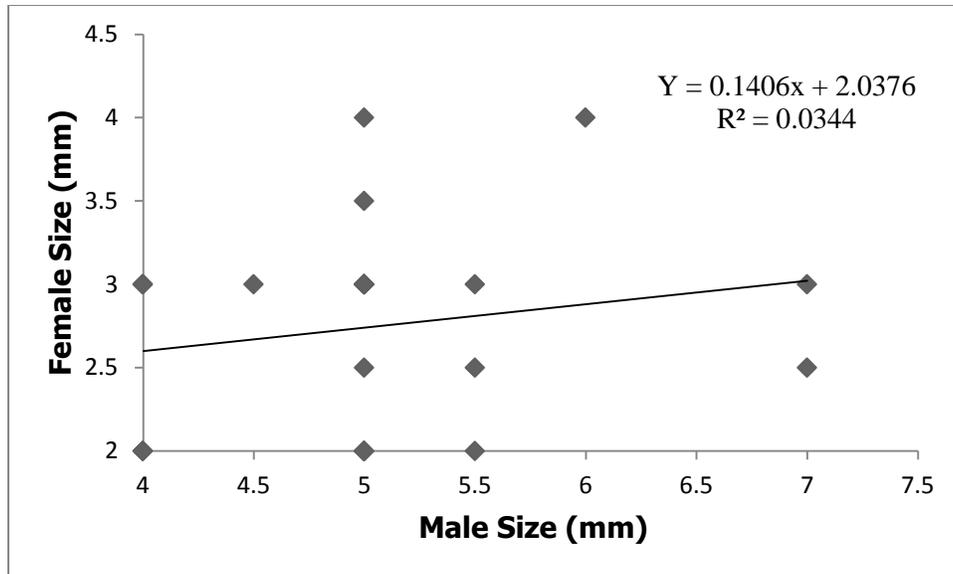


Figure 1. Size comparison of paired *Hyalella azteca*.

Discussion

These data provided no significant evidence supporting our hypotheses. We found that there was no correlation between the male size and the female size. There may be several reasons for the lack of correlation. One may be that *H. azteca* are found in very dense algal growth making maneuverability fairly difficult leading to more random mating than size selective mating. It may also be due to male competition, in which the female would not be in control of the size selection. If this were the case larger males would be more likely to mate with available females of any size. One more factor to consider is the ratio of sexually mature males to available females. With a higher proportion of males, only larger males may mate with available females, and with a higher proportion of females, only larger females may be selected for precopulate pairs.

A similar study recorded the lengths of male and female *H. azteca* in precopulate pairs, but also found no significant linear correlation (Othman et al., 2001). Another study also paired two males of differing size with one female (Wen, 1993). They found that 18 out of 22

precopulatory pairs were formed with the larger male. However, when they presented one female with three or more males, no size dependent guarding pattern was observed.

This experiment could be expanded in the future by having a much larger sample size, allowing for more accurate analysis of the data. Precopulatory pairing could also be tested by placing two or more females of differing sizes with one male to evaluate the outcomes. The effects of male versus female abundance could also be tested to assess the outcome when mate choices of either sex are scarce.

References

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