

The Battle of the Sperm: Observations of Sperm Competition in a *Wolbachia* Infected Species

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Introduction

Wolbachia are maternally inherited, intracellular bacteria and are well distributed among arthropod hosts (7). In order to improve its transmission, *Wolbachia* are capable of manipulating its host's reproduction. They have been known to induce the development of parthenogenetic induction, cytoplasmic incompatibility, feminization of genetic males, and engenders male killing (4,6). *Wolbachia* within *Drosophila recens* are responsible for causing cytoplasmic incompatibility (CI). CI occurs when the embryonic development is inhibited within crosses between an infected male and uninfected female (6). It has also been determined that within specific lines of infected *Drosophila* males, *Wolbachia* decrease sperm production (5). Additionally, *Wolbachia* reduces viral load in its insect host, preventing transmission of human pathogens and raising the possibility of its use as a biocontrol agent.

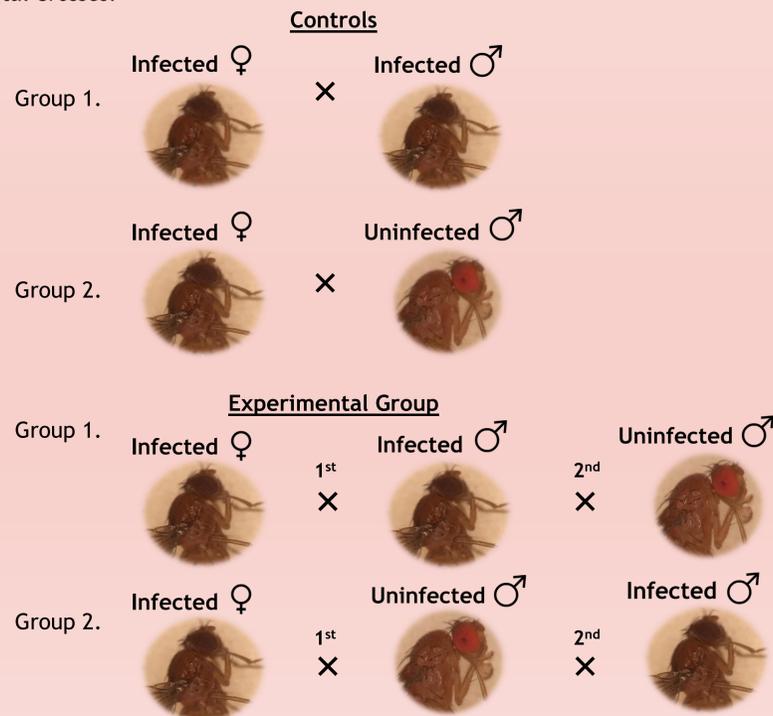
Within many insect populations, a female who has mated for a second time usually utilizes the second male's sperm to produce most of her offspring (1). The main objective of this research was to determine whether such second male precedence is affected by *Wolbachia* infection. Being able to obtain more knowledge of how this bacterium affects sperm competition will allow for a better understanding of *Wolbachia* frequency dynamics and its use as a form of biocontrol.

Materials and Methods

Experimental Cultures:

- The *Drosophila recens* lines were obtained from the Dyer Lab at the University of Georgia, Athens. Both uninfected and infected, with *Wolbachia*, lines were maintained 20°C with a light-dark cycle. The PCR technique was utilized to determine the infection status of the flies collected.
- The *Drosophila recens* with a recessive dark eye mutant was infected with the *Wolbachia* bacterium and a wild type line which remained uninfected was utilized.
- Offspring were collected and sorted based off of their eye color, indicating its paternal parent.

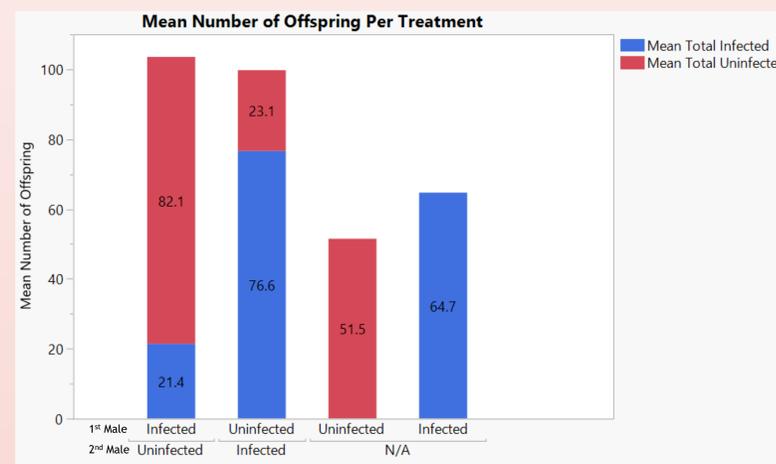
Experimental Crosses:



Questions?

- Does the presence of *Wolbachia* affect the amount of offspring produced by...
 - Single Mating?
 - Double Mating?
- Does the presence of *Wolbachia* affect second male precedence?

Results

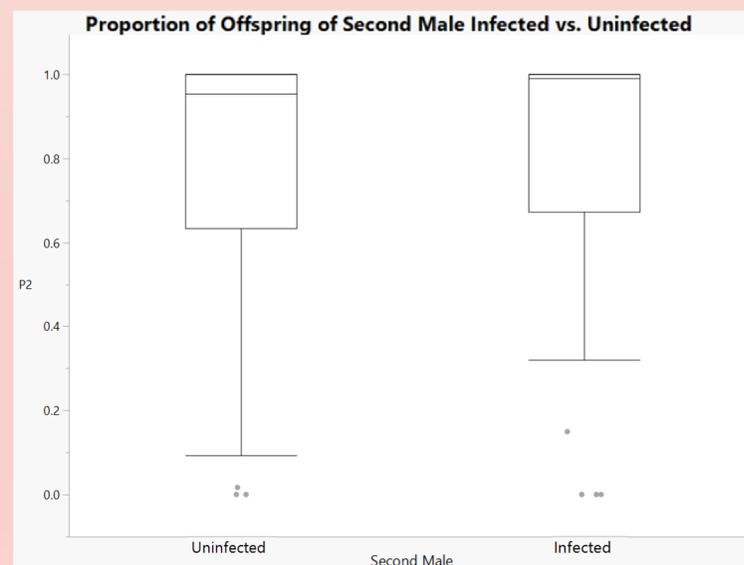


T-Test Values for Single Mating:

- t= 1.47
- DF= 66
- P= 0.15

T-Test Values for Double Mating:

- t= -0.39
- DF= 64
- P= 0.69



T-Test Values for P2 Compared to Infection Status:

- t= 0.54
- DF= 64
- P= 0.96

Conclusions and Future Direction

- Conclusion: There are no advantages or disadvantages of *Wolbachia* infection for male fertility or sperm competition.
 - Single Mating: number of offspring sired by the infected male was similar to the number of offspring sired by the uninfected male.
 - Double Mating: number of offspring sired by the infected male was similar to the number of offspring sired by the uninfected male.
 - Number of offspring produced by the single mating treatment was less than the amount of offspring produced by the double mating treatment.
 - The proportion of offspring sired by the second male was similar for both infected and uninfected males.
- Future Directions:
 - Create a similar experimental design to test whether the infected male's phenotype would have an effect.
 - Ex: Infected Wild Type vs. Uninfected Recessive Dark

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