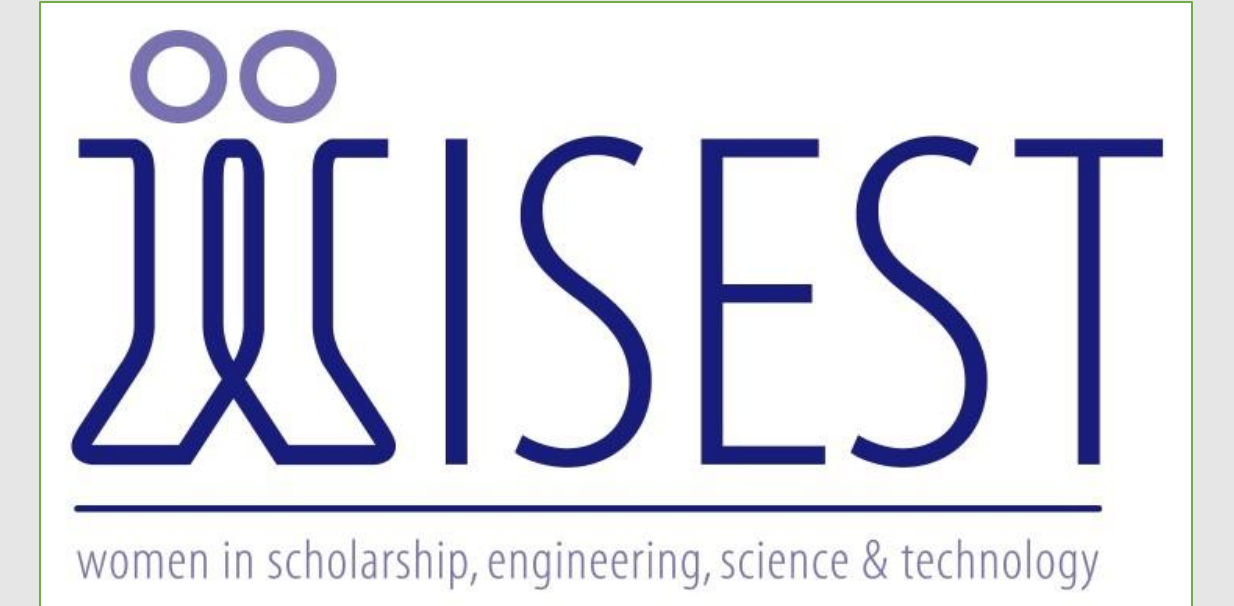


Why "Mite" Parasites Be A Problem?: Functional And Physical Effects Of Proximity To Parasites on Fruit Flies

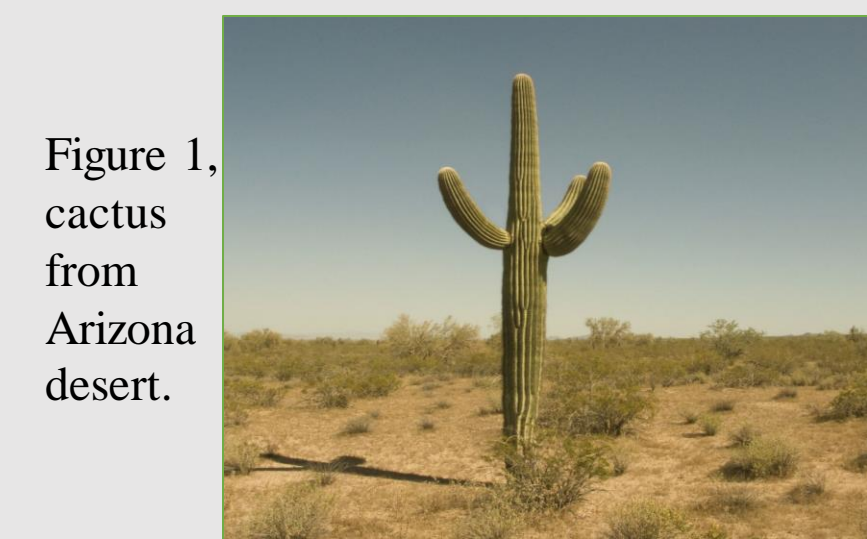


Introduction

Host and Parasite background

- *Drosophila nigrospiracula* (Fruit Fly) was collected from the Arizona desert.

- *D. nigrospiracula* prefers to eat necrotic cactus (figure 1).



- A facultative ectoparasite (figure 2 for example) *Macrocheles subdadius* (mite) can take fruit flies as a host went cactus is not obtainable.

Facultative meaning the mite can survive without a host.

Figure 2, example of ectoparasite



Ecology of Fear

- Ecology of fear is the concept that fear of parasites or predators impacts an organism's ecology.
- Will fruit flies fear of parasites effect fecundity and thorax length?
- There is an abundance of research on the ecology of fear in predator/prey relationships
- More research needs to be done on the ecology of fear in parasite/host relationships

Methods

- Experimental and control vials consisted of 1 female and 2 male fruit flies.

- Experimental fruit flies had been exposed to mites as larvae.

- Control fruit flies were isolated from mites.

- Offspring of the control and experimental vials were collected every 3 days. Flies were aspirated into eppendorfs and placed into a freezer.

- Female offspring was organized by date of emergence, collection date, and experiment vs control (figure 3).

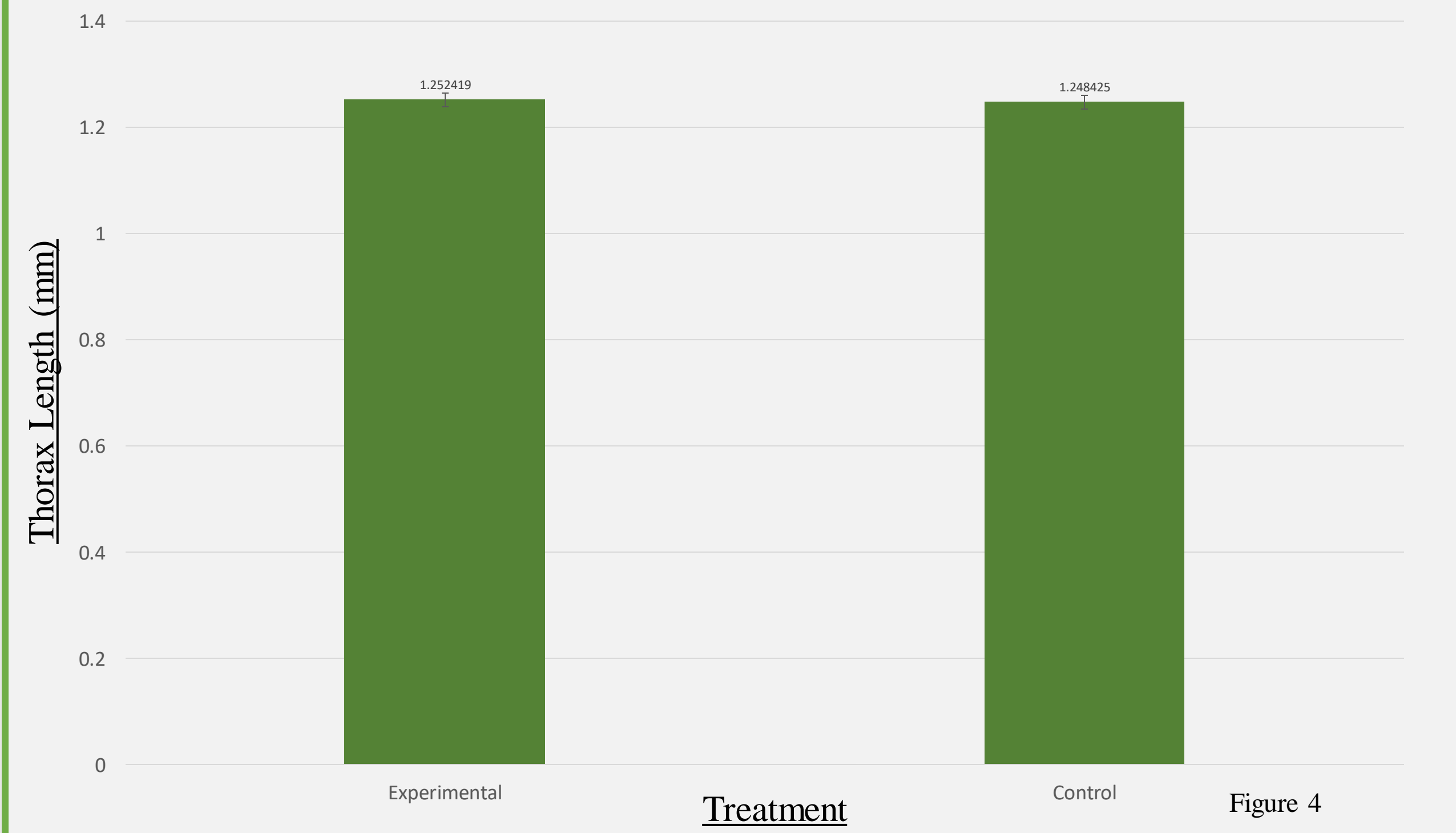
Figure 3, female fly image taken under microscope



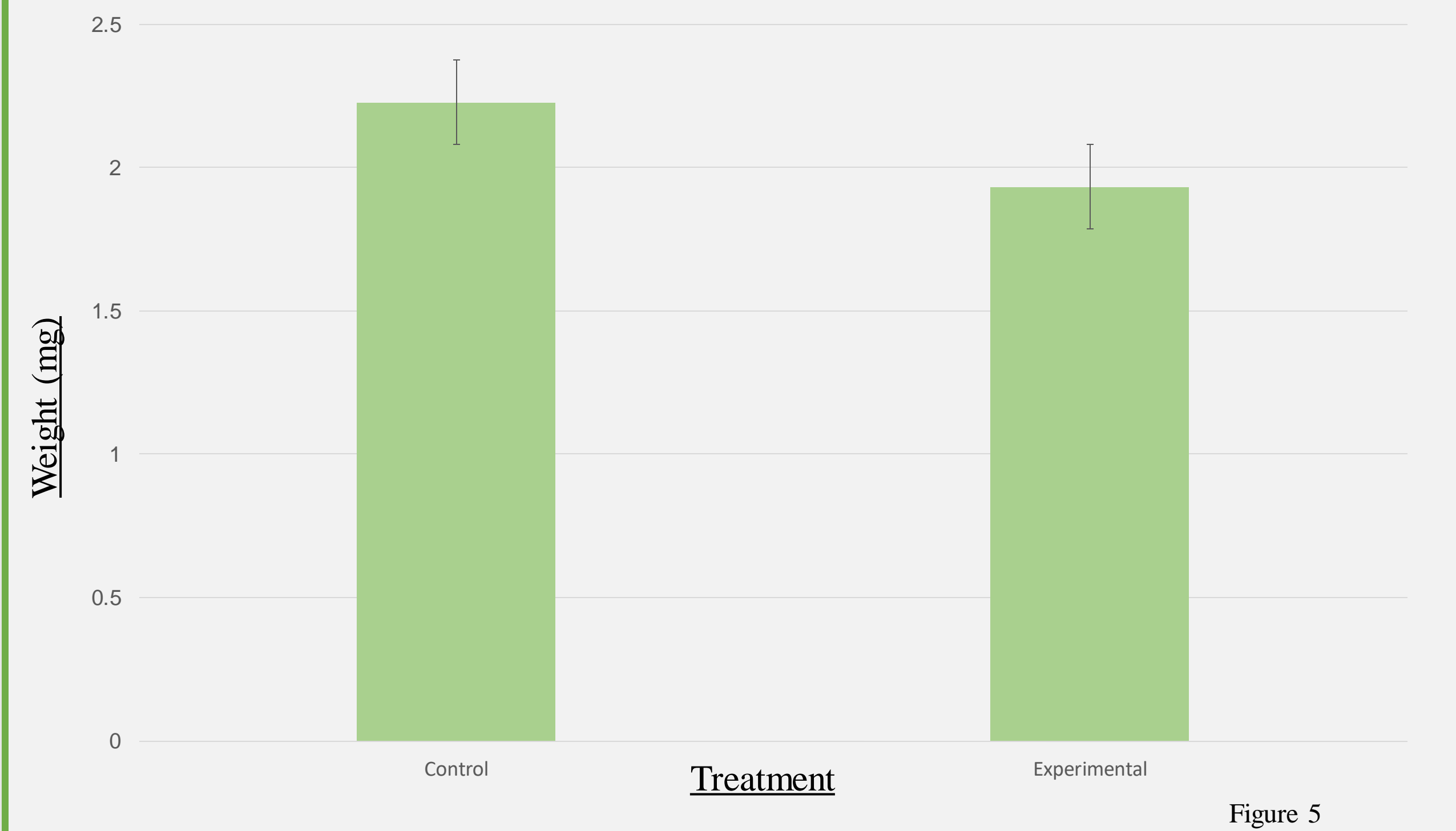
- Photos were captured of offspring on a microscope using LAZ EZ software, flies were placed on their side.
- The thorax of females was measured using ImageJ. Measurement was taken from the distal tip of the scutellum to the rear scutum.
- Male flies were weighed.

Results

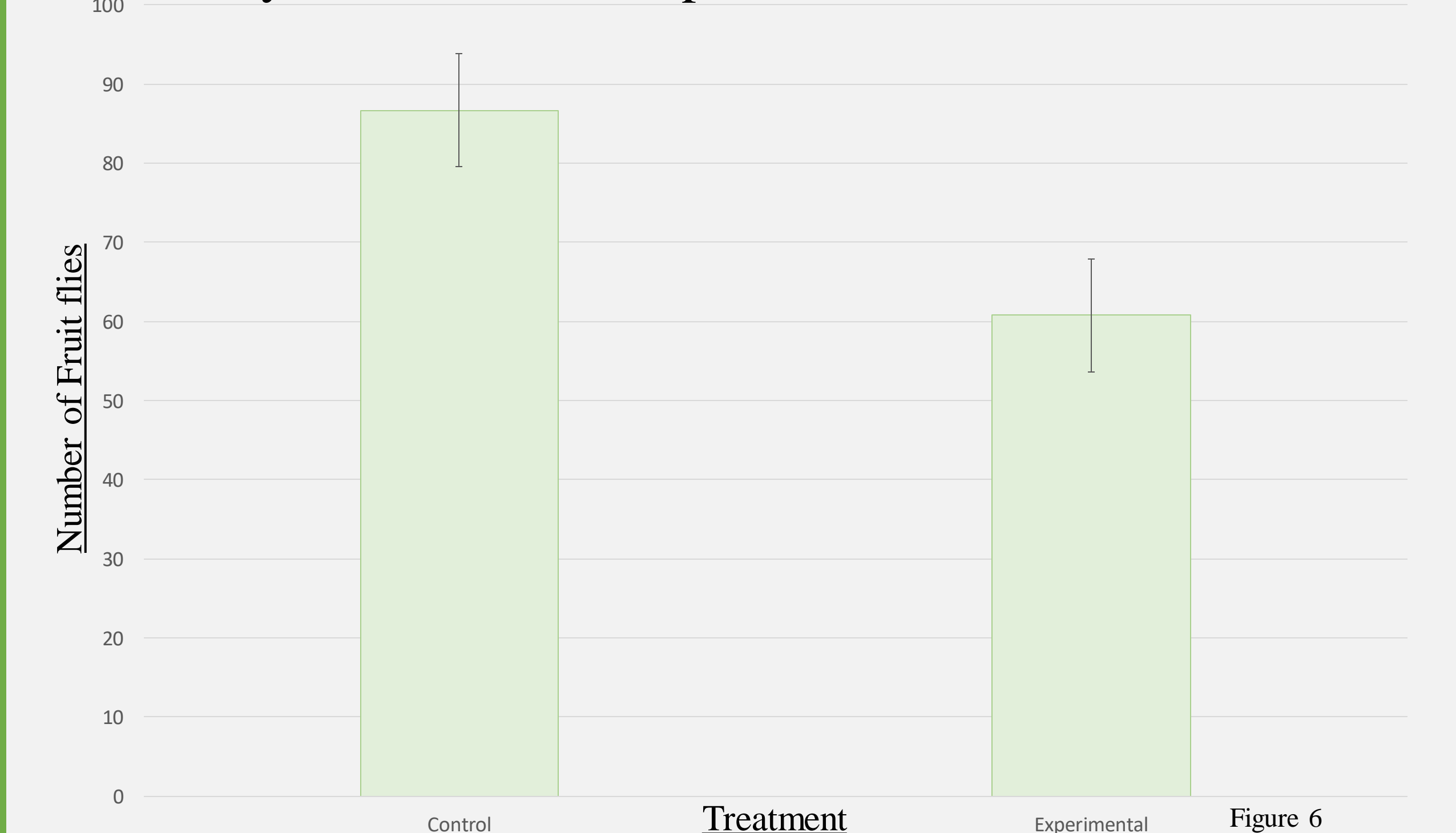
Thorax Measurement Dependent on Mothers Treatment



Weight Of Male Fruit Flies Dependent On Mothers Treatment



Fertility Of Fruit Flies Dependent On Mothers Treatment



Conclusions

Thorax Measurement

- Exposure to parasites on mother flies does not play a significant role in female offspring's thorax length (figure 4).
- Thorax size is instead based on which fly emerges first. Flies that emerge first have greater abundance of food than flies that emerge last, in turn making the well-fed flies bigger.

Weight

- Exposure to parasites on mother flies affects the weight of male offspring (figure 5).
- Flies weigh less on average when exposed to parasites. This is because fruit flies will spend more time preventing parasitism (grooming) than eating.

Fecundity/Fertility

- Fear of parasites plays a significant role in fruit flies' reproductive success (figure 6).
- Fruit flies use behaviors that prevent being parasitized, such as grooming (figure 7)
- Energy spent grooming takes away energy the fly would normally use to reproduce.
- There is a trade-off in whether flies should exert energy into anti-parasite behavior or reproductive success.



Figure 7, Cell.com current biology Zhang et al. Graphic of *D. nigrospiracula* grooming.

The Big Picture

- By exposing parasites to fruit flies without parasitism taking place we can measure the effect fear has on fruit flies.
- Fruit flies use methods to prevent parasitism, this takes up energy. The energy consumption takes away energy that would normally be used for reproduction.
- Fear causes fruit flies to make trade-offs. energy to prevent parasitism or energy for eating
- Offspring were not exposed to parasites, only the mothers were.

Citations

-Figure 7, Zhang, Neil, et al. "Spatial Comparisons of Mechanosensory Information Govern the Grooming Sequence in *Drosophila*." *Current Biology*, CellPress, 23 Mar. 2020, <https://www.cell.com/current-biology/pdf/S0960-9822%2820%2930089-0.pdf>.

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