Melanin and Behavior: Exploring Aggresiveness in Drosophila

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Introduction

- Pleiotropy is defined to be when one gene affects multiple traits. This phenomenon can impose limitations on adaptive evolution and can affect the ability to predict an organism's modification to an environment. This can be seen in many organisms, including *Drosophila simulans*.
- An example of pleiotropy is the relationship between body coloration and behavior, specifically aggression (1).This correlation possibly is due to the concept that dopamine is a precursor to melanin production. Dopamine is depleted when there are high levels of melanin which could potentially produce aggressive behaviors in *D. simulans* (2).
- The approach to examining the correlation between body coloration and aggression involved using the model organism *D. simulans*. The known genetic pathways for aggressive behavior make this an ideal model system to investigate pleiotropic effects of color and aggression (3).

Hypothesis:

- We hypothesized that pleiotropy causes a connection between body coloration and aggression. Furthermore, we predicted that artificially selecting for increased aggressive behaviors leads to darker pigmentations in *D. simulans*

Methods

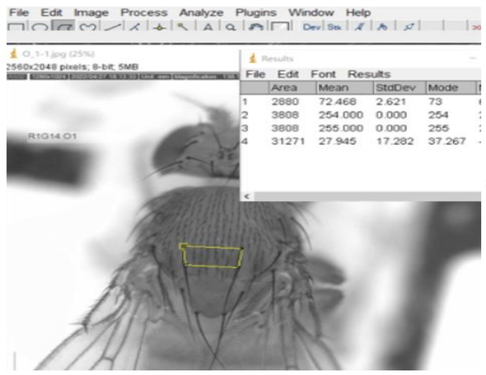
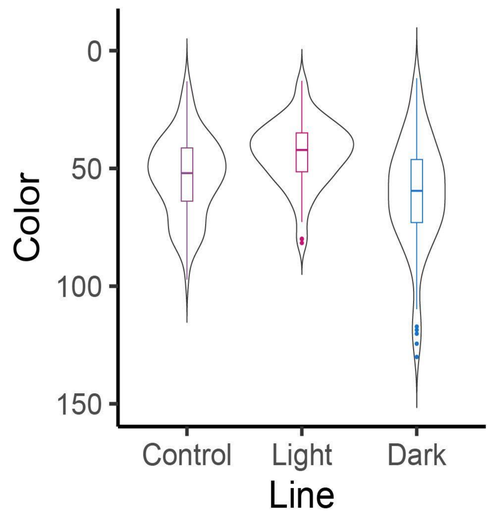


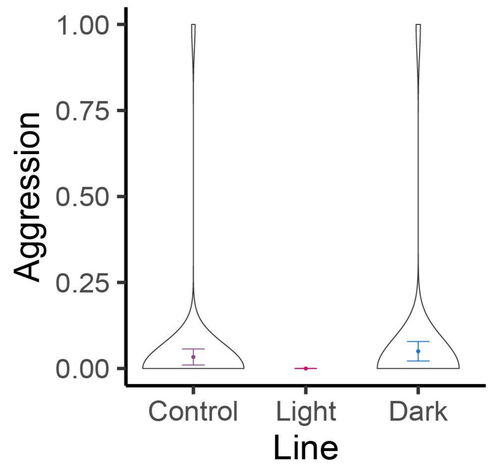
Figure 1: ImageJ software was used to calculate the average grey scale values by measuring the dorsal thorax of the fly.

- We selected for darker and lighter curticle color for 10 generations in *D. simulans.* As well as randomly selected control flies.
- After 10 generations, we tested for aggressive behavior using a scan sampling approach where every 5 minutes for 1 hour we checked for aggressive behaviors.
- Each individual fly was then photographed and we used the ImageJ software to measure their color (Figure 1). Using ImageJ, we would convert the image into 8-bit, and compare the mean black and white values to the average grey scale value. We would measure the color of the thorax to get the average grey scale value.

Results



Using a beta regression, we found that each line was signficantly different from each other.



Using a hurdle model, we found that there were no significant differencces in aggression between the three lines.

Conclusion & Future Directions

- We determined that there is no significant difference between body correlation and aggression.
- This does not confirm our hypothesis that artificially selecting for increased aggression leads to darker pigmented flies.
- This does not suggest a pleiotropic relationship between aggressiveness and darker colorations.
- To further substantiate this relationship, future studies will also select for color (darker, lighter, and a randomized control) and then test for aggressive behavior.
- Future work will also analyze the other behaviors including activity to see if there are differences in other behaviors.

References

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