



Sensory Cues and Receptors Driving Social Behavior in *Drosophila* larvae

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Introduction

Social behavior can be observed in *Drosophila* larvae in the form of clustering or aggregation on food (Slepian *et al.* 2015). Previous work in our lab showed that aggregate formation in *Drosophila melanogaster* larvae varies depending on their genetic background (Figure 1). "High" lines are defined as populations that exhibit >50% aggregation, whereas Low lines did not aggregate.

Hypothesis: During aggregation, larvae must be able to both produce and perceive chemosensory stimuli, such as pheromones.

In this study, we seek to find out whether the perception or production of chemosensory stimuli regulates attraction or repulsion of High and Low aggregating *Drosophila melanogaster* larvae. To test this, we conducted a social food experiment (Durisko and Dukas 2013) as well as an experiment extracting pheromones from *Drosophila* larvae (Mast *et al.* 2014).

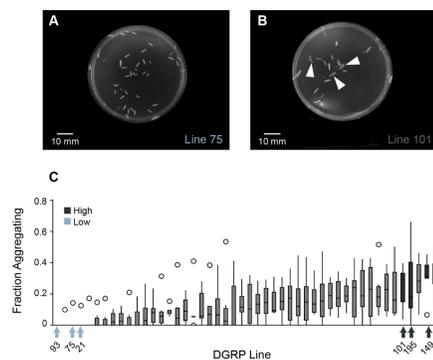


Figure 1. Variation in aggregation phenotypes between natural populations of *Drosophila* larvae

Social Food Assays

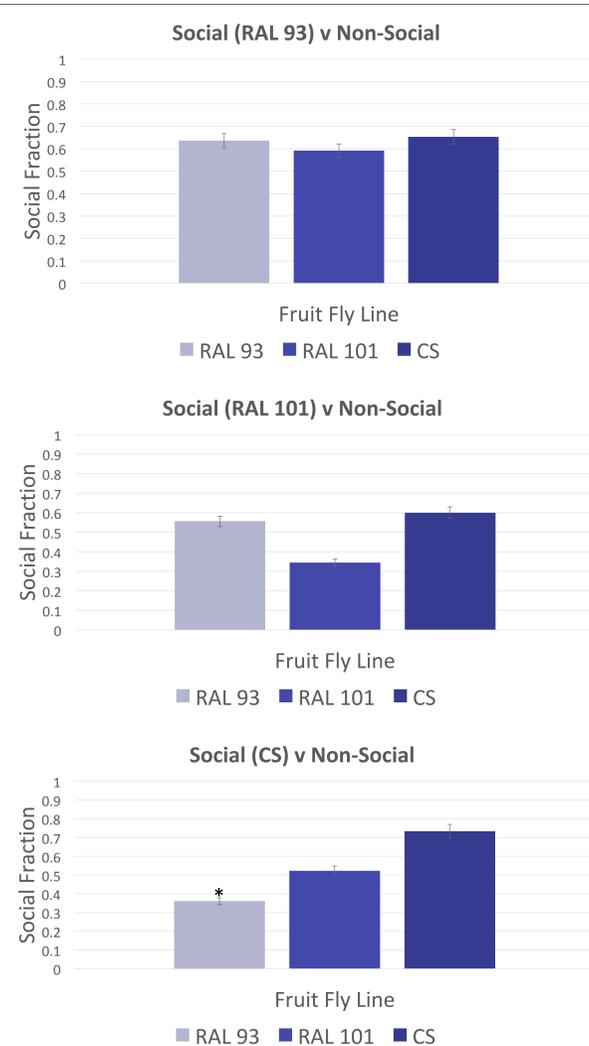


Figure 4. Genetic background effect on aggregation via response to social food cues. Chi-Square test: n = 30 larvae per social food assay (*p = 0.0054)

Pheromone Assays

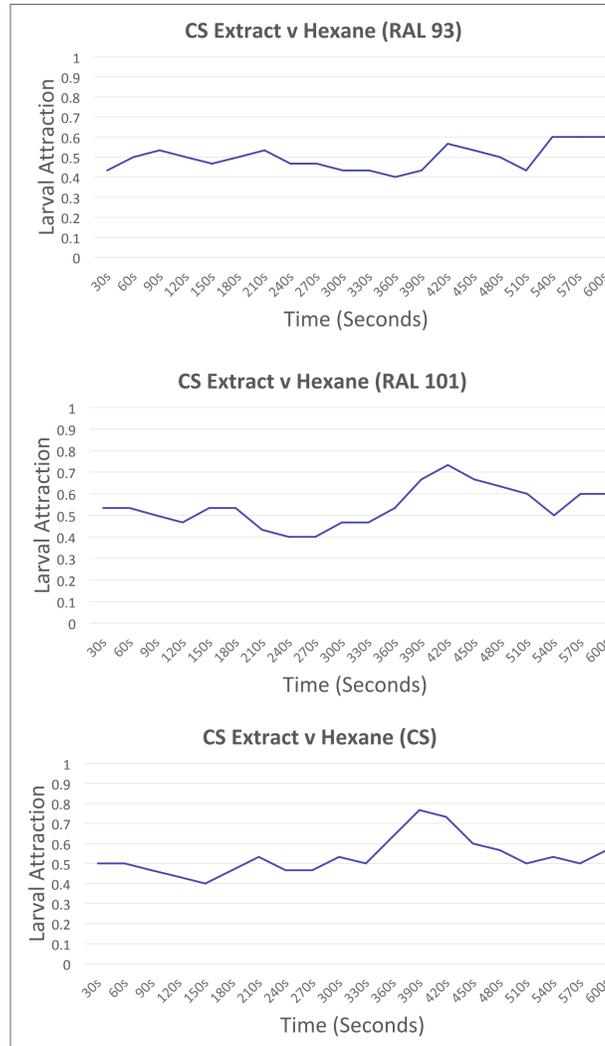


Figure 5. Genetic background effect on aggregation via response to pheromone extracts. 1-tailed t-test: n = 30 larvae per pheromone extract assay, no significant p-values

Future Work

Additional work could include, conducting different variations of the pheromone assay. In order to further test larval attraction, we would extract and test pheromones from both the Low line RAL 93 and the High line RAL 101.

Also, we could interrogate whether the *CG14205* gene plays a role in mediating the perception and/or production of chemosensory stimuli in *Drosophila melanogaster* larvae. Our lab identified *CG14205* whose expression is associated with the level of aggregate formation (Figure 4). More precisely, this gene is expressed at higher levels in "Low" lines than in "High" lines.

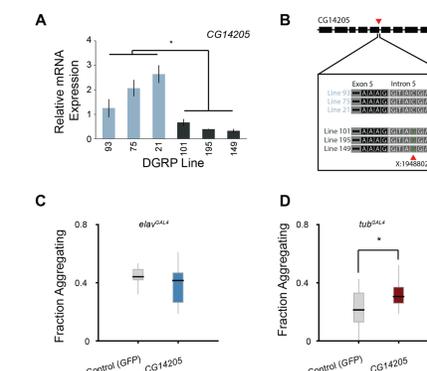


Figure 6. *CG14205* plays an important role in regulating naturally-occurring levels of aggregation in *Drosophila* larvae.

Materials and Methods

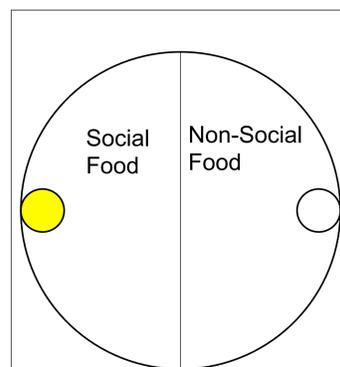


Figure 2. We placed the food discs on opposite sides of 100 mm Petri dishes and positioned a single larva in the middle, and equal distance away from both social and non-social food.

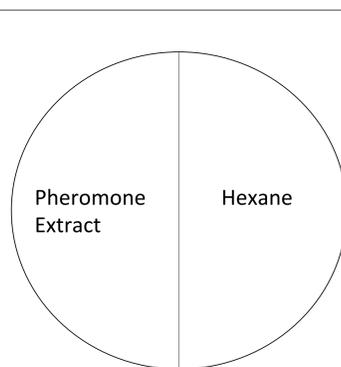


Figure 3. We extracted pheromones from larvae and coated half of the 100 mm Petri dish with the pheromone extract and the other half with hexane. Then we placed a single larva in the center of each prepared assay plate.

Acknowledgments

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Discussion

We found that results from the social food assay varied depending on which line of larvae fed on the on the social food. When we used the Low line RAL 93 to create the social food the results show that larval attraction to social food was relatively similar. Although, when the CS larvae fed on the social food RAL 93 had a significantly low attraction with a p-value of 0.0054 when compared to CS larvae.

After analyzing the results from the pheromone extract assay, we found that both the High line RAL 101 and CS had a peak in larval attraction to the pheromone extract towards the second half of the 10 minute experiment. However, it is important to note that the Low line RAL 93 did not have that same peak in larval attraction that we saw with the other two lines.