

Investigation of Neurotransmitter's Knockdown Effect on *Drosophila Melanogaster* Female Aggression

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Introduction

- *Drosophila melanogaster* (*D. melanogaster*) is a popular model organism in neurobiology.
- Neurotransmitters influencing aggressive behaviour in female *D. melanogaster* are poorly understood.
- Various neurotransmitters such as dopamine, octopamine (OA) and serotonin influence aggression in *D. melanogaster* (2). Further investigation of the role of neurotransmitters on aggression is thus important.
- The purpose of our experiment is to observe the effect of the knockdown of dopamine, octopamine and glutamate on aggression in female *D. melanogaster*

We hypothesized that knockdown of the following neurotransmitters: dopamine, glutamate, and octopamine will cause a change in *D. melanogaster* female aggression.

Methods

- Grow fly lines
- Collect male and female virgins from each line
- Cross 40F04 virgin males with female lines with neurotransmitter knockdown
- Collect crossed virgin females
- Behavioural assay of virgin females and wild-type males
- Analyze assay

Results

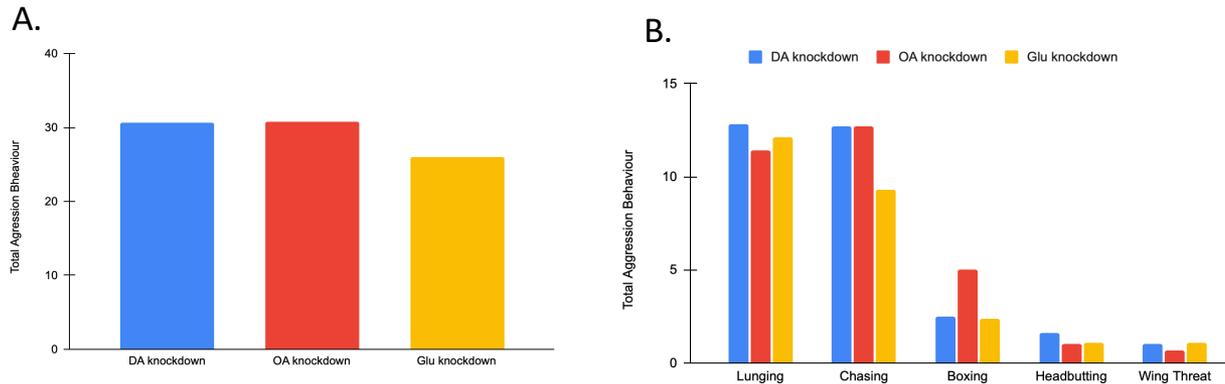


Figure 1. RNAi knockdown of dopamine, octopamine and glutamate precursors in female *D. melanogaster*

A) The knockdown of dopamine (DA), octopamine (OA), and glutamate (GA) precursors had a similar effect on aggression. B) Knockdown of all three neurotransmitters presented mostly as lunging and chasing.

Discussion

- The monoamine neurotransmitters dopamine and octopamine have been shown to be involved in aggressive behaviour in *Drosophila* (1).
- The neurotransmitter glutamate has separate and complementary actions with OA on aggression (2).
- All three knockout lines had a similar effect on aggression in female *D. melanogaster* with similar distributions of aggressive behaviour
- Further research is required to investigate the effects of overexpression and knockdown of other neurotransmitters on aggression

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References:

- 1: Zwarts, L., Versteven, M., & Callaerts, P. Genetics and Neurobiology of Aggression in *Drosophila*. *Fly* 6, 35–48 (2012).
- 2: Sherer, L., Garrett, E., Morgan, H. et al. Octopamine Neuron Dependent Aggression Requires dVGLUT from Dual-transmitting Neurons. *PLoS genetics* 16, (2020).