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Donovan Lucibello
dlucibello@carroll.edu

Tess Eaton
Carroll College, teaton@carroll.edu

Audrey Walker
Carroll College, amwalker@carroll.edu

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Effect of UVB Light Exposure on *Drosophila melanogaster* fruitless Gene and Reproductive Capability

**Tess Eaton, Audrey Walker, and Donovan Lucibello**
Department of Biology, Carroll College

**Introduction**

- UVB light is a known cause of DNA damage in many different organisms. In this experiment, we tested the effects of UVB exposure on *Drosophila melanogaster* (*D. melanogaster*) larvae, and its effects on adult male reproductive capabilities and *fruitless* gene expression.
- *fruitless* is a gene expressed in the dorsal-posterior protocerebral region of the brain in male *D. melanogaster* that allows them to court females and arch their abdomen to be able to properly copulate. When this gene is defective, males will attempt to court other males or not be able to successfully copulate at all with a female.
- To test our hypothesis we ran both a behavioral assay to count the number of larvae produced by our experimental group (larvae exposed to UVB light for ten minutes, every 12 hours, for three days), and the number of larvae produced by our control group.
- A RT-qPCR was then run to analyze expression of the *fruitless* gene in both the experimental and control *D. melanogaster*.
- We predicted that the experimental group would produce less larvae, and would have a decrease in *fruitless* gene expression compared to the control group.

**Methods**

- **Primer synthesis:** Primers for *fruitless* were designed using IDT OligoAnalyzer software.
- **Culturing:** *D. melanogaster* were cultured using 10mL of potato flakes soaked in 10mL of DI water. 10 yeast granules were added for adult flies.
- **Behavior/ RNA Assay:** All flies had the same amount of potato flakes, DI water, and yeast. Experimental groups were exposed to UVB light for 10mins twice a day, for three days. Larval counts and RNA extractions were performed after flies had time to mature and reproduce (approximately 2 weeks).
- **RNA extraction:** RNA was extracted using Trizol and purified using Qiagen’s RNeasy Mini Kit.
- **Reverse transcription:** cDNA was synthesized using RevertAid.
- **RT-qPCR** was performed using PowerUp SyBr Master Mix and primers targeting *fruitless* and GAPDH.

**Results**

![Graph of average fold change in fruitless expression between control and UVB-exposed groups](https://example.com/graph.png)

**Figure 1:** Larvae Counts For Control and UVB-exposed *Drosophila*. Graph of mean larvae counts in control and UVB-exposed behavioral groups. Overlap in error bars indicates that the data is not significant (p-value of 0.141).

**Conclusion**

- There was no change in *fruitless* gene expression in UVB-exposed *D. melanogaster* compared to control *D. melanogaster*.
- UVB-exposed *D. melanogaster* did not show a difference in reproductive capabilities compared to control *D. melanogaster*.
- There was a critical error in cycle 10 of round 2 of RT-qPCR which impacted our results.
- The critical error caused it to appear that there was a great increase in the expression of *fruitless* in the UVB-exposed *D. melanogaster*; however, analysis showed that this increase in expression was not consistent with the data found in the first round of RT-qPCR.
- We fail to reject the null hypothesis for both the expression of *fruitless*, and reproductive capabilities.

**References**


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