CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
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Project Number
31137

Project Title
Drosophila Eye Color in Response to Different Light Levels

Abstract

Objectives/Goals
Eye color in drosophila melanogaster is a classic example of sex-linked inheritance. My experiment is designed to show if there is any difference in expected inheritance patterns based on exposure to different levels of light. I hypothesized that the eye color of the drosophila would not change in different exposures to light.

Methods/Materials
A culture of wild type red eyed flies was crossed with white eyed flies to produce the F1 generation. These flies were separated into three different cultures and then exposed to three different light conditions. These light exposures consisted of complete darkness, twelve hours of light and twelve hours of darkness, or complete light. We followed two generations to see if there was any statistical differences in eye color inheritance compared with expected sex linked patterns.

Results
The chi-square statistical test was employed to see if there was a significant difference in the three cultures of different light exposure from the expected eye color inheritance. The flies in the F2 generation followed the expected genetic pattern regardless of the differing light levels. However, in the F3 generation, rather than the expected 3:2 ratio of red to white eyes, the 100% dark culture was a 9:1 ratio. This was significant to the 0.00001% level. The 50/50 light culture demonstrated a ratio of 7:3, which was also statistically significant.

Conclusions/Discussion
Exposure to increasing levels of darkness led to a predominance of wild type red eyed flies. These results are highly statistically significant. This is contrary to my hypothesis and suggests that environmental factors can rapidly influence the phenotypes of drosophila eye color. This raises the question of why there is an adaptive advantage to having red eyes in darker conditions. Future research could focus on several issues. First, further generations of flies (F4 and F5) could be bred and counted. The experiment could also be replicated with different eye colors or with different drosophila traits such as wing and body types to see if these phenotypes have any selective advantage in differing light conditions.

Summary Statement
My project determined that different light exposures influenced the eye color of subsequent generations of drosophila melanogaster.

Help Received
My mother helped with the final editing and revisions of my reports and board. My father purchased the flies and supplies needed for the experiment.