Stephanie Cabrera March 25, 2019
Lab #4: Genetic Crosses

Abstract:

The purpose of this experiment was to analyze and understand the inheritance patterns through monohybrid and dihybrid crosses using *Dysphoria melanogaster* flies. This experiment was accomplished in an elapsed time of 4 weeks. The purpose of this experiment was to determine which traits were dominant, recessive, autosomal and sex linked in both wild-type and mutant phenotypes of flies. Based on the results and observations made mutant sepia and white eyes are both sex linked. This experiment demonstrated a full understanding on the inheritance of patterns by constructing both a F1 and F2 generation using Mendel's theory on crosses.

Introduction:

Dysphoria melanogaster (fruit flies) are usually used in genetics to study their inheritance as well as understand the process of crossing over in monohybrids and dihybrids (Blair, C., 2018). Being able to distinguish these flies is an important factor. Male flies are known for their darker posterior region than female flies. Female flies tend to have strips in the abdomen/ pupa which distinguish them from male. The fruit flies in this experiment included both wild type and mutant phenotypes such as; white eye, sepia. In this experiment we analyzed the Gregor Mendel experiment which demonstrated the use of punnett square in order to understand monohybrids and dihybrid crosses.

Methods:

In the first week of the experiment the purpose was to become familiar with flies by determining their sex, eye color and wing shape. This was accomplished by anesthetizing them with fly nap and using a magnifying glass. The second week of this experiment the culture vials were set up, this was done by adding one cup of the Instant *Dysphoria melanogaster* and 15 mL of water to the vial. Once the solution solidifies add 4-7 grains of yeast to the culture. After that 6 male/female pairs of flies were placed culture vial this was labeled as the F1 cross. This was left for one week for the flies to mate/ cross over. The third week all the F1 flies were removed from the crossing vials only leaving behind the larvae by anesthetizing the F1 flies with fly nap and then crossing them over into an empty vial and placing them into the alcohol vial. The larvae were also observed however, without much interruption they were left in the culture vial for the following week. By the fourth week, the larvae matured and presented the F2 generation. The F2 flies were also anesthetized and then removed for observation purposes. The observations were then recorded as to what phenotype the F2 presented.

Results:

Parent Generation Individual Total

Sepia (Female Parent) x Wildtype (Male Parent)

Phenotype (and sex)	**Total**
Sepia (F)	3
Wildtype (F)	13
Sepia (M)	10
Wildtype (M)	15

Total: 41

Class Total:
Sepia (F) x Wildtype (M)

Phenotype (sex)	**Total**
Sepia (M/F)	26
Wildtype	43

Total: **69**

White Eyes vs Wildtype

Class total: White eye vs. Wildtype

Phenotype (and sex)	**Total**
White eye (F)	23
Wildtype (F)	31
White eye (M)	28
Wildtype (M)	31

Class Total: White eye x Wildtype

Phenotype (sex)	**Total**
White eyes (M/F)	51
Wildtype	62

Total: **113**

Crosses:

Sepia vs. Wildtype:

$\mathbf{X^s\ Y}$ x $\mathbf{X^s\ X^{wt}}$

	$\mathbf{X^s}$	$\mathbf{X^{wt}}$
$\mathbf{X^s}$	X^s X^s	$X^s\ X^{wt}$
Y	$X^s\ Y$	$X^{wt}\ Y$

3:1 Ratio

White eye vs. Wildtype

$\mathbf{X^{wt}X^w}$ x $\mathbf{X^{wt}\ Y}$

	$\mathbf{X^{wt}}$	**Y**
$\mathbf{X^{wt}}$	$X^{wt}\ X^{wt}$	$X^{wt}\ Y$
$\mathbf{X^w}$	$X^{wt}\ X^w$	$X^w\ Y$

1:1 Ratio

Discussion/ Conclusion:

Based on the results obtained from this experiment one can concluded that sepia and wild type F2 generations are sex-linked. Based on the punnett square performed as a class the ratio between sepia and wildtype is a 3:1 thus, this is sex linked. The white eye vs wildtype ratio presents to be 1:1 these calculations can be misleading perhaps due to misinterpretation of the data presented. In order to have white eyes both X chromosomes have to carry the allele. Based on our observations as a class white eye and sepia are both sex linked alleles thus one can conclude that those who present with these mutants must carry this gene in their X chromosome.

References:

Blair, Christopher, (2018). Bio 2450L Genetics Laboratory Manual., pg. 34-69