



StarGenetics

Fruit Fly Exercise 3

Description of StarGenetics

In this exercise you will use StarGenetics, a software tool that simulates mating experiments, to analyze the nature and mode of inheritance of specific genetic traits.

Getting started with StarGenetics

- To get to StarGenetics, please navigate to: <http://web.mit.edu/star/genetics/>.
- Click on the **Start** button to launch the application.
- Click **Trust** when a prompt appears asking if you trust the certificate.
- Click on **File -> New** on the main menu.
- Click on the **Fruit Fly Exercise 3** file.

You are just about to throw away a nearly rotten banana that your roommate abandoned on your kitchen counter when you notice a peculiar pair of fruit flies sitting there on it. You catch the flies and take them into the genetics lab to get a better look at them. Under the microscope, you see that one of these flies is male and the other is female. Both flies turn out to have a very unusual phenotype: blue eyes and white body color. You put these flies into a vial containing fly food and yeast. Several days later, you return to find a vial full of blue-eyed, white-bodied flies! The two flies that you caught have mated and it turns out that they are true breeding for the alleles that determine blue eyes and white body color! You have just learned about gene linkage in your genetics course, and you can't help but wonder if the genes that determine these traits may be linked on the same chromosome. You decide to find out! But when you come back to the lab, you discover that all of your blue-eyed, white-bodied flies have died except for one female. You are determined to test for gene linkage, though. To do so, you need to accomplish the following two tasks:

- First, you need to generate more blue-eyed, white-bodied flies. To do this, you will need to design crosses using your one remaining blue-eyed, white-bodied female and a common laboratory fruit fly stock with a well characterized genetic background.
- Then you can perform crosses to determine if the two genes that determine the traits of interest are linked.

1 Describe the sex and phenotype of the two flies available for your initial cross:

Flies	Sex	Phenotype
Parent 1		
Parent 2		



StarGenetics

2 To generate more flies with blue eyes and white body color, you set up a cross between the two available flies.

- You can set up a cross by dragging the chosen parent flies to the **Mating site** and then clicking on the **Mate** button.
- Mating results are summarized on the **Summary** tab, and all individual progeny resulting from your cross can be viewed by clicking on the **Individual** tab.

a) Describe the different phenotype(s) that you observe among the 50 F1 progeny and indicate how many of each type you observe.

Answer

b) Based on your answer to part (a), indicate which alleles are dominant and which are recessive for each trait (eye color and body color).

Answer

c) Indicate genotypes for the following flies. Use letters E and e for eye color alleles. Use letters B and b for body color alleles. For each gene use the upper case letter to represent the allele associated with the dominant phenotype and the lowercase letter to represent the allele associated with the recessive phenotype.

Answer

Parent 1:

Parent 2:

Male F1 progeny:

Female F1 progeny:

d) Based on your answers to parts (b) and (c), are the genes for eye color and/or body color sex linked (X-linked or Y-linked)? If so, which sex chromosome(s) are they located on?

Answer



StarGenetics

e) Are the two genes (eye color and body color) linked on the same chromosome? Explain your answer.

Answer

f) Design a cross that would enable you to confirm your answer to parts (d) and (e). Indicate genotypes and phenotypes of the flies that you will cross. Diagram the cross, including your predictions about the genotypes and phenotypes of the resulting progeny.

Answer