



StarGenetics

## Fruit Fly Exercise 5

### 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 5** file.

You are studying three distinct traits in fruit flies: body color, wing size, and antennae length. You come across six different fruit flies and decide to mate them in pairs to determine the nature and mode of inheritance of these traits. These flies (Flies #1-6) are true breeding (homozygous for all alleles). You may assume that each trait is controlled by a single gene.

### 1 *What are the phenotypes and genotypes that you obtain from each mating experiment?*

Score 100 progeny for each experiment and indicate the number of F1 flies that correspond to each phenotype. Use the letters B, W and A for body color, wing size and antennae length, respectively. 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.

- To set up a cross drag the specific parent flies to the **Mating site** and clicking on the **Mate** button.
- Mating results can be seen on the **Summary** tab and each resulting offspring can be viewed by clicking on the **Individual** tab.
- To add additional progeny, click on the **Mate** button until you obtain the desired number.
- To keep a track of your experiments, you can click on the **Save experiment** button in the main menu and rename your experiment.

Mating experiment	Flies	F1 progeny		
		Phenotypes	Numbers	Genotypes
I	Fly #1 x Fly #2			
II	Fly #3 x Fly #4			
III	Fly #5 x Fly # 6			



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**2** Based on your answer to question 1, *which alleles are dominant and which are recessive for each trait?*

Traits	Dominant	Recessive
Body color (brown/grey)		
Wing size (winged/wingless)		
Antennae length (small/long)		

**3** *Based on these experiments, indicate the genotypes of the following flies.* Use the same letters B/b, W/w and A/a to state the genotypes.

Flies	Genotypes
#1	
#2	
#3	
#4	
#5	
#6	

**4** Next, you cross two F1 flies from each set.

**a)** *What are phenotypic and genotypic ratios you obtain?*

Source of F1 progeny	Phenotypic ratio	Genotypic ratio
Experiment I (Question 1)		
Experiment II (Question 1)		
Experiment III (Question 1)		

**b)** *Based on your results in question (4), indicate which genes are linked and which ones are unlinked.*

**Answer**



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**5** You now want to determine the distance between the genes that are linked. Next you decide to mate F1 progeny from the cross(es) of parents with linked genes with either fly #7, #8 or #9.

***What are the phenotypes and genotypes for the parental and recombinant classes you obtain from these mating experiments?*** Score 200 progeny and indicate the number of flies that correspond to each phenotype.

**Answer**

**6** Based on your results, ***create a chromosomal map containing these three genes.*** Indicate the map distances in centimorgans (cM).

**Answer**