

## Genetics Virtual Lab: Sex-Linked Traits

[http://www.mhhe.com/biosci/genbio/virtual\\_labs/BL\\_15/BL\\_15.html](http://www.mhhe.com/biosci/genbio/virtual_labs/BL_15/BL_15.html)

Name: \_\_\_\_\_

### **Question: How Can Sex-Linked Traits be Identified?**

**Purpose:** The purpose of this investigation is to explore the sex-linked gene for eye color in *Drosophila*. This will involve performing various fruit-fly mating involving the eye-color trait and analyzing the outcomes of the mating using Punnett Squares.

### **Objectives:**

- \* *Construct and analyze Punnett Squares for monohybrid genetic crosses involving sex-linked traits.*
- \* *Perform *Drosophila* mating and analyze the offspring that results from each cross.*
- \* *Explain why sex-linked traits appear more often in males than in females.*



### **Procedure:**

1: Click the TV/VCR. Then, click the play button on the video controller. Watch the video about *Drosophila* mating.

### **Summarize video below:**

2: On the biology lab navigation screen, **click the vials** to mate *Drosophila* in the laboratory or **click the notebook** to perform genetic crosses using Punnett Squares.



3: **Drosophila mating:** Examine the four vials that contain pure lines of supply *Drosophila*. There is fruit-fly medium (food) in the bottom of the test tubes. Each test tube is labeled with a magnified drawing of the type of fly that is in that test tube. Use the key at the bottom of

the rack of vials to differentiate between male *Drosophila* and female *Drosophila*.

Decide *which flies* to mate for the **P Generation Cross**. Click one of the four vials of Supply *Drosophila* and drag a fly to the P Generation Cross vial. A picture of the selected fruit fly will appear on the label of

the P Generation Cross vial. **Click and drag another fruit fly** to the P Generation Cross Vial. You may change your selection by clicking and dragging the fly back to its supply Drosophila vial.

**Click the mate and sort button next to the P Generation Cross Vial.**

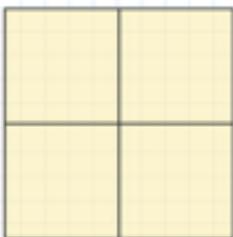
\* If no mating takes place, *check the sexes* of the 2 flies that you selected to cross and try again.

\* If mating takes place, many offspring may result. The offspring sort into the F1 Generation vials. The number of each type of offspring will appear next to the picture of the fruit fly on the label of the vial. **Click the table button and record the data in the table.**

\* **Repeat for F1 Generation Cross.** Record data below:

	Phenotype Male Parent	Phenotype Female Parent	# of red-eyed male offspring	# of white-eyed male offspring	# of red-eyed female offspring	# of white-eyed female offspring
P Generation Cross						
F1 Generation Cross						
P Generation Cross						
F1 Generation Cross						

After mating Drosophila in the laboratory, **perform genetic crosses** using Punnett Squares and then **complete the journal questions.**



**Punnett Squares:**

Label the Punnett square by clicking the arrow under the male parent and the female parent and selecting parents to cross. The alleles of the selected parents appear next to each box of the Punnett square. Determine the genotype and phenotype of the offspring that result from the genetic cross.

Fill in the Punnett Square by **clicking and dragging** the appropriate offspring at the bottom of the Punnett Square to the appropriate boxes in the Punnett Square.

If the Punnett Square is filled in correctly, **the phenotype and genotype ratios appear**. Use these data to answer the journal questions.

**Journal Questions:**

1: **Describe** the phenotypes and genotypes of the parents that you chose on the Punnett Square screen.

2: Describe the offspring phenotype and genotype ratios that resulted from crossing the parents that you chose on the Punnett Squares screen. Using these ratios, **what percentage of offspring is white-eyed**? **What percentage of offspring is red-eyed**?

3: **Compare and contrast** the data you collected from the Punnett Squares to the data you collected from the *Drosophila* mating.

4: In a mating between a red-eye male fruit fly and a red-eyed heterozygous female, what percentage of the female offspring is expected to be **carriers**? How did you determine the percentage?

5: In a mating between between a red-eyed male fruit fly and a white-eyed female fruit fly, what percentage of the male offspring will have **white eyes**? Describe how you determined the percentage.

6: Hemophilia, a blood disorder in humans, results from a sex-linked recessive allele. Suppose that a daughter of a mother without the allele and a father with the allele marries a man with hemophilia. What is the probability that the daughter's children will develop the disease? Describe how you determined probability. (**show Punnett Square**)

7: Colorblindness results from a sex-linked recessive allele. Determine the genotypes of the offspring that result from a cross between a color-blind male and a homozygous female who has normal vision.

**Describe** how you determined the genotypes of the offspring.

8: **Explain** why sex-linked traits appear more often in males than in females.