

Virtual *Drosophila* Lab

Biology

Genetics is the study of how genes and reproduction contribute to **heredity** – the inheritance of traits (characteristics) by offspring from their parents. Many scientists study genetics by using fruit flies (*Drosophila*) as they are easy to breed, have a relatively simple genetic profile, and show clear traits that can be observed. By breeding flies and their offspring, geneticists can determine which traits are dominant, which are recessive, which are autosomal, and which are sex-linked.

The following website has an on-line fruit fly lab that you can use to explore the ways scientists can observe and quantify *Drosophila* genetic data: <http://www.sciencecourseware.org/vcise/drosophila/>. You will need to register as a New User – click on the “Create New Account” button. Use the following “Class Code”: 2398344. Use your CSD509j e-mail and password.

Once you’ve registered, log in and follow the instructions on the screen to practice using the app. It takes a little getting used to – be patient. You might want to work with a partner in order to more easily determine the process you should follow.

After you are familiar with the interface for the virtual lab, complete the following tasks in order to solve a genetics mystery. You can work with a partner and turn in one copy of your assignment or work alone if you’d prefer. Either way, your work should be typed in Google Docs and submitted through Showbie. (It’s a good idea to share your work with your partner so you both have access to the file.) While working on the activity, make sure that you save your work from time to time by clicking on the “Notebook” tab and clicking “Save”. This way, you can access it later.

1. Perform a cross between two flies, focusing on the same trait in each type of fly. Make sure you pick a cross that is likely to result in unpredictable heredity (i.e., don’t mate two wild-type flies!). Save your results to your notebook **or** carefully write down your results in your notebook.
2. Next, perform at least six additional crosses using the offspring from your original cross and offspring from other crosses as well. Again, carefully document your results by saving them to your notebook or writing down the data.
3. Create Punnett Squares for all four of the cross you’ve done so far. Your Punnett Squares should show all of the following information:
 - a. The genotype and phenotype of each parent
 - b. The genotype and phenotype of each possible offspring
 - c. Numerical data showing the number of each type of offspring that resulted when you performed the cross

An example Punnett Square is shown below.

Male – heterozygous, wild-type body color (right)	Y	y
Female – homozygous recessive, yellow body color (below)		
Y	Yy (heterozygous, wild-type body color)	yy (homozygous recessive, yellow body color)
y	yy (homozygous recessive, yellow body color)	yy (homozygous recessive, yellow body color)

Cross results: 112 wild-type body color (male), 455 yellow body color (female)

- Identify the wild-type allele for the trait you are exploring as dominant or recessive.
- Identify the trait you are exploring as autosomal or sex-linked.
- In one or two paragraphs, explain the reasoning that you used to determine your Punnett Squares. How did you know the genotypes of the offspring? How did you use that information to determine the genotypes of the parents? In your explanation, be sure to correctly use appropriate genetics vocabulary wherever is applies.