Activity 1: Fruit Fly Genetics--Honors

(Topic 7: Dominance)

**Introduction**: Fruit flies are often used when studying Medelian genetics because they have relatively short life spans, which allows a person to study many generations quickly. *Drosophilia* (fruit flies) also share 75% of genes that cause diseases in humans, so by studying fruit flies you are also studying basic biological mechanisms of disease. Fruit flies have easily identifiable phenotypes, and are readily available to labs. All of these characteristics make them a good model organism to use when running evolution and genetics experiments.

**Purpose:** Simulate using *Drosophilia* to predict offspring ratios and determine inheritance patterns. (*NC Standard 3.2.2*)

**Directions:**

1. Using the following website: <http://ScienceCourseware.org/vcise/drosophila/> , you will mate fruit flies with various genetic traits to analyze inheritance patterns.

a) Once on the website, you must Create a New Account and register your name/password. Use the class code: **13036144**

b) Log in as a Registered User

c) Follow the onscreen directions to complete each of the assignments below. For each cross, you MUST show a Punnet square to predict the offspring ratios. There will be 15 crosses total.

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| **Basic Level** **Assignment 1**: Study the inheritance patterns of mutations from the list of autosomal mutations (excludes sex-linked and lethal mutations).  **(a)** Produce a **reciprocal cross** (female mutant vs. male wild type and female wild type vs. male mutant) for two of the listed traits. **(b)** Make the Punnet Square a **test cross** for recessive traits. Mate an F1 wild type to a homozygous recessive mutant from the store.  **(c)** Cross an F1 x F1 to get an F2 generation.  **\*Wild Type Notation is a “ + “** |
| |  |  |  |  | | --- | --- | --- | --- | | **Autosomal Mutation** | **Standard Notation** | **VCISE Notation** | **Dominant / Recessive** | | Apterous | *ap* | AP | recessive | | Black body | *b* | BL | recessive | | Brown eyes | *bw* | BW | recessive | | Curved wings | *c* | C | recessive | | Dumpy wings | *dp* | DP | recessive | | Ebony body | *e* | E | recessive | | Eyeless eyes | *ey* | EY | recessive | | Lobe eyes | *L* | L | dominant | | Purple eyes | *pr* | PR | recessive | | Radius incompletus | *ri* | RI | recessive | | Sepia eyes | *se* | SE | recessive | | Spineless bristles | *ss* | SS | recessive | | Shaven bristles | *sv* | SV | recessive | | Vestigial wings | *vg* | VG | recessive | |
| **Assignment 2**: Select any two traits on two different chromosomes and study their inheritance patterns (excludes sex-linked and lethal mutations). These are dihybrid crosses.  **(a)** Students should try reciprocal crosses:  i. female with mutant A vs. male with mutant B ii. female with mutant B vs. male mutant A  **(b)** Students should cross an F1 offspring with another F1 offspring to generate an F2 generation. |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Chromosome** | **Autosomal Mutation** | **Standard**  **Notation** | **VCISE**  **Notation** | **Dominant / Recessive** | | **II** | Dumpy Wings | *dp* | DP | recessive | | Black Body | *b* | BL | recessive | | Purple Eyes | *pr* | PR | recessive | | Apterous | *ap* | AP | recessive | | Vestigial Wings | *vg* | VG | recessive | | Lobe Eyes | *L* | L | dominant | | Curved Wings | *c* | C | recessive | | Brown Eyes | *bw* | BW | recessive | | **III** | Sepia Eyes | *se* | SE | recessive | | Radius Incompletus | *ri* | RI | recessive | | Spineless Bristles | *ss* | SS | recessive | | Ebony Body | *e* | E | recessive | | **IV** | Eyeless | *ey* | EY | recessive | | Shaven Bristles | *sv* | SV | recessive | |
| **Assignment 3**: In addition to autosomes, genes are found on the sex chromosome (I-X). The pattern of inheritance in these cases is different. These traits are considered as “sex-linked.” The table below and in the Appendix of Section 15 lists the traits that are found on the sex chromosome. |
| **(a)** Make reciprocal crosses (female wild type vs. male mutant and female mutant vs. male wild type) for 3 of the traits. |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Sex Chromosome** | **Mutation** | **Standard**  **Notation** | **VCISE**  **Notation** | **Dominant / Recessive** | | **I-X** | Yellow Body | *y* | Y | recessive | | White Eyes | *w* | W | recessive | | Crossveinless | *cv* | CV | recessive | | Singed Bristles | *sn* | SN | recessive | | Tan Body | *t* | T | recessive | | Miniature Wings | *m* | M | recessive | | Sable Body | *s* | S | recessive | | Scalloped Wings | *sd* | SD | recessive | | Forked Bristles | *f* | F | recessive | | Bar Eyes | *B* | B | dominant | |

Assignment 4: Complete the lab report and then take the quiz. Once you have completed the lab report and quiz, you should be able to print a Certificate of Completion. You should save that as a PDF file in your shared Biology folder on Google Drive. Place you Punnet Squares in the box at the front of the room.