COURSE: BIOL3001 GENETICS NAME:

LABORATORY 4, EXERCISE 2. CHROMOSOME LOCATION

Purpose

The purpose of this Laboratory is to introduce you to the important genetic concept of CONFIGURATION related to Linkage. In dihybrid crosses, when both WT alleles are contributed by one parent, the configuration is referred to as being ***cis*** or ***coupled***. When one parent contributed both a WT and a mutant allele, the configuration is referred to as ***trans*** or ***repulsed***. This exercise will demonstrate to you how to look at the F2 results of a dihybrid cross exhibiting linkage to make conclusions on the physical structure of alleles on chromosomes. You will do this part of the laboratory on your own following the same basic steps as Exercise 1.

Exercise Protocol

1. Launch the Fly Lab Colony (https://cws.auburn.edu/FlyLab) and open a LINKAGE cross.
2. Select the parental flies and the following mutant traits as below:

Male:	**Body Color: BLACK**	**Eye Color: WT**
Female:	**Body Color: WT**	**Eye Color: PURPLE**

3. Select the number of offspring you wish to produce and MATE the parental flies.
4. Select the F1 MALE offspring (move your cursor over the fly and make sure it is highlighted in blue).
5. Select the same number of offspring you chose above. The corresponding PARENTAL fly (FEMALE in this case) is automatically selected to mate with the F1 offspring in a BACK CROSS.
6. Cross the flies to produce an F2 Generation and record all the data below.
7. Repeat the original PARENTAL cross again as indicated on the sheet below (Steps 2 and 3 above).
8. This time, select the F1 FEMALE offspring (highlight in blue by clicking with your cursor). The corresponding parental fly will again be automatically chosen (MALE in this case) and back crossed to the F1 female when you the cross is performed.
9. Cross the flies to produce the F2 Generation and record all the data below.
10. Answer the questions at the end of this Exercise.

GENETIC CROSS

LAB 4 EXERCISE 2 - DATA SHEET

NAME:

TRAIT 1: Body Color: **BLACK (B)** **TRAIT 2:** Eye Color: **PURPLE (P)**

CROSS 1 DIAGRAM

Parentals	**Male**		**Female**
Phenotype	Black, WT	**x**	WT, Purple
Genotype	bbPP	**x**	BBpp

F1 Generation	**Total**	**Male ONLY**		**Female**
Phenotype			**x**	Black, Purple
Genotype				bbpp

F2 Generation

Total	**Sex**	**Phenotype**	**Genotype**

CROSS 2 DIAGRAM

Parentals	**Male**		**Female**
Phenotype	WT, Purple	**x**	Black, WT
Genotype	BBpp	**x**	bbPP

F1 Generation	**Male**		**Total**	**Female ONLY**
Phenotype	Black, Purple	**x**		
Genotype	bbpp			

F2 Generation

Total	**Sex**	**Phenotype**	**Genotype**

Chi-Squared Test Cross 1

Phenotype	Observed	Expected	O - E	$(O – E)^2$	$(O – E)^2 / E$
TOTAL					

Observed Chi – Squared Value =

Degrees of Freedom (*df*) =

Table Value (0.05) =

Overall Conclusion = --

Chi-Squared Test Cross 2

Phenotype	Observed	Expected	O - E	$(O – E)^2$	$(O – E)^2 / E$
TOTAL					

Observed Chi – Squared Value =

Degrees of Freedom (*df*) =

Table Value (0.05) =

Overall Conclusion = --

Describe any differences in the outcomes from the two sets of matings.

Propose a hypothesis to explain any differences that you observed in your results.

What does this information tell you about the CONFIGURATION of these alleles?

In either of the two crosses above, if you flipped the F1 cross to its opposite (e.g. original – F1 male to homozygote recessive female changed to F1 female to homozygote recessive male), would you expect there to be a different result and if so, what would that result tell you about your traits?