COURSE: BIOL3001 GENETICS NAME:

LABORATORY 2, EXERCISE 1. MULTI-TRAIT MENDELIAN CROSSES

Purpose

The purpose of this exercise is to acquaint you with important dihybrid ratios and to provide practice with the application of genetic principles of Segregation and Assortment. Your TA will walk you through this Exercise step by step. You will be responsible for completing the remaining exercises on your own.

Exercise Protocol

Your assignment is:
1. Determine for your selected traits, whether their inheritance patterns follow Mendelian Segregation and Assortment patterns.
2. Using Chi-squared analysis, demonstrate that the F_2 offspring fit a **9:3:3:1** expected ratio.

Steps for this Exercise:

1. Launch the Fly Lab Colony (https://cws.auburn.edu/FlyLab) and open a Mendelian cross.

2. Choose the following **TRAITS** to examine:
   EYE COLOR – Sepia **WING SHAPE – Crumpled**
   (It does not matter which parent you choose, however at this point, place both mutants in the same parent.)
3. Mate the parents using the default 1000 offspring.

4. Record the results on the data sheet for LABORATORY EXERCISE 1. Take a moment to think about your results.
   a. *Do the offspring look like either parent?*
   b. *Are the numbers of males and females equal for each phenotype?*
   c. *Are both the mutant and Wild phenotypes present?*
   d. *Did any new phenotypes appear?*

5. Mate the F_1 offspring to produce F_2 offspring and record the results on the LABORATORY EXERCISE 1 data sheet. Remember to select which traits you are examining in the Chi-Squared Test box.

6. Using the Chi-Squared Tests at the bottom of the exercise, calculate the Chi-Squared for your results and enter that data on your data sheet as well. You will need to calculate three separate Chi-Squares.

7. Answer the Exercise 1 questions on the following pages.

GENETIC CROSS

LAB 4 EXERCISE 1 - DATA SHEET

NAME:

TRAIT 1:

TRAIT 2:

PHENOTYPES CROSSED: **Male** X **Female**

CROSS DIAGRAM

Parentals	**Male**		**Female**
Phenotype		**x**	
Genotype		**x**	

F1 Results	**Male**		**Female**
Phenotype			
Genotype			

Parents for F2	**Male**		**Female**
Phenotype		**x**	
Genotype		**x**	

F2 Results

	phenotype	**ratio**		**phenotype**	**ratio**
Predicted Segregation Ratio (Trait 1) =			**:**		
Predicted Segregation Ratio (Trait 2) =					

Gender	**Phenotype**	**Genotype**	**Exp Number**	**Obs Number**

Chi-Squared Test Trait 1 (enter values from F2 Generation Page, combine sexes to one phenotype)

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 = --

CONCLUSIONS:

Chi-Squared Test Trait 2 (enter values from F2 Generation Page, combine sexes to one phenotype)

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 = --

CONCLUSIONS:

Chi-Squared Test Combined Traits (enter values from F2 Generation Page, combine sexes to one phenotype)

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 = --

CONCLUSIONS:

What was your final phenotypic Assortment Ratio?

Does your final Assortment Ratio fit with what you predicted would occur with this cross? Write a short summary to support your conclusion.