

LABORATORY 5, EXERCISE 2. CHROMOSOME MAPPING

Purpose

The purpose of this Laboratory is to give you practice in performing linkage experiments and a better understanding of how genetics laboratories use these same exercises to map genes for different organisms. You will essentially be performing the same type of experiment that Morgan Hunt's Cal Tech Fly Lab performed only you will not have to wait for flies to make. You will be using the Auburn Fly Lab computer program to speed all those steps up.

You will choose one *Drosophila* chromosome to map a set of genes for. You will be limited to chromosomes 1-3. Make your choice and you will be given a list of genes. You must calculate and provide the map distances between all the genes you are given. You are provided two reference genes and their locations on each chromosome to get you started. You **MUST** provide the **CORRECT LOCATION** for each gene and put the genes in the **CORRECT ORDER** on the worksheet provided. You are also provided a number of "Data Sheets" to document your mapping. You may, or may not need to use all the sheets. Use as many as needed to determine all the information requested above.

Exercise Protocol

1. Launch the Fly Lab Colony (<https://cws.auburn.edu/FlyLab>) and open a LINKAGE cross.
2. Select the MALE parental fly to use for your mutant traits. Choose the traits you wish to map from the list in Exercise 3 and assign to the male.
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 BACKCROSS.
6. Cross the flies to produce an F2 Generation and record all the data in the data sheets provided. You probably have more data sheets than you will need so don't feel that you need to use all of them but they are there for you use if you need them. If you need more, open the file again and just keep going!
7. Fill in the CHROMOSOME MAPPING SHEET provided in this module for your chromosome of choice as you complete your mapping. You will need to place the genes in the correct order and you will need to provide the map distances on the mapping sheet. You **DO NOT** need to map all the chromosomes, only the one you choose.

GENETIC CROSS

LAB 5 EXERCISE 2 - DATA SHEET 1

NAME:

	Category	Trait
TRAIT 1:		
TRAIT 2:		
TRAIT 3:		

Parentals	Male		Female
Phenotype		x	
Genotype		x	

F1 Generation	Male		Female
Phenotype		x	
Genotype			

F2 Generation	Observed	Phenotype	Genotype

	Gene 1	Gene 2	Gene 3
Gene Order:			

Gene 1 : Gene 2 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

Gene 2 : Gene 3 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

Gene 1 : Gene 3 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

GENETIC CROSS

LAB 5 EXERCISE 2 - DATA SHEET 2

NAME:

	Category	Trait
TRAIT 1:		
TRAIT 2:		
TRAIT 3:		

Parentals	Male		Female
Phenotype		x	
Genotype		x	

F1 Generation	Male		Female
Phenotype		x	
Genotype			

F2 Generation	Observed	Phenotype	Genotype

	Gene 1	Gene 2	Gene 3
Gene Order:			

Gene 1 : Gene 2 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

Gene 2 : Gene 3 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

Gene 1 : Gene 3 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

GENETIC CROSS

LAB 5 EXERCISE 2 - DATA SHEET 3

NAME:

	Category	Trait
TRAIT 1:		
TRAIT 2:		
TRAIT 3:		

Parentals

	Male		Female
Phenotype		x	
Genotype		x	

F1 Generation

	Male		Female
Phenotype		x	
Genotype			

F2 Generation

Observed	Phenotype	Genotype

	Gene 1	Gene 2	Gene 3
Gene Order:			

Gene 1 : Gene 2 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

Gene 2 : Gene 3 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

Gene 1 : Gene 3 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

GENETIC CROSS

LAB 5 EXERCISE 2 - DATA SHEET 4

NAME:

	Category	Trait
TRAIT 1:		
TRAIT 2:		
TRAIT 3:		

Parentals	Male		Female
Phenotype		x	
Genotype		x	

F1 Generation	Male		Female
Phenotype		x	
Genotype			

F2 Generation	Observed	Phenotype	Genotype

	Gene 1	Gene 2	Gene 3
Gene Order:			

Gene 1 : Gene 2 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

Gene 2 : Gene 3 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

Gene 1 : Gene 3 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

GENETIC CROSS

LAB 5 EXERCISE 2 - DATA SHEET 5

NAME:

	Category	Trait
TRAIT 1:		
TRAIT 2:		
TRAIT 3:		

Parentals

	Male		Female
Phenotype		x	
Genotype		x	

F1 Generation

	Male		Female
Phenotype		x	
Genotype			

F2 Generation

Observed	Phenotype	Genotype

	Gene 1	Gene 2	Gene 3
Gene Order:			

Gene 1 : Gene 2 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

Gene 2 : Gene 3 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

Gene 1 : Gene 3 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

GENETIC CROSS

LAB 5 EXERCISE 2 - DATA SHEET 6

NAME:

	Category	Trait
TRAIT 1:		
TRAIT 2:		
TRAIT 3:		

Parentals	Male		Female
Phenotype		x	
Genotype		x	

F1 Generation	Male		Female
Phenotype		x	
Genotype			

F2 Generation	Observed	Phenotype	Genotype

	Gene 1	Gene 2	Gene 3
Gene Order:			

Gene 1 : Gene 2 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

Gene 2 : Gene 3 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

Gene 1 : Gene 3 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

GENETIC CROSS

LAB 5 EXERCISE 2 - DATA SHEET 7

NAME:

	Category	Trait
TRAIT 1:		
TRAIT 2:		
TRAIT 3:		

Parentals

	Male		Female
Phenotype		x	
Genotype		x	

F1 Generation

	Male		Female
Phenotype		x	
Genotype			

F2 Generation

Observed	Phenotype	Genotype

	Gene 1	Gene 2	Gene 3
Gene Order:			

Gene 1 : Gene 2 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

Gene 2 : Gene 3 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

Gene 1 : Gene 3 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

GENETIC CROSS

LAB 5 EXERCISE 2 - DATA SHEET 8

NAME:

	Category	Trait
TRAIT 1:		
TRAIT 2:		
TRAIT 3:		

Parentals	Male		Female
Phenotype		x	
Genotype		x	

F1 Generation	Male		Female
Phenotype		x	
Genotype			

F2 Generation	Observed	Phenotype	Genotype

Gene Order:

Gene 1	Gene 2	Gene 3

Gene 1 : Gene 2 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

Gene 2 : Gene 3 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

Gene 1 : Gene 3 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

GENETIC CROSS

LAB 5 EXERCISE 2 - DATA SHEET 9

NAME:

	Category	Trait
TRAIT 1:		
TRAIT 2:		
TRAIT 3:		

Parentals	Male		Female
Phenotype		x	
Genotype		x	

F1 Generation	Male		Female
Phenotype		x	
Genotype			

F2 Generation	Observed	Phenotype	Genotype

	Gene 1	Gene 2	Gene 3
Gene Order:			

Gene 1 : Gene 2 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

Gene 2 : Gene 3 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

Gene 1 : Gene 3 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

GENETIC CROSS

LAB 5 EXERCISE 2 - DATA SHEET 10

NAME:

	Category	Trait
TRAIT 1:		
TRAIT 2:		
TRAIT 3:		

Parentals

	Male		Female
Phenotype		x	
Genotype		x	

F1 Generation

	Male		Female
Phenotype		x	
Genotype			

F2 Generation

Observed	Phenotype	Genotype

	Gene 1	Gene 2	Gene 3
Gene Order:			

Gene 1 : Gene 2 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

Gene 2 : Gene 3 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)

Gene 1 : Gene 3 Recombination Frequency

Calculations: (list all crossover progeny along with their phenotype and show your work for the RF calculation)