Diploid Genetics and Chromosomal Inheritance

A. Diploid Genetics

For each set of data below, determine the genotype of the parents in cross 1. Where it applies, indicate which phenotypes are dominant and which are recessive.

1. Mice I

a) cross 1: red-eyed mouse _____ **X** white-eyed mouse _____

gives F_1: all red-eyed

cross 2: red-eyed F_1 **X** red-eyed F_1

gives F_2: 36 red-eyed
13 white-eyed

b) cross 1: long-eared mouse _____ **X** short-eared mouse _____

gives F_1: 12 long-eared
10 short-eared

cross 2: long-eared F_1 **X** long-eared F_1

gives F_2: 36 long-eared
13 short-eared

2. Flowers

cross 1: blue-flowered plant _____ **X** white-flowered plant _____

gives F_1: all pale-blue-flowered

cross 2: pale-blue F_1 **X** pale-blue F_1

gives F_2: 27 blue
49 pale-blue
24 white

3. Blood Type

a) cross 1: person, type A blood _____ **X** person with type B _____

gives F_1: all type AB blood

cross 2: type AB F_1 **X** type AB F_1

gives F_2: 2 type A
4 type AB
1 type B

b) cross 1: type A blood _____ **X** type B _____

gives F_1: 2 type A blood
3 type AB blood
1 type B blood
2 type O blood

4. Mice II

cross 1: tail-less mouse _____ **X** normal mouse _____

gives F_1: 10 tail-less
9 normal

cross 2: tail-less F_1 **X** tail-less F_1

gives F_2: 10 normal
21 tail-less
9 dead

B. Chromosomes and Recombination

1. What is the physical basis of the genetic inheritance?

2. Why is sexual reproduction a powerful source of variation?

3. Why was it evolutionarily advantageous to develop the ability to recombine chromosomes?

Think about the following question for next time (we will talk about it in Section 16):
Recombination can occur anywhere along the length of the chromosome. However, we have been relying on the fact that genes are inherited as discreet units. How do we reconcile these two things? (Hint: think about what usually is the difference between two alleles of the same gene.)