**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 F₁: all red-eyed

   cross 2: red-eyed F₁ X red-eyed F₁

   gives F₂: 36 red-eyed
             13 white-eyed

   b) cross 1: long-eared mouse ____________ X short-eared mouse ____________

   gives F₁: 12 long-eared
             10 short-eared

   cross 2: long-eared F₁ X long-eared F₁

   gives F₂: 36 long-eared
             13 short-eared

2. Flowers

   cross 1: blue-flowered plant ____________ X white-flowered plant ____________

   gives F₁: all pale-blue-flowered

   cross 2: pale-blue F₁ X pale-blue F₁

   gives F₂: 27 blue
             49 pale-blue
             24 white
3. Blood Type
   a) cross 1: person, type A blood _________ X person with type B _________
      gives F1: all type AB blood
   cross 2: type AB F1 X type AB F1
      gives F2: 2 type A
               4 type AB
               1 type B

   b) cross 1: type A blood ___________ X type B ___________
      gives F1: 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 F1: 10 tail-less
               9 normal
   cross 2: tail-less F1 X tail-less F1
      gives F2: 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.)