Name:_____ Dr. Reichler's Bio 325-uex Spring 2009 Quiz 4/23

1) Two people mate. They are heterozygous for three different traits coded for by three different genes (P, D, and Q). The P and D genes have simple dominance, and the Q gene has incomplete dominance. What is the chance of having an offspring that has the recessive phenotype for P and D with the intermediate trait for Q?

2) Which genes are closer to each other? A and B that have 34% recombination or C and D that have 22% recombination?

3) When looking at the inheritance of two traits coded for by two different genes, what can you infer from a cross that results in 50% recombinant offspring?

4) Can genes located on different chromosomes have less than 50% recombination?

5) If crossing over occurs twice between two genes, would you get any recombinant offspring?

6) Would you be able to use linkage mapping to determine the distance between two genes on the Y chromosome?

7) Two individuals have mutations in two of their smell receptors on chromosome 11. One for the ability to smell apples, and the other to smell oranges. The mutations act as recessive alleles. You want to know how far apart the genes are. Two heterozygous individuals mate and have 100 offspring with the following traits. 80 can smell both oranges and apples, 12 cannot smell apples or oranges, while 4 can smell apples but not oranges, and 4 can smell oranges but not apples. How far apart are these two genes?

8) When looking at three linked genes, how do you identify the double cross-over, and why do you need to?

9) You are studying three genes located on the same chromosome that occur in this order: A, B, and C. Out of 100 offspring there are 30 recombinants of A-B and 40 recombinants of B-C. How many recombinant offspring would you expect between A and C?

10) What leads to discrepancies between a linkage map and the actual DNA sequence?

11) If a woman has poor ATP production due to a mutation in her mtDNA, and her mate has normal mtDNA, what will be the phenotypes and genotypes of their offspring?

12) You are testing whether a gene is inherited via incomplete dominance by using a chi squared test. How many degrees of freedom would you have?

13) If two cats with medium length tails mate and have 17 offspring with long tails, 20 offspring with short tails, and 63 offspring with medium tails, is cat tail length inherited via incomplete dominance?

Answers:

1) 0.25x0.25x0.5= 3.125%

2) C and D are closer.

3) The genes are either far apart on the same chromosome (unlinked) or on two different chromosomes.

4) No, independent assortment means that the different alleles will have an equal chance of ending up in either gamete.

5) No, the double cross-over would return the genes to their original chromosome giving only parentals.

6) A gene on the Y chromosome in mammals would only be transmitted from father to son. It would be difficult to genetically map Y-linked genes because a normal male has only one copy of the Y

7) 8 m.u.

8) The pair of traits with the fewest offspring are derived from the double cross-over. By seeing which genes are separated by the double cross-over, you can determine the order of the genes.

9) A and C are not linked, there are 70 m.u. between them and so you would get about 50 recombinants.

10) Areas of the DNA that have greater or less than average crossing-over.

11) They all have mom's mtDNA.

12) Df=2. 3 possible phenotypes-1.

13) Chi square = 6.94 with 2 degrees of freedom, P is between 0.05 and 0.01, so this is not incomplete dominance.