

Sex-Linked Traits: Practice Problems

Name _____

Date _____ Per _____

Remember: When writing genotypes, you need to write both the alleles and the sex chromosomes – i.e. $X^N X^N$

Answer the following questions about sex linked traits:

1. In humans, the allele for normal blood clotting, H, is dominant to the allele for hemophilia, h. This is a sex-linked trait found on the X chromosome. A woman with normal blood clotting has four children: a normal son, a hemophiliac son, and two normal daughters. The father has normal blood clotting. What is the genotype for each member of the family?

2. The bison herd on Konza Prairie has begun to show a genetic defect. Some of the males have a condition known as "rabbit hock" in which the knee of the back leg is malformed slightly. This condition is controlled by a **sex-linked gene** and it is **recessive**. Now, suppose that the herd bull (the dominant one which does most of the breeding) who is normal (X^N) mates with a cow that is a carrier for rabbit hock.
 - a) What are his chances of producing a normal son (bull)?

 - b) If he mates with this cow every year, what percentage of their daughters will have normal knees?

 - c) What percentage of their daughters will be carriers of rabbit hock?

3. Red-green color blindness (b) is a recessive sex-linked trait. A colorblind male marries a normal female. Their daughter is colorblind.
 - a) What are the genotypes of both parents and the daughter?

 - b) Can a colorblind father have daughters who are not colorblind? Explain.

c) If a normal sighted woman whose father was color-blind marries a color-blind man, what is the probability that they will have a colorblind child?

4. Clouded leopards are a medium sized, endangered species of cat, living in the very wet cloud forests of Central America. Assume that the normal spots (X^N) are a **dominant**, sex-linked trait and that dark spots are the **recessive** counterpart. Suppose as a Conservation Biologist, you are involved in a clouded leopard breeding program. One year you cross a male with dark spots and a female with normal spots. She has four cubs and, conveniently, two are male and two female. One male and one female cub have normal spots and one each have dark spots.

a) What is the genotype of the mother?

b) Suppose a few years later, you cross the female cub that has normal spots with a male that also has normal spots. How many of each genotype will be found in the cubs (assume 4)?

c) Will any of the cubs from this latest cross have dark spots?

d) If so, how many and of what sex will they be?