Monohybrid Crosses

In humans, brown eyes (B) are dominant over blue (b)*. A brown-eyed man marries a blue-eyed woman and they have three children, two of whom are brown-eyed and one of whom is blue-eyed. Draw the Punnett square that illustrates this marriage. What is the man's genotype? What are the genotypes of the children?

(* Actually, the situation is complicated by the fact that there is more than one gene involved in eye color, but for this example, we'll consider only this one gene.)

In dogs, there is an hereditary deafness caused by a recessive gene, "d." A kennel owner has a male dog that she wants to use for breeding purposes if possible. The dog can hear, so the owner knows his genotype is either DD or Dd. If the dog's genotype is Dd, the owner does not wish to use him for breeding so that the deafness gene will not be passed on. This can be tested by breeding the dog to a deaf female (dd). Draw the Punnett squares to illustrate these two possible crosses. In each case, what percentage/how many of the offspring would be expected to be hearing? deaf? How could you tell the genotype of this male dog? Also, using Punnett square(s), show how two hearing dogs could produce deaf offspring.

Mouse

a) Cross 1: red X white gives all red - a likely model is that eye color is controlled by one gene which has 2 alleles, red and white; also the red allele's phenotype is likely to be dominant. Therefore, choose appropriate symbols (one letter per gene, capital letter for allele with dominant phenotype):

R - red allele. Dominant phenotype of red eyes.

r - white allele. Recessive phenotype of white eyes.

b) Cross 1: long X short gives some long and some short - a likely model is that ear length is controlled by one gene with 2 alleles, long and short. From this data, we cannot determine which allele has the dominant phenotype.

Cross 2: long X long gives some long and some short - a likely model is that the long allele has the dominant phenotype. Therefore, the appropriate symbols are:

L - long allele. Dominant phenotype of long ears.

l - short allele. Recessive phenotype of short ears.

Cross 1 is then: Ll X ll ----> 1:1 long:short

Cross 2 is then Ll X Ll ----> 3:1 long:short

In Drosophila, ebony body colour is produced by a recessive gene 'e' and wild type greybody colour is by its dominant allele 'E'. Vestigial wings are governed by a recessive gene'v' and normal wings by its dominant allele 'V'. If the wild type dihybrid flies are crossed to produce 256 progeny, how many of these progeny are expected in each phenotypic class?

A ragged leaved corn plant with round pollen was crossed to a ragged leaved corn plantwith angular pollen produced offspring in the following manner - 186 ragged leaved andround pollen, 174 ragged leaved and angular pollen , 57 smooth leaved and round pollenand 64 smooth leaved and angular pollen . (Ragged- S, Smooth-s, Round–A, Angular – a) Give the genotypes of the two parents and what numbers would you have expected for each of the four types of progenies?

White flower colour 'W' is dominant over cream 'w' and salver shaped corolla 'S' isdominant over funnel shaped corolla's'. A white funnel (x) cream salver cross gives ¼ white salver, ¼ white funnel, ¼ cream salver, ¼ cream funnel plants. Determine the genotype of the parents? What is the chance of these parents producing only two types of offspring, one white salver and the other cream salver?

In poultry black plumage 'B' is dominant over red 'b' and crested head 'C' is dominant over plain 'c'. A red crested male bird is mated to a black plain female. They produced offspring half of which were black crested and half red crested. What wasthe genotype of the parents?