

### Tutorial session 3: Monohybridism in diploid Organisms

#### Exercise 1:

Numerous crosses between two black Labradors produced 8 brown puppies and 25 black puppies.

1. Identify the dominant and recessive traits.
2. Provide the genotypes of the parents and their offspring. Among the individuals, distinguish between homozygotes and heterozygotes.

#### Exercise 2:

In a species of insect, antenna color is determined by a gene; antennae can be black or brown, with brown antennae having appeared due to X-ray irradiation.

A female with phenotype brown antennae [**n**] is crossed with a male with the phenotype black antennae [**N**], resulting in F1 offspring of 150 individuals with black antennae and 140 individuals with brown antennae.

1. How do you explain the appearance of the two phenotypes in F1?
2. What is this type of cross called? Justify your answer.

#### Exercise 3:

A geneticist crossed two purebred lines of beans: one with white seeds and the other with red seeds.

1. The F1 generation consists only of beans with red seeds.
  - a) Which of Mendel's laws is demonstrated in this cross?
  - b) Specify the dominance of the traits.
  - c) Write the genotypes of the parents and the F1 hybrids.
2. When the F1 red-seeded beans are crossed with each other, a second generation is produced with: 150 red-seeded beans and 50 white-seeded beans. Construct a **Punnett square** to theoretically verify this result.
3. However, crossing the F1 red-seeded beans with white-seeded beans results in 100 red-seeded beans and 100 white-seeded beans. What type of cross is this? Justify your answer.

**Exercise 4:**

In tomatoes, fruit flesh can be either red or yellow. A series of crosses produced the following results:

<b>Cross</b>	<b>Results</b>
<b>Red x Red</b>	150 red
<b>Red x Yellow</b>	175 red
<b>Red x Yellow</b>	78 red and 80 yellow
<b>Yellow x Yellow</b>	168 yellow
<b>Red x Red</b>	125 red and 40 yellow

1. What is the dominant allele?
2. What are the genotypes of the parents in each cross?