

## Tutorial session 7: Sex linked inheritance

### Exercise 1

A recessive gene “h” linked to the X chromosome delays blood clotting time and is responsible for **hemophilia**. Ali and Layla, who are not hemophiliacs, have four children: Adam is healthy, Sara is healthy, as is Yasmin, but Omar is hemophilic.

- 1) If Sara marries a healthy man, what is the probability that their first child will be a hemophilic boy?
- 2) Suppose their first child is hemophilic. What is the probability that their second child will also be a hemophilic boy?
- 3) If Yasmin marries a hemophilic man, what is the probability that their first child will be a healthy boy?
- 4) If Layla's mother was phenotypically normal (healthy), what was the phenotype of her father?

### Exercise 2

In chickens, the gene for feather color is sex-linked and found on the Z chromosome. The allele for barred feathers ( $Z^B$ ) is dominant to the allele for non-barred feathers ( $Z^b$ ). Males are ZZ, and females are ZW (heterogametic).

A barred rooster ( $Z^BZ^b$ ) is crossed with a non-barred hen ( $Z^bW$ ).

**Note:** In chicken and other birds, the female is heterogametic (ZW) and the male is homogametic (ZZ). The sex chromosomes are referred to as Z and W to distinguish them from XY in mammals.

1. Determine the genotypes and phenotypes of the offspring.
2. What is the probability of getting a non-barred male?
3. What is the probability of getting a barred female?
4. If a non-barred rooster ( $Z^bZ^b$ ) is crossed with a barred hen ( $Z^BW$ ). Give the Punnett square and give the probability for having a barred male and the probability for having a non-barred female.