# Genetic Crosses | Notes

## Genetic Terms

Gene

- Part of a chromosome that contains information to produce a protein

Alleles

- Alternative forms of the same gene

Gamete

- Sex cell; egg and sperm

Genotype

- The genes present in the organism

Phenotype

- Outward appearance of the organism

Dominant

- Expressed in the phenotype when present in the genotype

Recessive

- Expressed only when an individual has no dominant gene present

Homozygous

- Alleles present in the genotype are the same

Heterozygous

- Alleles present in the genotype are not the same

Incomplete dominance

- Neither allele present in the genotype is dominant

Multiple alleles

- When a characteristic is controlled by two or more alleles

Continuous variation

- When a range of phenotypes is possible rather than two distinct groups

## Mendel's Laws of Inheritance

Law of segregation

- When gametes are formed only one allele from a pair of alleles is carried into the gamete

Law of independent assortment

- During gamete formation, members of a pair of alleles segregate and move into the gamete independently of any other pair of alleles

## Why Pea Plants?

- Easily distinguishable alternatives
- Concentrate on one characteristic at a time
- Controlled pollination by crossing the plants by hand
- Easily grown
- Produce a large number of seeds
- Traits are controlled by genes that were not linked

## Monohybrid Crosses

- Studies the inheritance of one characteristic
- One allele is dominant
- Other form is recessive

## Incomplete Dominance

- Two alleles of equal dominance
- Resulting phenotype is a blend of the two alleles
- Crossing red snapdragons with white snapdragons, the resulting offspring are pink

## Sex Determination

- Females are XX
- Males are XY

- Male sperm is responsible for determining the sex

## Sexed Semen

- In dairy herds, heifer calves are more desirable than bull calves
- Bull semen can be divided or sexed into two groups; sperm carrying Y and sperm carrying X
- Achieved by using a flow cytometer

## Advantages of Sexed Semen

- 90% chance of producing a heifer
- Good for replacement heifers
- Expansion of a dairy herd
- Maintains biosecurity
- Reduces the number of male dairy calves being born
- Reduce risk of calving difficulties in maiden heifers
- Used on genetically superior cows to produce bulls

## Disadvantages of Sexed Semen

- 10% chance of a male calf
- More expensive
- Reduced conception rates
- Less sperm per straw than non-sexed semen

## Sex Linkage or X Linkage

- Y chromosome is much smaller than the X chromosome
- Y chromosome does not contain the same amount of genetic information
- X chromosome carries a number of genes that are not related to sex determination
- Some genes on the X chromosome have no corresponding copy on the Y chromosome

## Why Fruit Flies Are Used

- Easy to keep
- Produce large numbers of offspring
- Produce a new generation every two weeks
- Have only four pairs of chromosomes
- Mutations are well documented