

CHAPTER - 5

PRINCIPLES OF INHERITANCE AND VARIATION

GLOSSARY :

Aneuploidy :

Failure of segregation of chromatin during cell division results in the gain or loss of a chromosome(s).

Chromosomal disorders :

Disorders caused due to the absence or excess or abnormal arrangement of one or more chromosomes.

Complete linkage :

Phenomenon in which parental combinations of characters appear together for two or more generations in continuous and regular fashions due to the tendency of linked genes getting inherited together.

Coupling :

The tendency of linked genes to remain together for dominant characters of one parent on one chromosome and for recessive characters on the homologous chromosome.

+ Crossing over :

The mechanism of recombination of the genes due to interchange of chromosomal segments of homologous chromosomes during pachytene stage of meiotic prophase.

+ Dihybridization:

The experiments considering simultaneous inheritance of two characters.

+ Dominance:

The organic phenomenon in which one of a pair of alleles present in a genotype is expressed in the phenotype and the other allele of the pair is not.

+ Dominant gene:

The allele which is expressed.

+ Epistasis:

The dominance between genes, located on two non-homologous chromosomes, wherein one gene is dominant over the other.

+ Epistasis gene:

The gene present on a different pair of chromosome, unpaired and dominates the other.

✚ **First Generation (F₁):**

The first filial generation, produced by crossing two parental lines.

✚ **Genotype:**

Genetic constitution for concerned expression of a character.

✚ **Heterozygous :**

Hybrids that contain alleles which express contrasting traits.

✚ **Heterozygous chromosome :**

The chromosomes which are not identical in shape, morphology and number of genes.

✚ **Homologous chromosome :**

The chromosomes which are identical in shape, morphology and number of genes.

✚ **Hybridization :**

Mating between two (or more) individual differing in genotype.

✚ **Hypostatic gene:**

The gene which is dominated by other gene.

+ Incomplete dominance :

A form of intermediate inheritance in which both heterozygous alleles are expressed, resulting in a combined phenotype.

+ Law of segregation :

The alleles do not show any blending and that both the characters are recovered as such in the F_2 generation though one of them is not seen at the F_1 stage.

+ Linkage :

The phenomenon in which certain gene groups do not separate during the formation of gametes, they tend to remain together and go together into the next generation in their original parental combinations.

+ Linked genes :

Genes, which are existing on a chromosome during the formation of gametes do not get separated, tend to remain together and get inherited together in their original parental combinations.

+ Linked characters :

Characters inherited by an organism through linked genes.

+ Linkage Group :

Any pair of genes that tend to be transmitted together.

+ Mendelian disorders :

Disorders mainly determined by alteration or mutation in the single gene.

+ Multiple genes :

More than two optional forms of a gene.

+ Mutation :

Sudden and heritable change in a character of an organism.

+ Mutagen :

Anything that induces mutation.

+ Phenotype:

The apparent expression seen due to combinations of a gene.

+ Ploidy :

Numerical mutation in chromosome.

+ Point mutation :

A change in single nucleotide.

✚ **Punnett square :**

A graphical representation to calculate the probability of all possible genotypes of offspring in a genetic cross.

✚ **Pedigree analysis :**

Pedigree is a chart showing the record of inheritance of certain genetic traits for two or more ancestral generation of an individual or domesticated animals.

✚ **Recessive gene:**

The allele which is not expressed.

✚ **Recombination :**

Type of genetic variation, which appear due to reshuffling of genes in linkage groups resulting in change of genotypes.

✚ **Repulsion :**

The tendency of dominant gene and recessive gene, to remain together on one chromosome and one recessive and other dominant gene on another chromosome.

✚ **Second Filial Generation [F₂] :**

The off springs produced due to self cross of F₁ individuals.

✚ **Serum test:**

The test carried out to determine the blood group of a person.

✚ **Spontaneous mutation :**

The mutation which develop randomly, naturally, automatically or spontaneously in an organism due to internal reasons without any relation to any external / environmental factor.

✚ **Test cross:**

A cross arranged for deciding whether an organism is homozygous or heterozygous.