

Terminology Of Genetics:

Gene:

The basic unit of hereditary material which is responsible for development of a trait.

Alleles:

Alternatives forms of genes are called alleles, e.g. tall versus dwarf.

Dominant:

The dominant alleles are those traits which show complete expression even in heterozygous state. Dominant alleles dominate the recessive alleles in heterozygous state.

Recessive:

Recessive alleles or traits are those which fail to express themselves in heterozygous state. For example r and y are recessive alleles for wrinkle and green seeds.

Homozygous:

Homozygous is a condition in which an individual possess similar alleles for a particular trait. For example TT for tallness and tt for dwarfness.

Heterozygous:

Heterozygous is a condition in which an individual possess dissimilar alleles for a particular trait. For example Tt for tallness.

Genotype:

Genetic make of an organism is called genotype.

Phenotype:

External appearance or expression of genotype is called phenotype. For example, roundness, wrinkleness of seeds and tall or dwarf plants represent different phenotype.

Gene:

Definition:

The fundamental unit of heredity, formed as a sequence of bases in DNA.

Characteristics Of Genes:

- Each gene has a definite position at the chromosome and may occur as alleles.
- The name gene was introduced by Johannsen in 1909 and the structure of DNA was elaborated by Watson and Crick in 1953.
- Genes determine all the structural and functional characters of an individual, like eye colour, skin colour, height, weight, blood group, hair, intelligence, temperament and all others.
- The characters from one generation to other are taken by genes.
- They sometimes change through the process of mutation. This gives variety in characters.
- The accurate structure of the proteins and enzymes in the body is determined by genes.

Chromosomes:

A chromosome is a rod-like portion of the chromatin of a cell nucleus, performing an important part in meiotic cell division, and in the transmission of heredity characteristics. Normally they are constant in number for any species; there are 22 pairs of chromosomes and two sex chromosomes in the human.

Types Of Chromosomes: in higher animals and plants, there are two fundamental types of chromosomes, which are classified on the basis of sex determination these are:

- i) Autosomes
- ii) Sex Chromosomes:

Autosomes:

These are paired somatic chromosomes that play no part in sex determination of organisms. These chromosomes are similar in males and females.

Sex Chromosomes:

The chromosomes that determine sex in organisms are called sex chromosomes. There are two types of sex chromosomes.

- a) X- chromosome
- b) Y- Chromosome

Genetic Engineering:

The deliberate modification of the characteristics of an organism by manipulating its genetic material.

OR

Scientific alteration of the structure of genetic material in a living organism. It involves the production and use of recombinant DNA and has been employed to create bacteria that synthesize insulin and other human proteins.

Significance Of Genetic Engineering:

i) To Cure the genetic disorders

Heredity diseases can possibly be treated by this technique by transplanting normal genes in the place of abnormal or diseased genes.

ii) To Prepare Better Crops

Crops with desired characteristics could possibly be produced by introducing desired genes.

iii) To Get Better Breeds Of Animals

Like plants better breeds of animals can also be produced by the introduction of recombinant DNA.

iv) Interferon

Interferons are effectively used in the treatment of Hepatitis of A & B.

v) Insulin

Human insulin is being produced by genetic engineering to treat diabetes

vi) Vaccines

Genetic engineering has also helped in the production of vaccines which are used for controlling and treating viral diseases.

Biotechnology:

The exploitation of biological processes for industrial and other purposes, esp. the genetic manipulation of microorganisms for the production of antibiotics, hormones, etc.

OR

Biotechnology is the use of living organisms (especially microorganisms) in industrial, agricultural, medical and other technological applications.

Importance Of Biotechnology:

- i) To increase production
- ii) To introduce improved quality of seeds and plants
- iii) To introduce plants resistant to disease and insect pests
- iv) To introduce varieties suited to particular climates and soils.
- v) To introduce varieties resistant to lodging
- vi) To improve nutritional value of crops
- vii) To save rare varieties of plants by rapid clonal propagation for breeders to use.