9. Heredity and Evolution

1. The transmission of characters from parent to their off springs is known as **heredity.**

- The study of heredity and variations is known as genetics.
- Clones are those organisms which are the carbon copies of one another.
- Variation in sexually reproducing organisms are caused due to the following factors like environment, crossing over and recombination of genes and mutation.
- The first study of inheritance was done by Gregor Mendel on garden pea.
- Paired condition of chromosomes is known as diploid.
- Unpaired condition of chromosomes is known as haploid.
- DNA (Deoxyribo Nucleic Acid), RNA (Ribo Nucleic Acid) is the genetic material in all organisms.

2. Mendel's laws of inheritance are

(i) Law of Dominance
(ii) Law of Segregation (Law of purjty of gametes)
(iii) Law of Independent Assortment

3. Genotype is the composition of genes present in an organism and the characteristic which is visible in an organism is called its phenotype.

4. When two parents cross (or breed) to produce progeny (or offsprings), then their progeny is called F1-generation (First Filial Generation) and when the first generation progeny cross among themselves to produce second progeny, then this progeny is called F2-generation or second Filial Generation.

- Mendel conducted his famous experiments on garden pea (Pisum sativum).
- He used a number of contrasting characters like round / wrinkled seeds, tall/ short plants, white/ violet flowers and so on.

5. During Monohybrid Cross

- When tall pea plants are crossed with short pea plants then in Fi generation only tall plants were obtained.
- F_2 progeny ofFi tall plants are not all tall but one quarter of them are short indicating that both tallness and shortness traits were inherited in F1 but only tallness trait was expressed due to dominance.
- In dihybrid cross two pairs of contrasting characters were considered. Tall plant with round seeds were crossed with short plant with wrinkled seeds. In Fi tall plants with round seeds were obtained. On selfing these F, plants with F_2 produced tall plants with round seeds, short plant with wrinkled seeds and some new combinations (tall plant

with wrinkled seeds and short plant with rounds seeds) were also obtained. The tall/short trait and round wrinkled traits are independently inherited.
- The expression of a particular trait is controlled by gene.

6. DNA is the source of making protein in a cell.

The section of DNA that provides information for one protein is called gene.

7. Physical and Chemical Basis of Heredity

Mendel (1866) said that heredity was controlled by particles, called germinal units, or factors.

8 Sex determination is the process by which the sex of a person is determined.

All human chromosomes are not paired. 22 pairs are called autosomes. Women have a perfect pair of sex chromosomes XX. But men have a mismatched pair XY.

9. Evolution

It is the sequence of gradual changes which take place in the primitive organisms over millions of years in which new species are produced.

A. The evidences of evolution are :

i. Homologous organs,
ii. Analogous organs, and

Fossils

B. Theories of Evolution

Jean Baptiste Lamarck gave the first theory of evolution.

Darwin's Theory of Evolution

Charles Robert Darwin (1809-1882) explained the evolutionary principle in his famous book "The origin of species". The theory proposed by him is popularly known as theory of natural selection or Darwinsim.

The main features of the theory of natural selection are as follows:

(i) Over production
(ii) Limited food and space
(iii) Struggle for Existence
(iv) Variations
(v) Natural Selection or Survival of the Fittest

10. Speciation : The process by which new species develop from the existing species is known as speciation.

The factors which leads to speciation are :

- Geographical isolation
- Genetic drift and
- Variations

11. Classification

Evolutions are of three types :-

(i) Convergent Evolution
(ii) Divergent Evolution, and
(iii) Parallel Evolution.

12. Fossils : The remains of dead plants or animals that lived in the remote past are known as fossils.

Various kinds of fossils are : Ammonite, Trilobite and Dinosaur.

13. Evolution by Stages : Evolution of complex organs have taken place bit-by-bit over generations.

For example eye, feathers of birds have evolved because of survival advantage of intermediate stages.

Thus changes in DNA during reproduction are the main cause of evolution.

14. Human Evolution : All have beings belong to single speceis Homo sapiens, although there were many races of humans.

They have originated in Africa, some ancestors left Africa and migrated to West Asia, Central Asia, Eurasia South Asia, East Asia, Indonesia, Australia, America, while others stayed there.

Excavating, time-dating, studying fossils, determining DNA Sequences have been used for studying human evolution.