PRINCIPLE OF INHERITANCE AND VARIATION

Mendelian Disorder
- It is caused by alteration or mutation in the single gene.
- Autosomal dominant: Eg. Muscular Dystrophy.
- Autosomal recessive; Eg. Sickle cell anaemia, Albinism
- Sex linked: Eg Haemophilia.

Chromosomal disorder
- It is caused due to absence or excess or abnormal arrangement of one or more chromosomes.
- Example. Down's syndrome(trisomy of 221)
- Klinefelter's Syndrome(XXY in male).
- Turner's syndrome(XO in female)

Pedigree Analysis

Definition
Record of occurence of a trait in several generation of a family

Symbol used
- ☐ Male
- ○ Female
- ◇ Sex unspecified
- ☐○◇ Affected Individual
- ☐—○ Mating
- ☐—○ Mating between relatives(consanguineous mating)
- Parents above and children below(in order of birth-left to right)
- Parents with male child affected with disease
- ⑤ Five uneffected offspring

Importance
Pedigree study is utilized to track the inheritence of a specific trait, abnormality or disease.

Genetic Disorder

Studied 7 pairs of cotrasting characters of Pea Plant

S No.	Characters	Contrasting Traits
1	Stem Height	Tall/ Dwarf
2	Flower Colour	Vollet/ White
3	Flower Position	Axial/ Terminal
4	Pod Shape	Inflated/ Constricted
5	Pod Colour	Green/ Yellow
6	Seed Shape	Round/ Wrinkled
7	Seed Colour	Yellow/ Green

Gregor Mendel proposed Three laws

Law of dominance
In heterozygous condition only one member of a pair expresses its effect in the hybrid and is called as dominat while the expression of other is supressed and is known as recessive.

Law of Segregation
During gamete formation, the factors of a character pair present is parent segregate from each other such that a gamete recieves only one of the two factors.
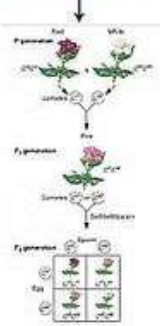
Law of Independent assortment
When two pairs of traits are combined in a hybrid, segregation of one pair of characteristics is independent of the other pair of characters.

Mutation

Definition
- Sudden heritable change in DNA sequence, which results in change in the genotype and the phenotype of an organism.
- Leads to variation in DNA.

Frameshirt Mutation
Loss/ Deletion or gain/ insertion/ duplication of a DNA segment

Point Mutation
Change in a single base pair of DNA. Eg. sickle cell anaemia.

Sex Determination
- ZZ ZW mechanism Example Birds
- XX X O mechanism Example Grasshopper
- XX XY mechanism example Human being

Chromosomal theory of Inheritance
- Proposed by Walter Sutton and Theodore Boveri in 1902.
- Thomas Hunt Morgan Formulated Chromosonal theory of inheritance using fruit flies (Drosophila melanogaster).
- Morgan coined the term Linkage

- Chromosomes are immortal.
- Two identical chromosomes form a homologous pair.
- They segregate at the time of gamete formation.
- Independent pairs segregate independently of each other.
- Chromosomes are mutable

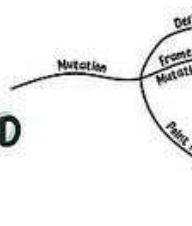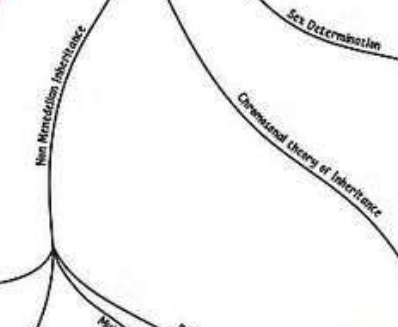## Non Mendelian Inheritance

Incomplete Dominance
The heterozygous offspring shows intermediate character between two parental characteristics.
- Phenotypic ratio and Genotypic ratio are same Eg. Flower colour in Antirrhinum sp. and Mirabilis Jalapa

Co-Dominance
- Two alleles of a gene are usually dominant and express themselves even when they are together.
- Eg. ABO blood grouping in Human.

Multiple Alleles
A gene exists in more than two allelic forms Eg. ABO blood grouping

Pleiotropy
Ability of a gene to have multiple phenotypic effects as it influences a number of character simultaneously.