

GENETICS

25/5-

PRINCIPLES OF INHERITANCE AND VARIATIONS

⇒ Study of the heredity and variation called "genetics".

● HEREDITY ⇒

Study of the transfer of characteristics called "heredity".

It is associated with similar kind of progeny [Like begets like].

⇒ In human being there are more than 200 characteristics transmit from progeny and these characteristics are responsible for maintenance of consistency of species.

Mechanism of the transmission of characters called "Inheritance".

● VARIATION ⇒

Study of the difference among the individuals of same species / population are known as variation.

↪ variation are base of "evolution and adaptation".

↪ "variation" are two types :-



- These are Non inheritable variation.

- These are inheritable variation.

- These are acquired variation arises after birth.

- These are innate variation since birth.

- It arises due to :-

- [i]. Environment
- [ii]. Use and disuse
- [iii]. Conscious effort

- It may be arises due to :-

- [i]. Crossing over
- [ii]. Independent assortment
- [iii]. Random Fertilization
- [iv]. Mutation.

GERMINAL VARIATION



Continuous variation

- Such differences appear around mean value of character and also called as fluxal variation.

- These are predictable change.

- They already present in population specie.

- ** They may be arises due to crossing over, Random Fertilization, Independent Assortment.

- Darwin concept based on continuous variation.

Discontinuous variation

- It arises suddenly and recently. They are also known as SPORTS / SALTATION / MUTATION.

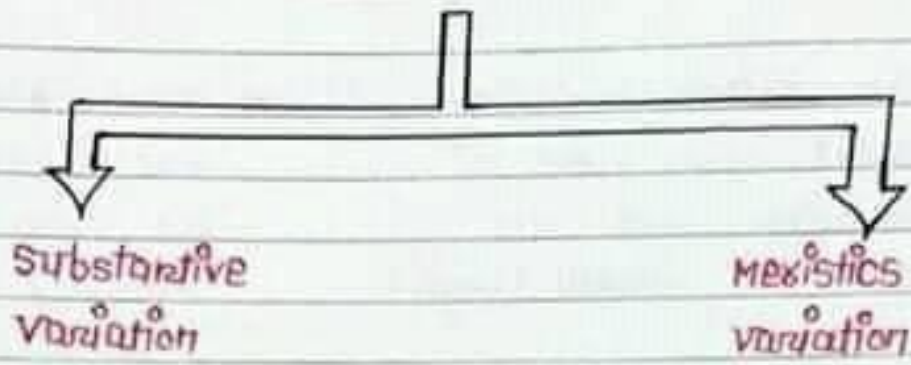
- These are unpredictable.

- They arises accidentally / suddenly so they are not necessary to present in population.

- ** They arises due to mutation.

- Hugo de Vries concept based on discontinuous variation.

CONTINUOUS VARIATION



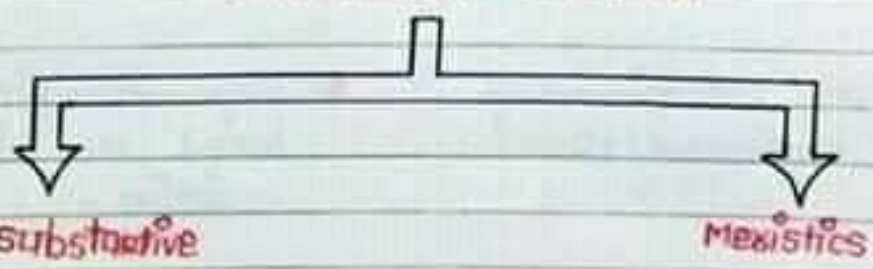
- These variations present appearance associate character.

- These variations present with number associate variation.

eg: = Human skin colour,
Human height,
Human eye colour.

eg: = Number of grains in wheat,
Number of arms in starfish,
Number of tentacles in Hydra.

DISCONTINUOUS VARIATION



eg: = short legged
finer sheep,
hairless cat,
hornless cattle,
brachydactyly,
syndactyly.

eg: = Polydactyly,
single kidney in
human being.

INTRODUCTION

- Genetics term was given by "W. Bateson".
- "G. J. Mendel" - Father of Genetics.
- "W. Bateson" - Father of modern Genetics.
- "Morgan" - Father of Experimental genetics.

Morgan performed experiment on *Drosophila* and proposed various concept like Linkage, sex linkage, crossing over, Dis - cross inheritance, Linkage map on *Drosophila*.

- "A. Garrod" - Father of human genetics and Biochemical genetics. Garrod discovered first human metabolic disorder which is called "alcaptonuria" [black urine dis.]. In this disease enzyme homogentisic acid oxidase is deficient. He gave the concept "one mutant gene - one metabolic block".

* SOME GENETICAL TERMS :-

1. CLONE ↷

Group of the products of asexual reproduction are known as clone.

2. **RAMATES** ↷

Each representative of clone is known as ramates.

3. **OFFSPRING** ↷

Products of the sexual reproduction are known as offspring.

4. **SIBLING** ↷

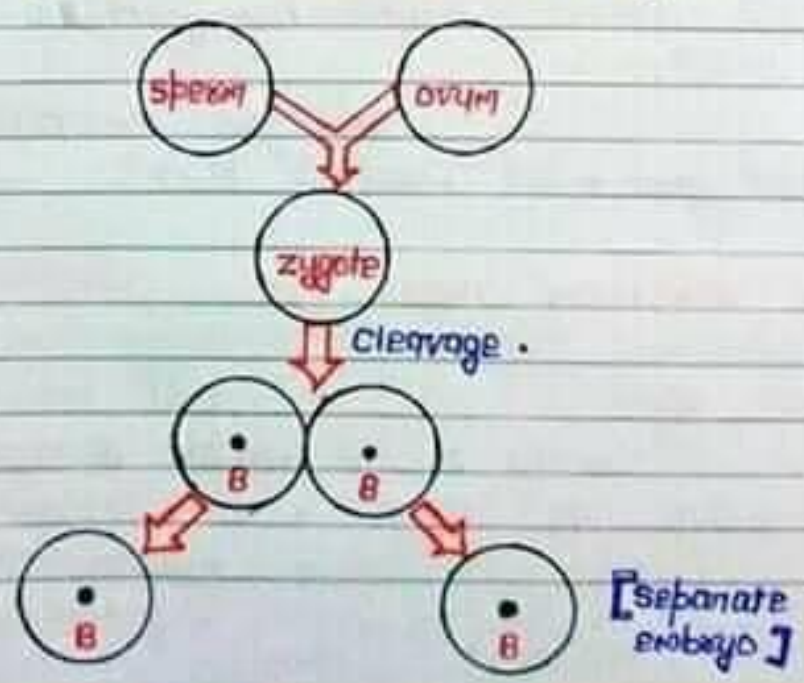
Products of the sexual reproduction of the same parents called sibling.

5. **TWINS** ↷

Product of sexual reproduction through the same pregnancy of same parents.

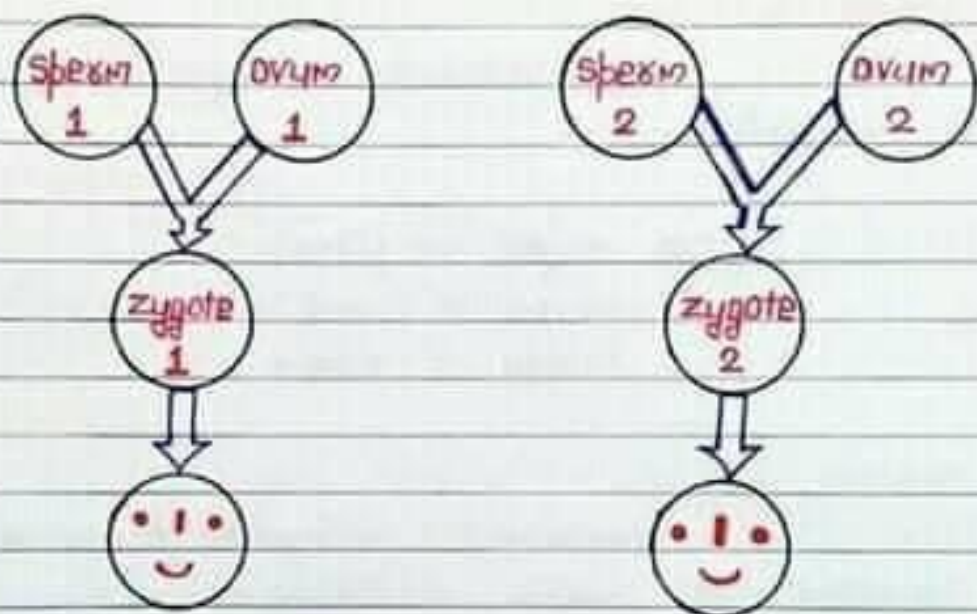
● **Monozygotic Twins** ↷

They develop from one zygote, which splits and forms two embryos.



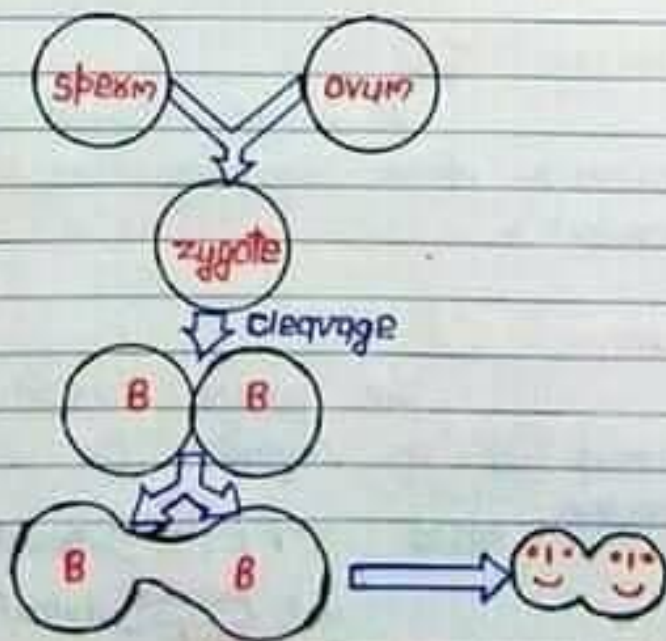
• Dizygotic Twins ↷

Each twin develops from a separate egg and each egg is fertilized by its own sperm cell.



• Siamese Twins ↷

Siamese twins are two babies who are born physically connected to each other.



25/3-

⇒ In certain cattle dizygotic twins may not be of opposite sex because developing male fetus arrested differentiating female fetus, that is known as free martin.

6. CHARACTER ⇒

Features of the organism are known as characters.

eg: = height of plant,
shape of seed,
colour of flowers.

7. TRADE ⇒

Inheritable distinguish forms of the characters are known as Trade.

eg: = Tall / dwarf,
violet / white,
Round / wrinkled etc.

8. PHENOTYPE ⇒

It is the external and morphological appearance of an organism for a particular character.

9. GENOTYPE ⇒

The genetic constitution or genetic make-up of an organism for a particular character.

eg: = TT $\xrightarrow{\text{Poor nutrients}}$ dwarf
 tt $\xrightarrow{\text{Rich nutrients}}$ dwarf

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Genotype and Phenotype terms were coined by Johannsen.

10. GENOME

The haploid set of chromosome in a gamete / microorganism / in each cell of a multicellular organism.

OR

Sum total of all the gene present on the single set of chromosome called genome.

12. GENE POOL

Sum total of all the genes present in all individuals of any population are known as gene pool.

13. GERMPLASM

Sum total of all the gene present in cultivated varieties, wild varieties, regional varieties and other cultivated varieties called germ plasm.

14. HOMOLOGOUS CHROMOSOME

Those chromosome which are similar in structure, shape, size and locus are known as homologous chromosome.

Their gene may or may not be similar.

