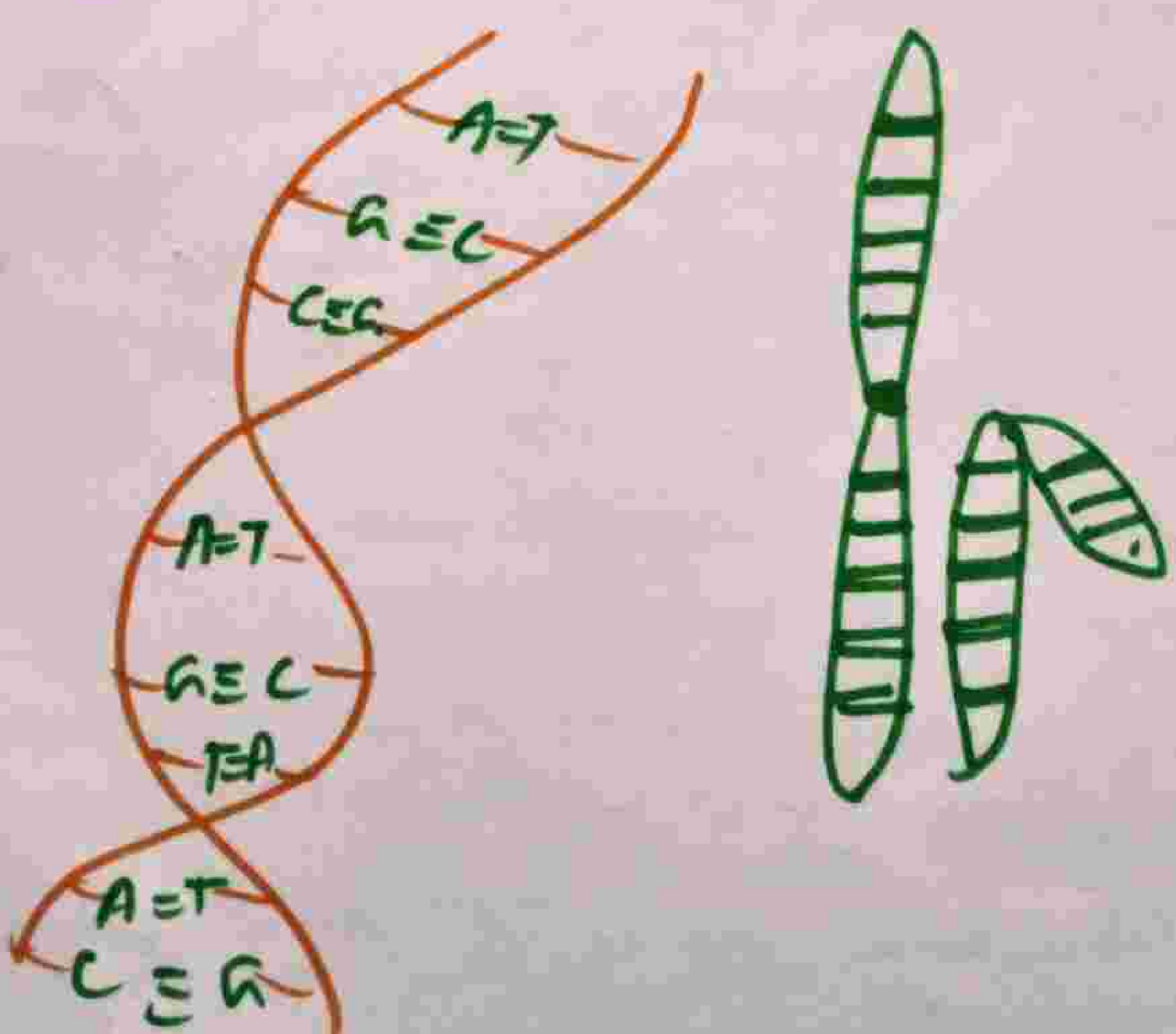
UNIT II

GENETICS

and

Evolution



chapter 5 - Principles of Inheritance and Variation.

→ Some terms of Genetics

→ Premendelian concept of Genetics

→ Mendelian inheritance

→ Mendels laws of Inheritance

→ Non Mendelian Inheritance.

→ Pleiotropy

→ Polygenic inheritance.

→ Multiple allele

→ chromosome theory of inheritance

→ Linkage and recombination.

→ chromosome mapping.

→ Sex determination.

→ Pedigree analysis.

→ Mutation - Genetic disorders

Some common terms of Genetics

1. **Genetics** → The branch of Biology concerned with the study of Heredity and variation in orgenism

→ The term Genetics was given by British biologist **William Bateson**

2. **Heredity** → The offsprings resemble their parents i.e "like begets like"

→ The transmission of characters from one generation to other generation is called Heredity or Inheritance.

3. **Variation** → The differences between parents and offspring is called Variation.

→ organism which undergo asexual reproduction have less chances of variation, whereas organism which adopt Sexual reproduction undergo Variation.

→ Sexually reproducing organism have better chances of survival due to variation.

→ Variation appear in sexually reproducing organism due to recombination of genes. as Meiosis occure during sexual reproduction so crossing over
→ takes place and gametes come from different individual.

→ Types of variation

Continuous variation

↓

→ These variation passes from one generation to other. It occur due to Meiosis.
→ When number of vari. Variation increase and Interbreeding is not possible between one generation to other than it results in formation of New species..

Discontinuous Variation

→ The variation which appear suddenly due to Mutation.
→ concept of Mutation was explained by Hugo devries
→ The useful Mutations are Inheritol.

3. **Gene** → Gene is the unit of inheritance.

→ Gene is the segment of DNA that code for any Protein.

→ Term Gene was given by **Johannsen**.

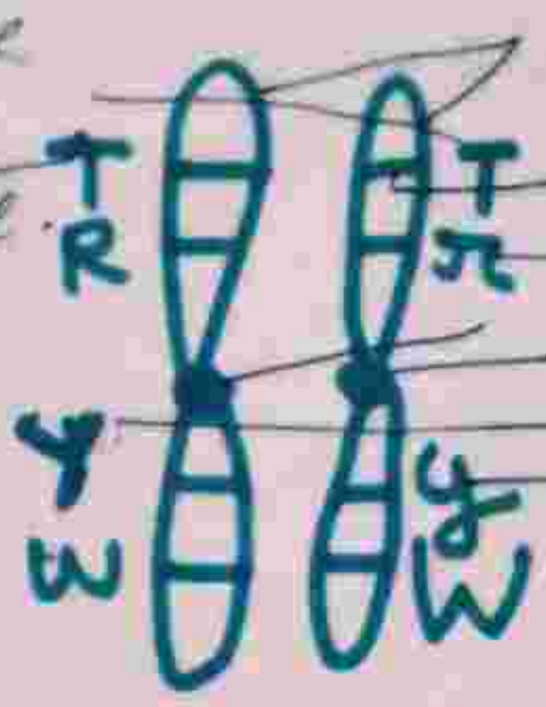
4. **Allele** → Allele are the alternative forms of genes.

e.g If a gene is for Height of stem then Alleles are T and t (Tallness) (Dwarfness)

→ **T** is dominant Allele, **t** is recessive Allele.

5. **Homologous chromosome**

The chromosome which are of same size, have same location of centromere carry Same type of genes but they can carry different type of Allele.



Homologous chromosome.

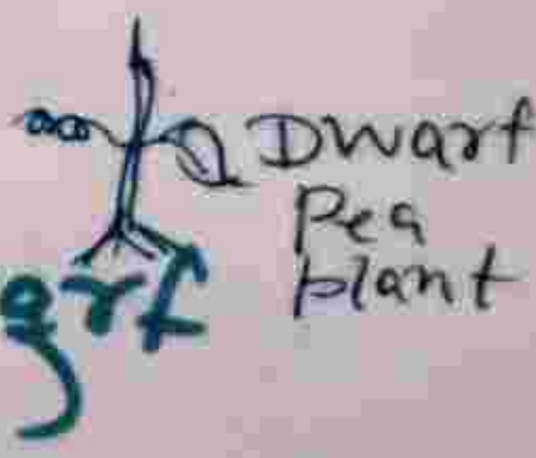
6. **Character** — The specific morphological or Physiological feature of Individual.
e.g Height of stem, colour of flower.
Shape of seed, colour of seed.

7. **Trait** — The expression of character in Phenotypic form.

→ Each character has two contrasting trait e.g a) **Height of stem**

Tall (T)

Dwarf (t)



b) Shape of Seed

(R) Round

Wrinkled (r)

c) colour of seed.

(Y) Yellow

Green. (y)

Note → Allele Always exist in pairs.

e.g For the genes of Height

TT [Tall]

Tt [Tall]

tt [Dwarf]

Gene symbol :-

Each Trait have particular symbol

Dominant Trait → T

Recessive trait → t

D

d

Phenotype → Expressed form of any character [External appearance]

→ Term given by Johannsen.

→ E.g For the character Height

→ Phenotype will be either
Tall or Dwarf
TT tt
or
Tt

→ Phenotype changes with Age and tim

Genotype → It is the actual genetic constitution of the Individual.

e.g Pure Tall TT
Hybrid Tall Tt
Pure dwarf tt

→ Term given by Johannsen

→ Genotype do not change with age and time.