
	<b>INDIAN SCHOOL AL WADI AL KABIR</b>		
<b>Class: X</b>	<b>Department: SCIENCE 2023 – 24</b> <b>SUBJECT: SCIENCE(BIOLOGY)</b>		<b>Date:</b> <b>17-10-2023</b>
<b>HANDOUT</b>	<b>CHAPTER / UNIT: HEREDITY AND EVOLUTION</b>		<b>Note:</b> <b>A4 FILE FORMAT</b>
<b>NAME OF THE STUDENT</b>		<b>CLASS &amp; SEC:</b>	<b>ROLL NO.</b>

**GENETICS:** It is the branch of biology that deals heredity and variation.

**HEREDITY:** It is the branch of genetic which deals with the transmission of traits (characters) from one generation to another generation.

**VARIATION:** It is defined as the changes in the characters (traits) among the individuals of the same species.

Some variations arise due to inaccuracy in DNA replication.

**DOMINANT TRAIT:** The form of a character of trait which expressed in the hybrid progeny, is called a dominant trait.

**RECESSIVE TRAIT:** The form of a character of trait which is not expressed in the hybrid progeny, is called a recessive trait.

**GENOTYPE:** The genetic information or constitution of a cell or an organism is called its genotype.

**PHENOTYPE:** - It is a morphological expression of a single character. For example: If a particular plant is tall or short, it is the tall or short phenotype.

**GENE:** Gene is the functional unit of DNA, which provides information for a protein.

**ALLELES:** Alternative forms of the same gene. (Tt) for Height.

**HOMOZYGOUS:** Organism in which both the genes of a character are identical. E.g. -Tall-TT

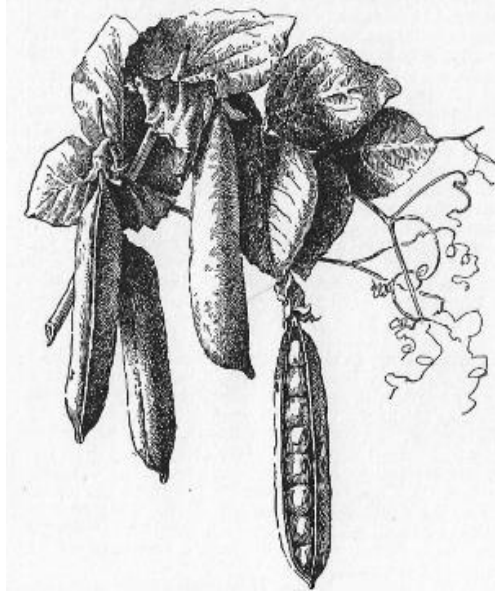
**HETEROZYGOUS:** Organism in which both the genes of a character are unlike. E.g.-Tall-Tt

## MENDELISM

**Gregor Mendel** is considered as '**Father of Genetics**'.

His breeding experiments were carried out on **Garden peas** (*Pisum sativum*). He chose this plant due to the following reasons:

- As it is an annual plant, and easy to cultivate.
- Flowers are bisexual.
- Cross pollination can be achieved easily.



### **Reasons for selecting *Pisum sativum*, the garden pea plant:**

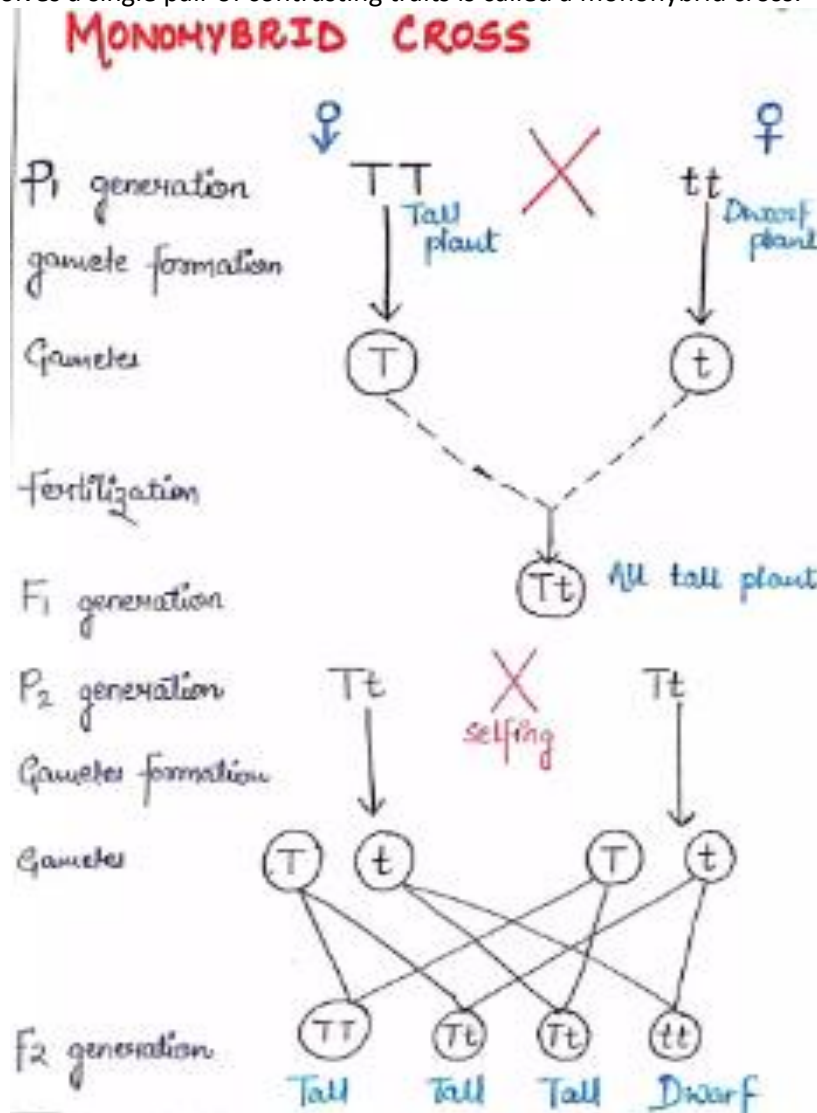
- Flowers are bisexual & naturally self-pollinating
- Annual plant with short life cycle makes it possible to study several generations within a short duration of time.
- Easy to cross pollinate
- Easy to cultivate & large number of offspring are produced in each progeny.

He studied the inheritance of **7 different pairs** of contrasting characters in garden pea.

S.no.	Character	Dominant	Recessive
1.	Plant height	Tall	Dwarf
2.	Seed shape	Round	Wrinkled
3.	Cotyledon colour	Yellow	Green
4.	Seed coat colour	Grey	White
5.	Pod shape	Inflated	Constricted
6.	Pod colour	Green	Yellow
7.	Position of Pod	Axial	Terminal

## Monohybrid cross

A cross which involves a single pair of contrasting traits is called a monohybrid cross.



On the basis of monohybrid cross, he proposed the following principles:

### a) Principle of dominance

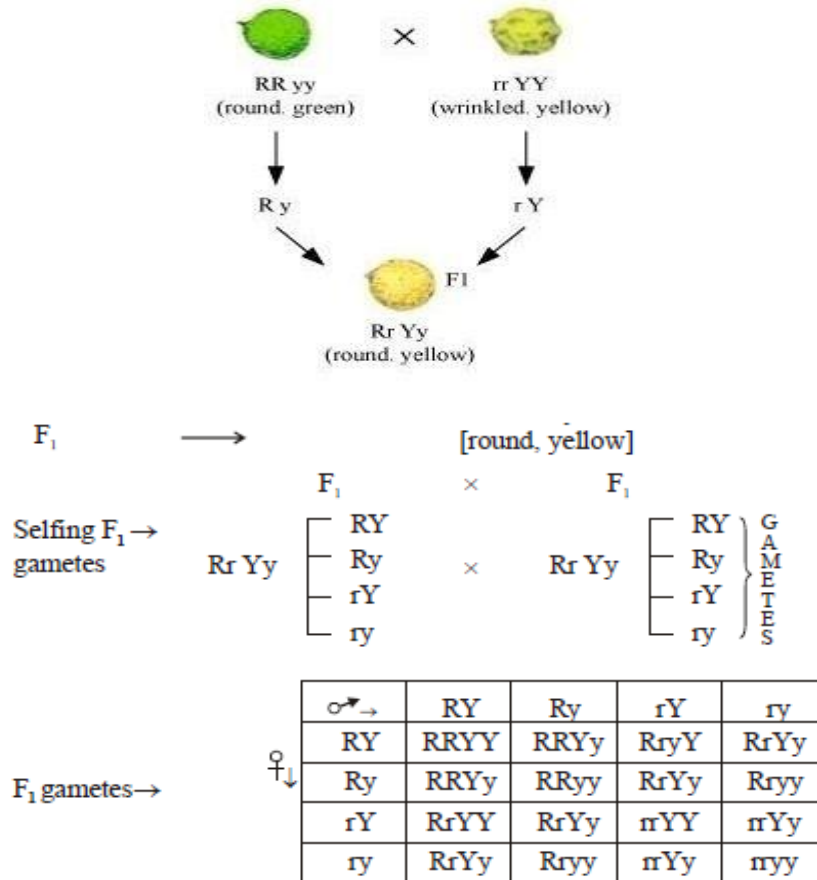
When one contrasting pair of traits are crossed, one of the factor only expresses itself in an individual. The trait that expresses is called dominant trait and the one which did not show its effect is called a recessive one.

### b) Principle of segregation

In a monohybrid cross, the factors do not mix up but just associate themselves and remain together, and separate at the time of gamete formation.

**Dihybrid cross:** A cross involving two pairs of contrasting characters is called a dihybrid cross. For example- **Round & green seeds (RRyy), Wrinkled & Yellow seeds (rrYY)**

**PARENT GENERATION ---> ROUND GREEN SEEDS x WRINKLED YELLOW SEEDS**



The phenotype ratio was 9: 3: 3: 1; as shown in the punnet square

**9 are Round and yellow**

**3 are Round and green**

**3 are Wrinkled and yellow**

**1 is wrinkled and green**

On the basis of a dihybrid cross, he proposed the Principle of Independent assortment

**Principle of Independent assortment** -The inheritance of two or more genes at a time, their distribution in gametes and in subsequent generations is independent of each other.

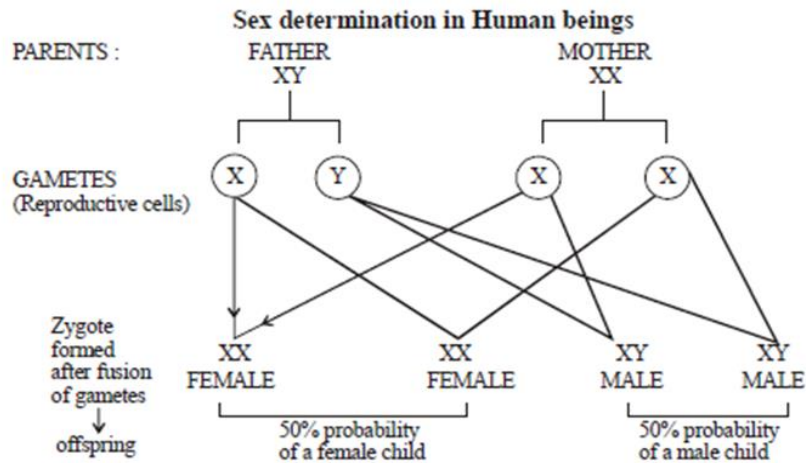
**Expression of traits:** Gene is the segment of DNA which provides information for synthesis of a protein and this protein is responsible for a trait. For example: The height in plants -Plant hormones control the height in plants. If the gene is dominant, more enzyme will be produced which in turn will help in increasing the hormone production. As a result, the plant will be tall. If

the protein (enzyme) is formed in less quantity, hormone will be less and in turn the plant will be short.

In this way, genes control traits in organisms

**Sex determination in humans**

Sex in humans is determined at the time of fertilization, when the male and female gametes fuse together. Humans have 46 chromosomes in their normal cells. 44 of them are called autosomes and are responsible for general body features. The remaining two are called sex chromosomes or allosomes which determine the sex of the offspring.



This shows that half the children will be boys and half will be girls. All children will inherit an X-chromosome from their mother regardless whether they are boys or girls. Thus, sex of children will be determined by what they inherit from their father, and not from their mother.

Inherited Trait	Acquired Trait
Characteristic features that are inherited from previous generation	Traits or characteristics which develop in response to the environment and cannot be inherited
Occur due to a change in genes or DNA	No change in genes or DNA is involved
Pass on from one generation to another	Cannot pass on from one generation to another
E.g. Red curly hair, Brown eyes	E.g. Cycling, Swimming

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