

STD 10-BIOLOGY-FIRST BELL-CLASS-37 Dated 17/12/2020
Chapter – 6
UNRAVELLING GENETIC MYSTERIES



- Children may inherit certain features either from their mother or father. Features that are not seen in parents may also be found in children.

Find out such differences from the picture.

- The hair colour of parent and offsprings of deer and cat are different.
- The shape of the hair of the mother and the children are different.
- Shape of the forehead and ear of the son are different from that of the mother

HEREDITY

- The transmission of features of parents to offspring is termed as heredity.

VARIATION

- The features seen in offspring that are different from their parents are called variations.

GENETICS

The branch of science that deals with heredity and variations is called Genetics.

Gregor Johann Mendel



- Born in 1822 at Brunn, Austria.
- He studied the inheritance of 7 pairs of contrasting traits in pea plants, scientifically known as *Pisum sativum*.
- In 1866 his findings were published, but they failed to get due recognition.
- In 1884 he died.

- The significance of his findings was identified by research works conducted later.

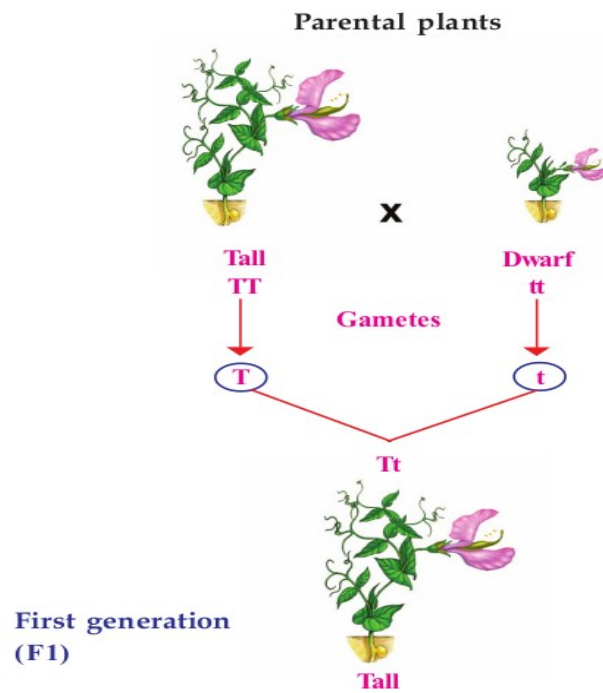
- Mendel formulated the laws of inheritance by analysing the inheritance of seven different characters like:
 - Height of plants,
 - Position of flower,
 - Shape of seed,
 - Colour of seed coat,
 - Colour of cotyledon,
 - Colour of fruit
 - Shape of fruit.

Genes and Alleles

- Gregor Mendel assumed that the inheritance of characteristics from parents to offspring is by certain factors transferred through gametes.
- It was discovered on the basis of later studies that the factors are the genes present in the chromosomes of the nucleus.
- **Genes** are considered as a unit of heredity that is responsible to carry traits and characteristics from parents to children.
- A gene that controls a character has different forms. They are called **alleles**.
- Generally, a gene has two alleles.

- For example, **T and t** are the different alleles of the gene that controls the character, height.
 - The **allele T** determines the trait tallness and the **allele t** determines the trait dwarfness.
 - The allele that determines the dominant trait is generally indicated by a capital letter and the allele that determines the recessive trait is indicated by a small letter.
- Mendel explained that each character is controlled by a pair of factors, which he illustrated using symbols.
- **The hybridization experiment conducted on the basis of two contrasting traits of the character height in pea plant.**





- The character of pea plants considered in this experiment is :
 - Height of a plant
- The contrasting traits of this character.
 - Tall and short
- The traits those were apparent and not apparent in the first generation.
 - Apparent trait TALLNESS
 - Not Apparent trait DWARFNESS
- Difference in the factors of tall parent plant and the first generation plant.
 - Factors of Tall Parent plant was TT (Homozygous)
 - First generation is Tt (Heterozygous)

- When plants that differ in a pair of contrasting traits are hybridized, only one trait is expressed while the other remains hidden in the offspring of the first generation.
- The expressed trait is called **Dominant trait**
- The hidden trait is called **Recessive trait**.
- The factor that no intermediate plants were formed by the hybridization of tall and dwarf plants, and the factor responsible for dwarfness remaining hidden persuaded Mendel to continue with his experiments.
- Mendel self pollinated the first generation plant to understand what happened to the factor responsible for dwarfness in the first generation.



- Among the 1064 plants obtained in the second generation, 787 plants were tall and 277 plants were dwarf. The ratio of the result obtained is approximately 3 : 1.

ഒന്നാം തലമുറ സസ്യത്തിന്റെ സ്വപരാഗണം
Self pollination of first generation plant



രണ്ടാം തലമുറ
Second generation
F2

1064 ചെടികൾ

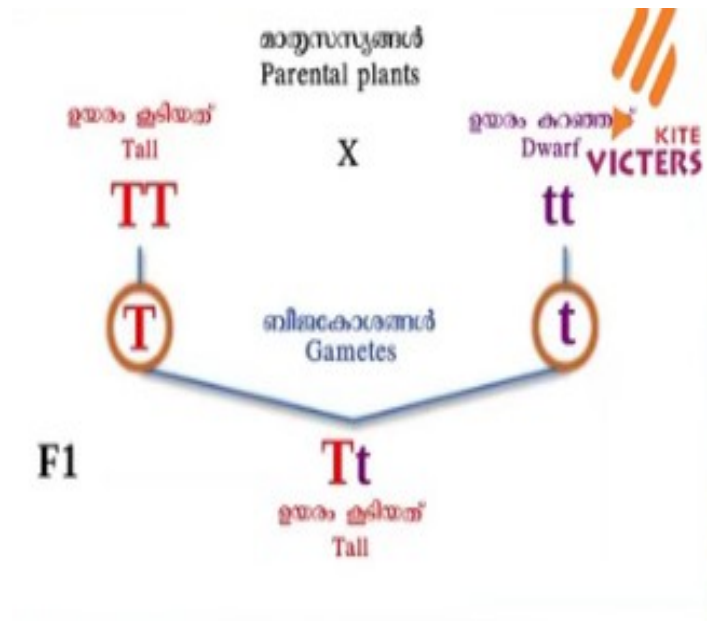
787 - ഉയരം കൂടിയത് / Tall

277 - ഉയരം കുറഞ്ഞത് / Dwarf

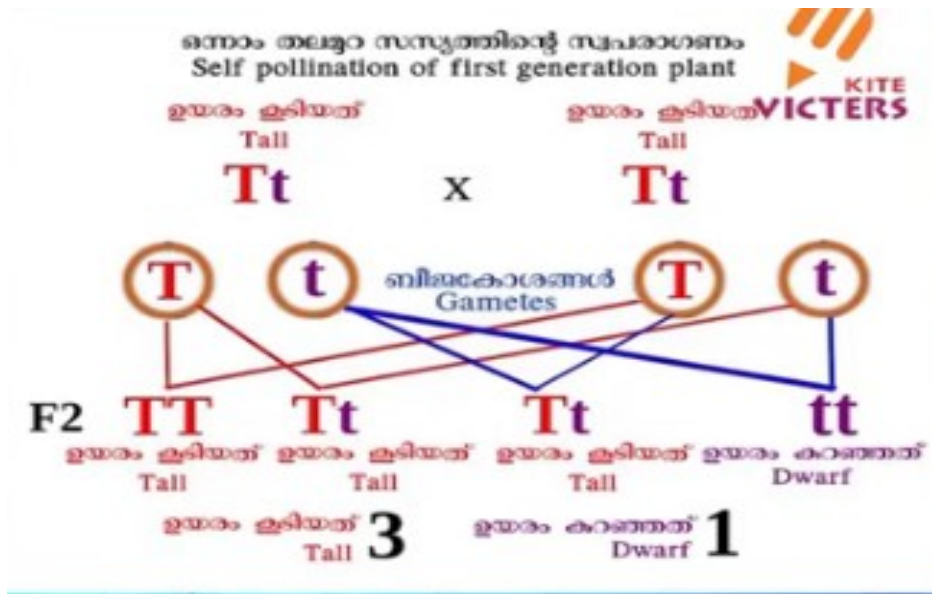
അനുപാതം/Ratio

3:1

F1 GENERATION (F1)



SELF POLLINATION OF F1 GENERATION – F2 GENERATION



- Plants in the second generation and their factors.
 - In Second generation there were 4 plants , one tall plant with TT factor , and 2 tall plants with Tt factor and one dwarf with tt factor in the ratio 3:1(three tall plants and one dwarf plant)
- Recessive trait in the first generation and the second generation.
 - Recessive trait was not expressed in First generation and in second generation one plant with recessive trait(tt) was expressed.
- Why does the recessive trait in the first generation appear in the second generation?
 - During gamete formation the factors that determine a particular character segregate without getting mixed; ie., half of the gametes formed from first generation plant Tt, contain T and the other half contain t.
- **The inferences formulated by Mendel from such experiments are given below.**
 - A character is controlled by the combination of two factors.
 - One trait is expressed (dominant trait) and the other trait remains hidden (recessive trait) in the offspring of the first generation.

- The traits that remain hidden in the first generation appear in the second generation.
- The ratio of the dominant and the recessive traits in the second generation is 3:1.

EVALUATION:

Parental plants	First generation	Second generation (self pollination)	Approximate ratio
Position of flowers Axial × Terminal	651 (Axial), 207 (Terminal)
Shape of seeds Round × Wrinkled	882 (Round), 299 (Wrinkled)

1) Complete the above table and write short note by comparing the ratios.

2) What is :

- Hereditiy
- Variations
- Genetics.
