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# PRINCIPLES OF INHERITANCE AND VARIATION

## Genetics

Genetics is a branch of biology dealing with inheritance and variation of characters from parents of offspring.

### Inheritance

Process by which characters are passed on from parent to progeny

### Variation

Degree by which the progeny differs from its parents

## Mendel's Experiments

- Gregor Johann Mendel known as the father of genetics proposed the laws of inheritance.
- He used garden pea as his sample.
- Large sampling size gave credibility to his collected data.
- Garden pea plant possessed certain completely opposite traits.

Example – tall and dwarf plants

- He worked on the following **seven** traits of garden pea:

S. No.	Character	Dominant	Recessive
1	Stem height	Tall	Dwarf
2	Flower colour	Violet	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

- True breeding pea lines were obtained by continuous self pollination for several generations.
- Fourteen true breeding pea lines were selected as pairs, which were similar except for one character with contrasting traits.
- Artificial cross pollination (hybridisation) was performed on such varieties to obtain first hybrid generation known as the first filial progeny or F<sub>1</sub>.

## Inheritance of One Gene

- After hybridisation, the F<sub>1</sub> generation so obtained resembled only one of its parents (say, all tall; no dwarf).
- When 2 plants from F<sub>1</sub> generation were self pollinated, the second filial progeny or F<sub>2</sub> generation was obtained.
- Revival of unexpressed trait (dwarf) was observed in some F<sub>2</sub> progeny.  
Both traits, tall and dwarf, were expressed in F<sub>2</sub> in ratio 3:1.
- Mendel proposed that something is being passed unchanged from generation to generation. He called these things as 'factors' (presently called genes).
- Factors contain and carry hereditary information.
- Alleles – Slightly different form of same factor

Two alleles code for a pair of two contrasting traits. (e.g., tall and dwarf)