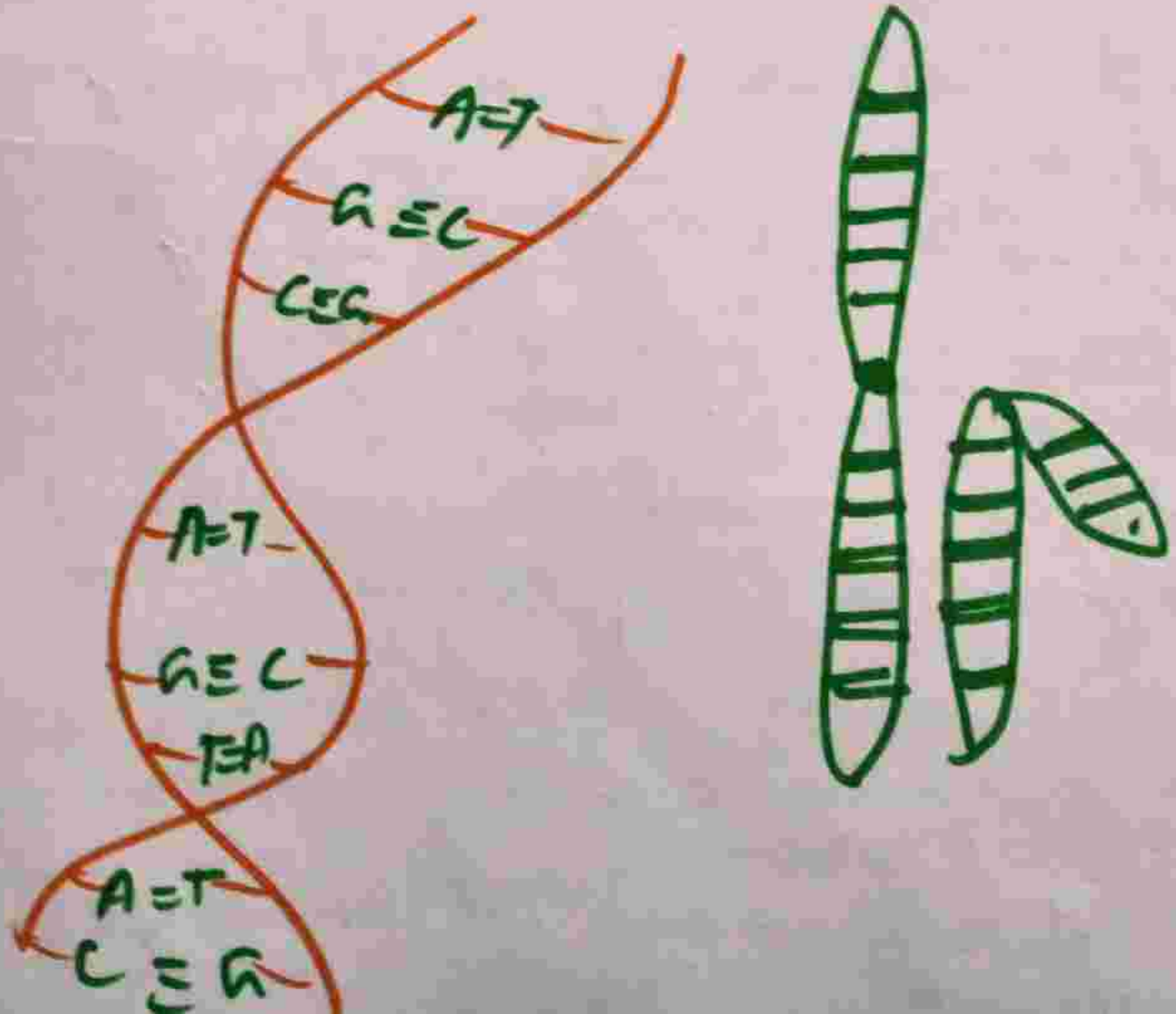
# UNIT II

# GENETICS

and

# EVOLUTION



# Principles of Inheritance and Variation — 04

**Back cross** → Back cross is cross of $F_1$ generation with one of their parents i.e either recessive or dominant.

- Out cross
- Test cross

**$F_1$ generation crossed with Dominant Parent**

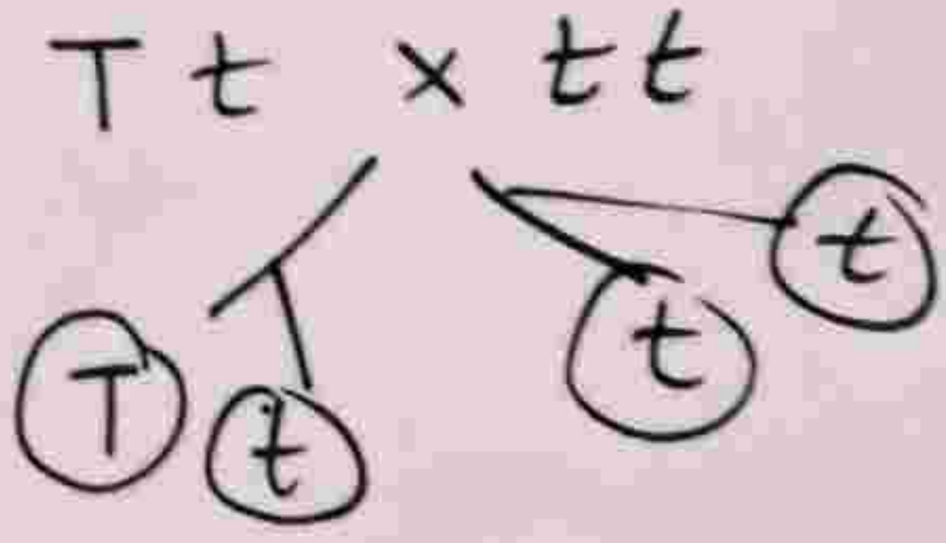
TT x Tt


| ♂ / ♀ | T | T |
|---|---|---|
| T | TT | TT |
| t | Tt | Tt |

All Tall

**$F_1$ generation crossed with recessive parent**

Tt x tt




| ♂ / ♀ | T | t |
|---|---|---|
| t | Tt | tt |
| t | Tt | tt |

50% tall : 50% Dwarf

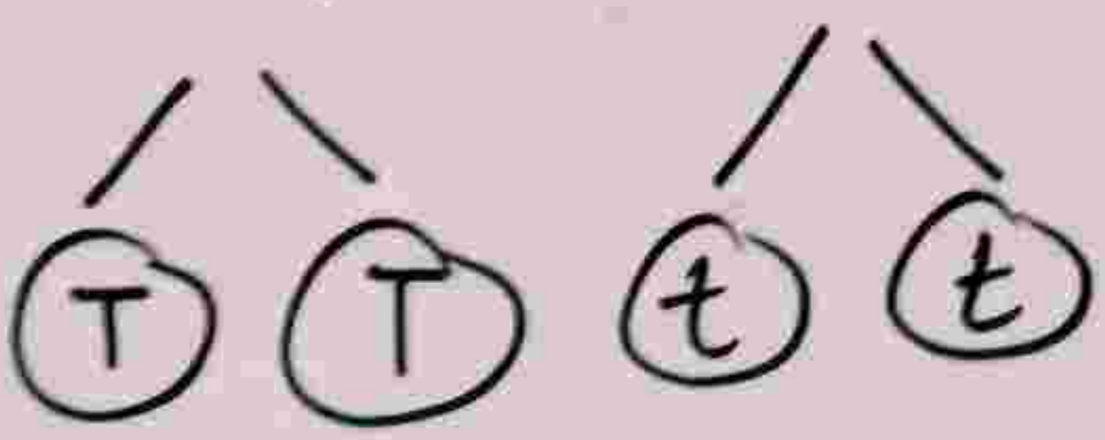
→ Test cross is to test the Purity of the individual.

Test cross I

↓

When the individual is Homozygous dominant

TT x tt




| ♂ T | T |
|---|---|
| ♀ t | Tt | Tt |
| t | Tt | Tt |

All Tall [Hybrid]

Test cross II

When the individual is Heterozygous dominant

Tt x tt


| ♂ T | t |
|---|---|
| ♀ t | Tt | tt |
| t | Tt | tt |

50% Tall :
50% Dwarf.
1 : 1

Out cross is done to increase Homozygous forms.

# PREMENDELIAN CONCEPT of GENETICS
# or
# HEREDITY
# or
# THEORY OF BLENDING INHERITANCE

→ It was believed that all the traits of parents get blended in the offspring during Transmission.

→ ① Moist vapour theory – Pythagorus.
According to this theory. vapours are emitted from different part of body which get collected to form offspring

② Fluid theory – Empedocles
Fluid is secreted from different part of body of Parents, which get mixed during formation

③ Reproductive blood theory
– Aristotle
embryo is produced due to mixing of reproductive blood of Parents

(4) Preformation theory — Malpighi
Acc. to this theory a miniature individual of very small size is present in sperm or egg. Which was Homunculus and it grows to form individual.

(5) Particulate theory — Maupertius
Body of each Parent give rise to minute particles which unite to form individual.

(6) Theory of Pangenesis — Darwin
Acc. to this theory every cell of the body produces minute structures called Pangene or gemmule. They accumulate in reproductive cell and from there to embryo.

(7) Theory of Epigenesis — Wolff
Acc. to this theory germ cells contain definite but undifferentiated substance which after fertilization become organised to organs and New individual is formed.

# MENDELIAN INHERITANCE

→ Gregor John Mendel (1822 – 1884)

→ FATHER OF GENETICS

→ Birth 22 July 1822 in village Silisian of Heinzendrof [Austria]

→ Joined Augustinian Monastry [Brunn] (1843) Monk Priest + Science teacher

→ got interested in breeding of Garden Pea [1856]

→ Pisum sativum [Experimental Material]

→ Hybridisation [1856 - 1863] - 7 years.

→ 7 varieties of Pea plant

→ 7 contrasting traits.

→ statistical Analysis.

→ Results presented in a two sitting of "Natural History Society" Brunn [1865] 4 volume.

→ Result published in proceedings of Natural History Society.

→ Topic - Experiments of plant Hybridisation"

→ Died 1884 without any credit of his work.

## Rediscovery of Mendel's work

→ In 1900 similar experiments were performed by Hugo devries of Holland, carl correns of Germany and Erich von Tschermak of Austria. and they got same result that Mendel had found.

→ Hugo devries found the paper of Mendel. and got it reprinted in 'Flora' journal.

→ carl correns postulate into inheritance: and called

Mendel's laws of Mendel was Father of Genetics.

→