

Gregor Johann Mendel (1822 - 1884) -

— Born on July 22, 1822 in Austria

— worked in Augustinian monastery as a monk at Brunn city of Austria.

* He experimented on —

Garden Pea = Pisum sativum

* His results were published in "The Annual Proceedings of Natural History Society of Brunn in 1866"

* Title of Mendel's original paper was —

"Experiments in Plant Hybridization"

⊗ However Mendel did not get any popularity & died in 1884
* By kidney disease.

→ Because →

① → * At that time Darwin's Book - Origin of Species (1859) was published and scientists were busy in discussion.

② → * He published his work in a Journal that has limited circulation

③ → * His work was ahead of time.

④ → * His statistical calculation was tough to understand by scientist

⑤ → * Mendel failed to get similar result on Hiracium (Hawk weed)

Mendel studied 7 characters (7 pair of contrasting Traits) that were present on 4 different pair of chromosome. L 1, 4, 5, 7th

Characters

Contrasting Traits
↓
Dominant Recessive

12	1)	Stem Height	Tall	Dwarf
	2)	Flower position	Axial	Terminal
1	3)	Flower colour	Violet	white
	4)	Pod shape	Inflated	constricted
2	5)	Pod colour	Green	Yellow
	6)	Seed shape	Round	Wrinkled
3	7)	Seed colour	yellow	Green

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Stem Height }
Pod shape } 4th chromosome
Flower position }

Pod colour → 5th

Seed shape → 7th

Rest flower colour }
seed colour } — 1st

Reason of Success -

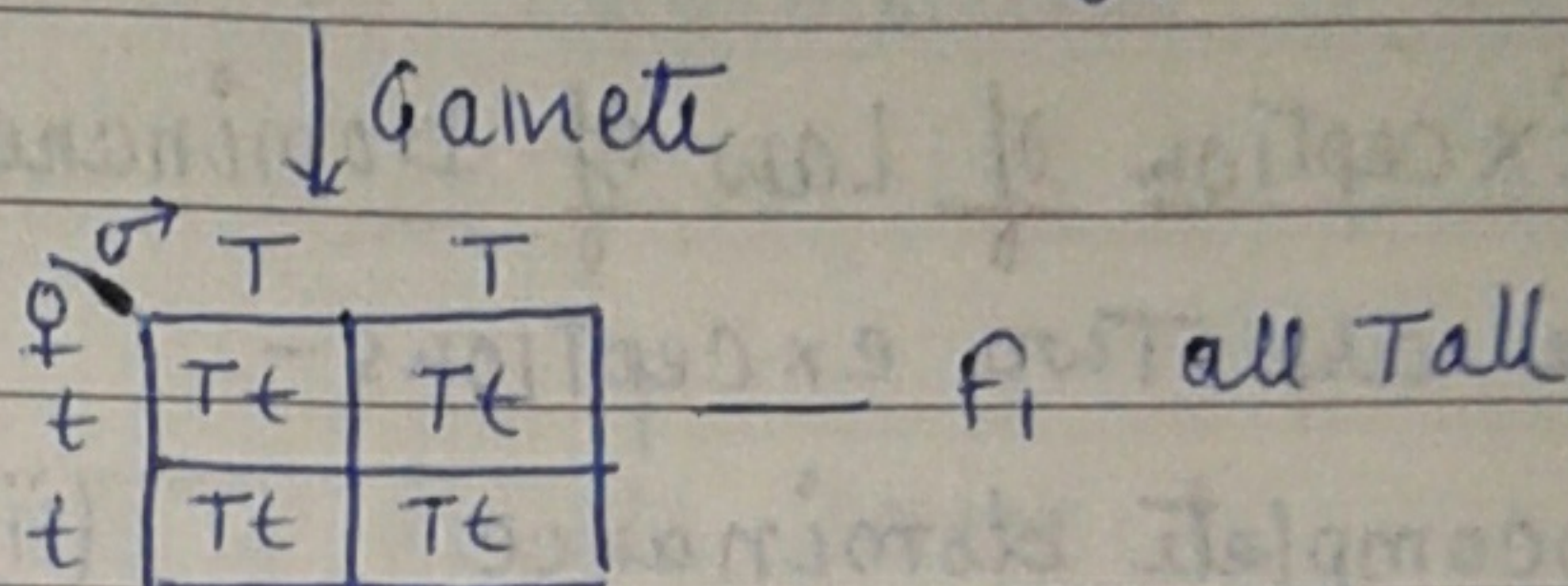
- (1) - Studied inheritance one or two characters at a time.
- (2) - Maintained the Statical Record of all experiments.
- (3) - Selected pure Breeding lines (Pure plants) for exp.
- (4) He selected Pisum sativum

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- (a) Annual Plant (short life span)
- (b) Easy to Grow & less care is required
- (c) Has many contrasting Traits
- (d) Seeds were large & many in numbers.
- (e) Both Natural & cross pollination can be done.
- (f) Bisexual.

Monohybrid Cross —

P — Pure Tall \times Pure dwarf
 TT tt



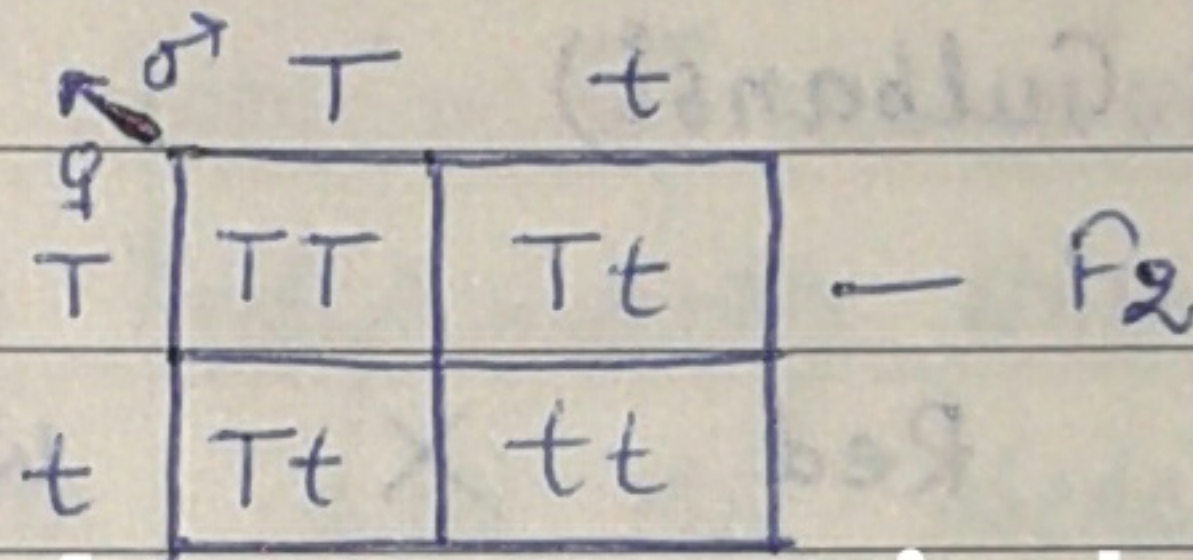
11 * Phenotype Ratio = 3:1

12 * Genotype Ratio = 1:2:1

↓ Selfing

$Tt \times Tt$

1 * Selfing is done to see whether Recessive allele appear in next Generation or not



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(1) - Law of Dominance —

In Hybrid condition only dominant allele is expressed while recessive allele is unexpressed or masked.

eg - $Tt = \text{Tall}$.

— Due to this harmful characters are not expressed for several Generation.

(2) - Law of segregation (Law of Purity of Gametes) —

The factors (Alleles) for each Trait segregate during Gametogenesis. As a result each gamete receive only one factor. Hence each Gamete is pure having either T or t.

Exception of Conclusion of Mendel

[A] - Exception of Law of Dominance -

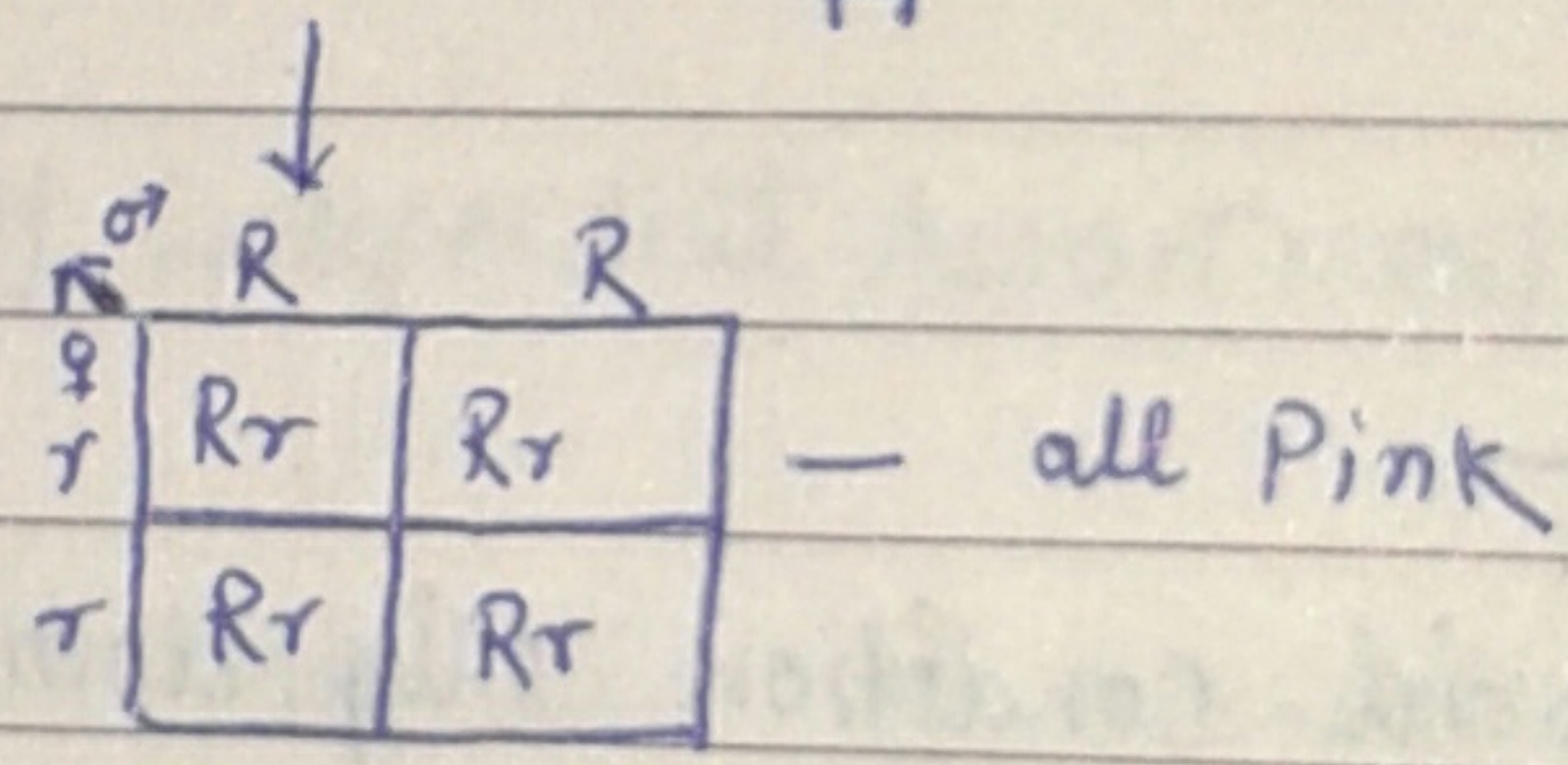
There are two exceptions -

- (i) Incomplete dominance
- (ii) co-dominance.

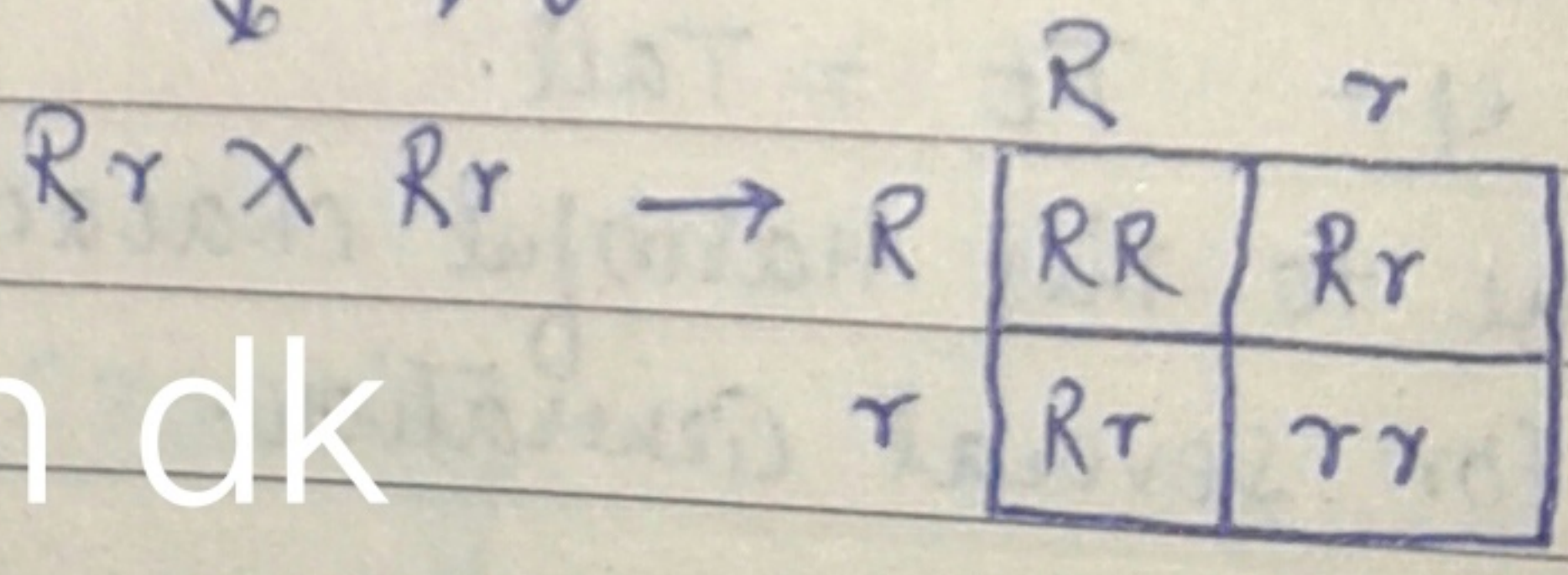
(i) Incomplete dominance -

(a) - First discovered by Carl Correns (1903) in Mirabilis jalapa (4'o'clock or Gulbansi)

Red \times white
 RR rr



selfing



Genotype = 1:2:1

Phenotype = 1:2:1

Red: Pink: White

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(b) Incomplete dominance was also seen in -

Antirrhinum majus (Snapdragon/ Dogflower) exactly as 4'o'clock

(c) Andalusian Fowls have two pure forms Black (BB) & white (WW) for their feather colour. When crossed F_1 are Blue.

* In Incomplete dominance, None of the two contrasting allele or factor is dominant and the F_1 hybrid is intermediate or fine mixture of the two factors.

* Both Genotype and phenotype ratio is the same.

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[2] Co-dominant -

The alleles which do not show dominant recessive relationship and are able to express themselves independently when present together are called co-dominant allele. and this phenomenon is known as co-dominance.

- In co-dominance, Both the gene are expressed for a particular character in F_1 progeny.
- There is no blending of characters, and Both the characters are expressed equally.

- ex -
- 1) AB - Blood Group - $I^A I^B$
 - 2) Sickle cell Haemoglobin - $Hb^A Hb^S$
(carrier)

