

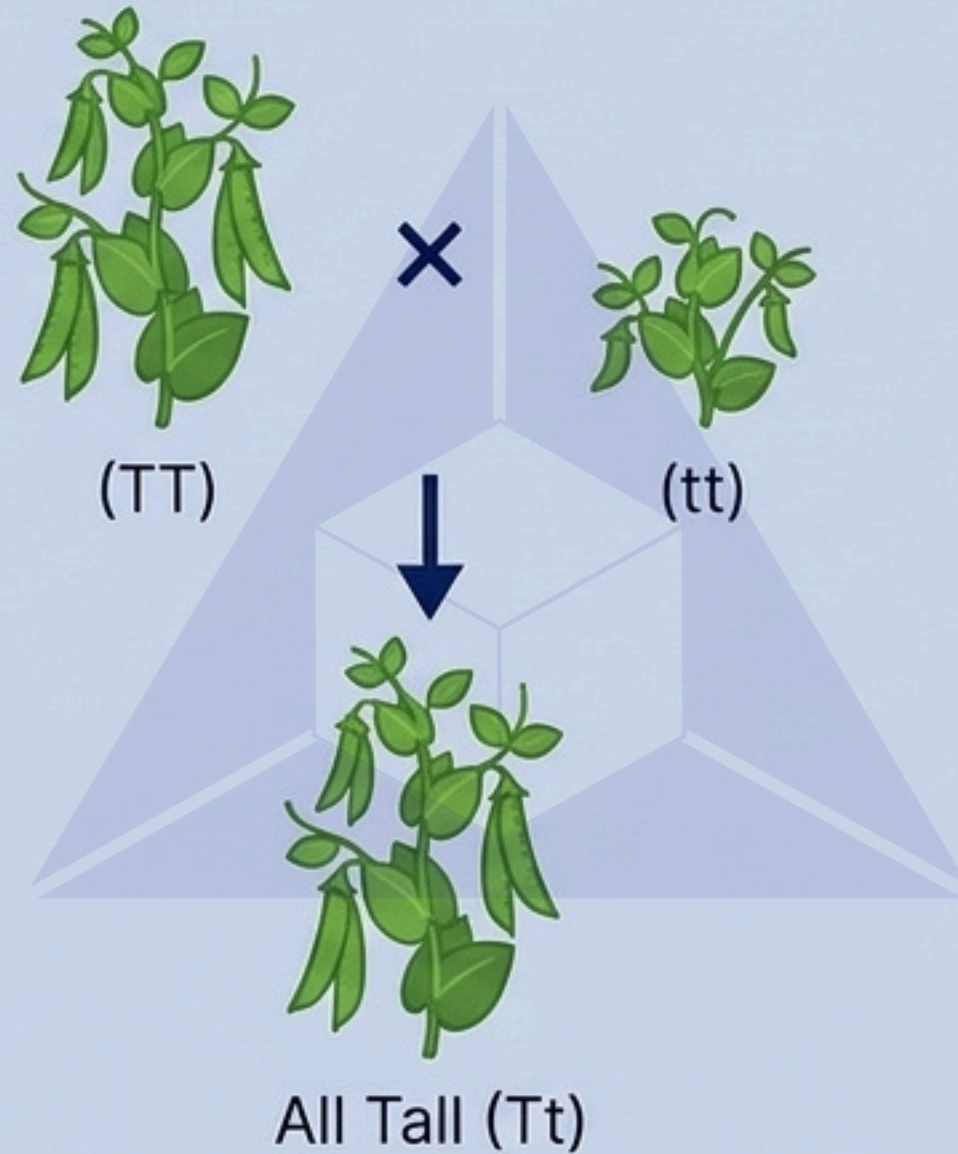
Genetics & Inheritance Principles

Incomplete Dominance

The Snapdragon Anomaly
and the Molecular Logic of
Alleles

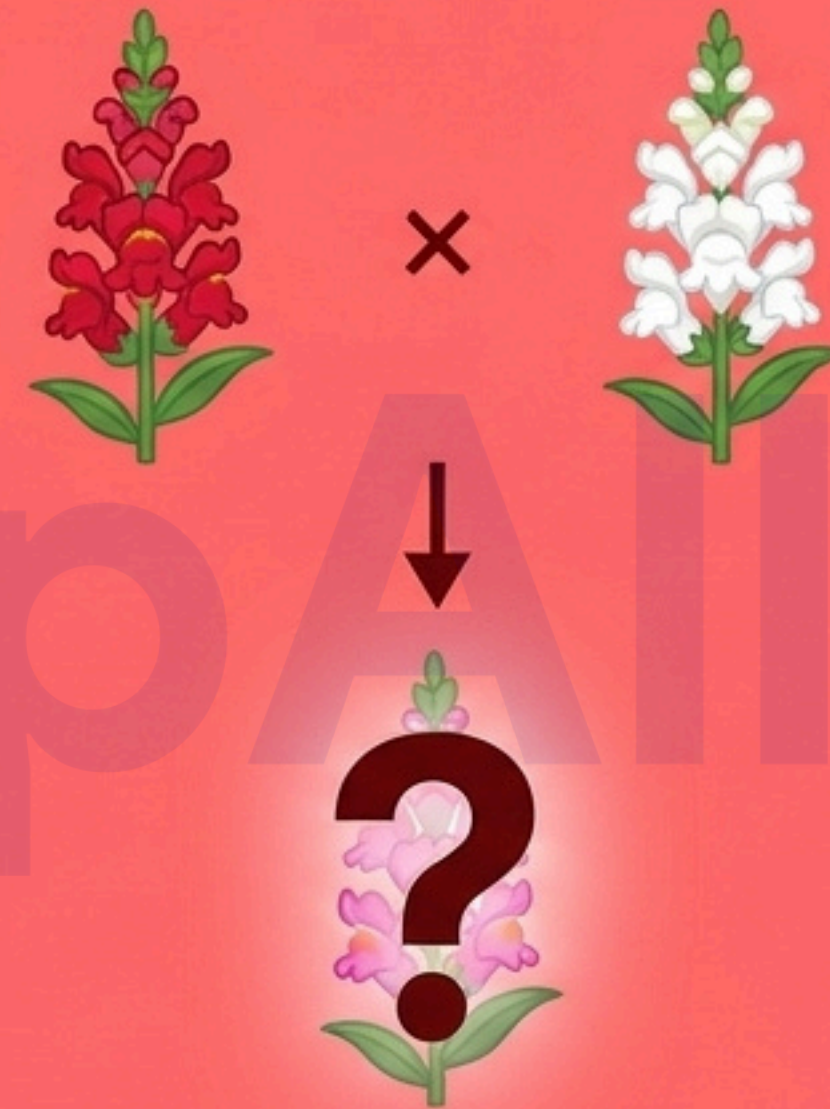


Mendel's Law of Dominance



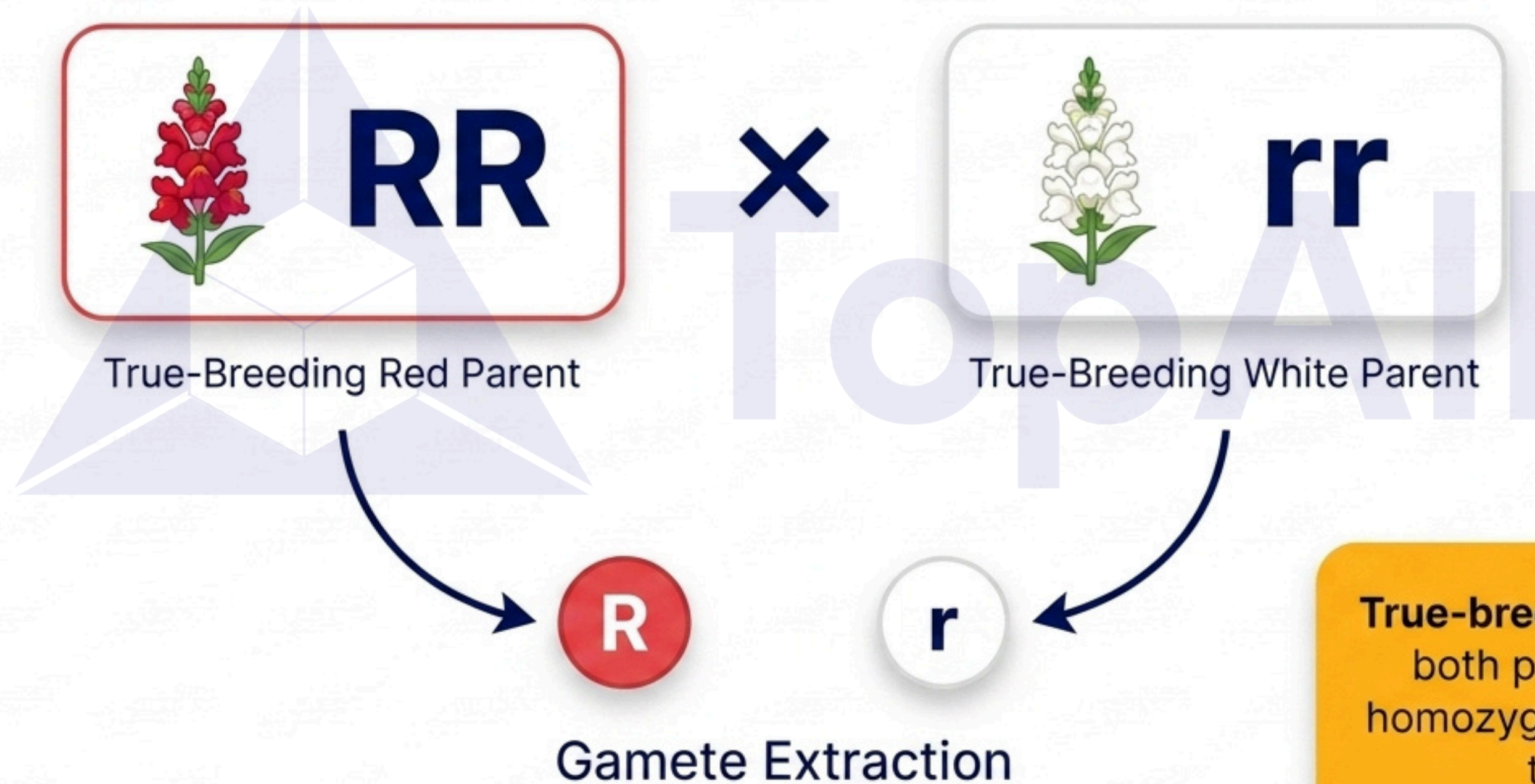
The dominant trait masks the recessive entirely.

The Botanical Anomaly

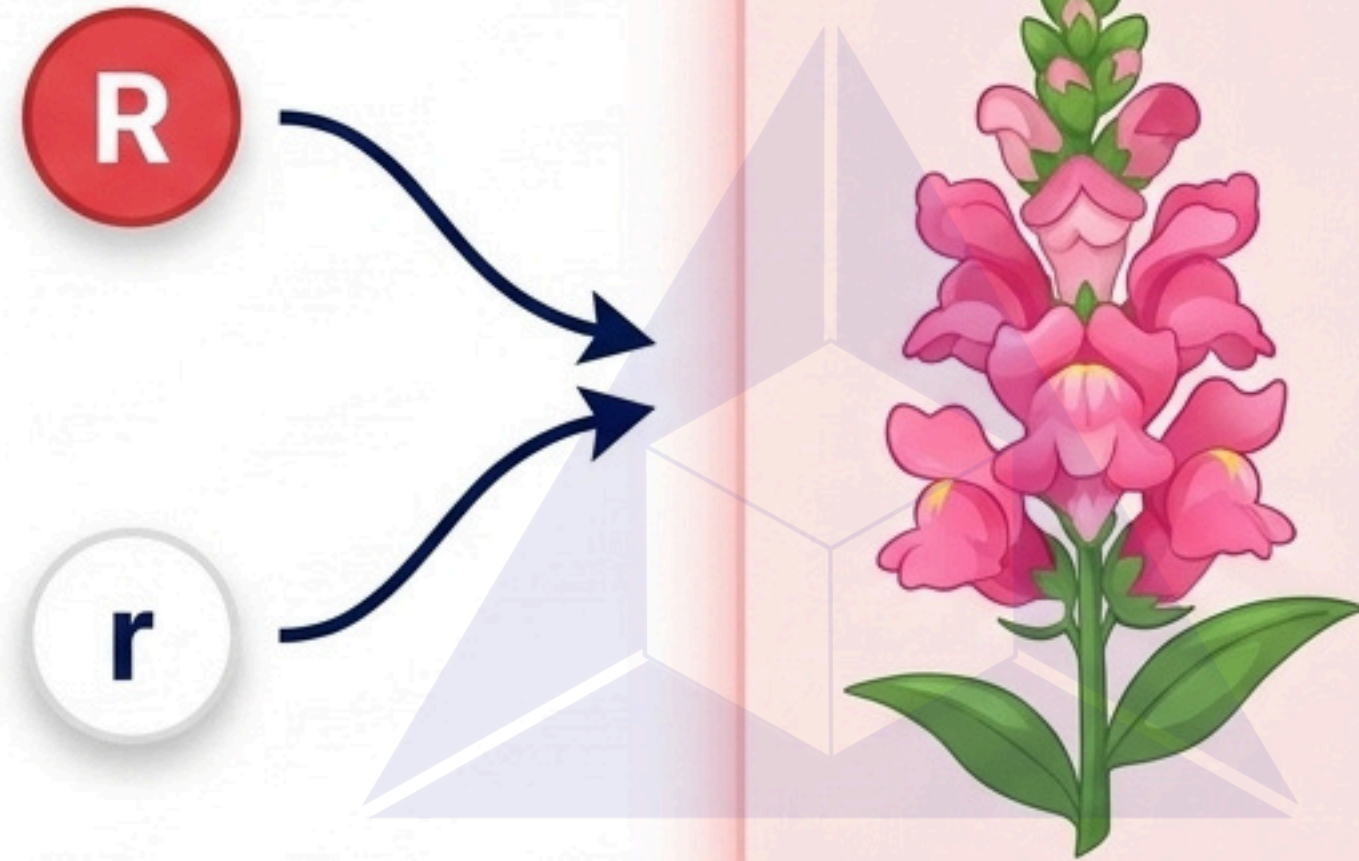


The F1 generation doesn't resemble either parent. It sits exactly in-between.

Parental (P) Generation Cross: Incomplete Dominance



True-breeding means both parents are homozygous for their trait.



What happened?

The F1 has a phenotype that does not resemble either of the two parents and is in between the two.

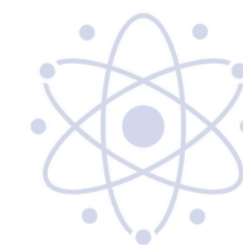


R is not completely dominant over r.



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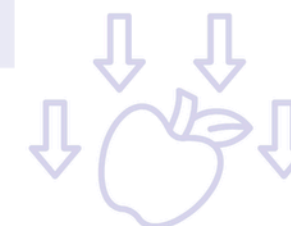
Practice Now



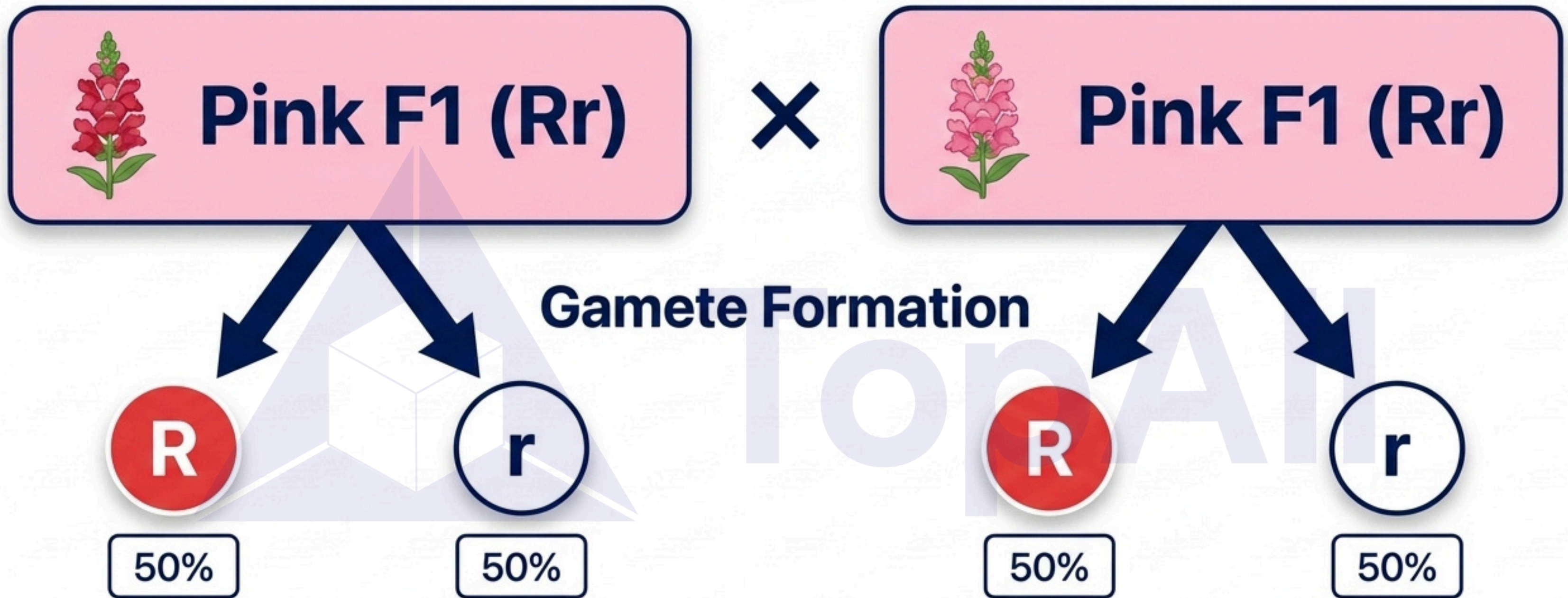
At prep.topall.app

Key Highlights

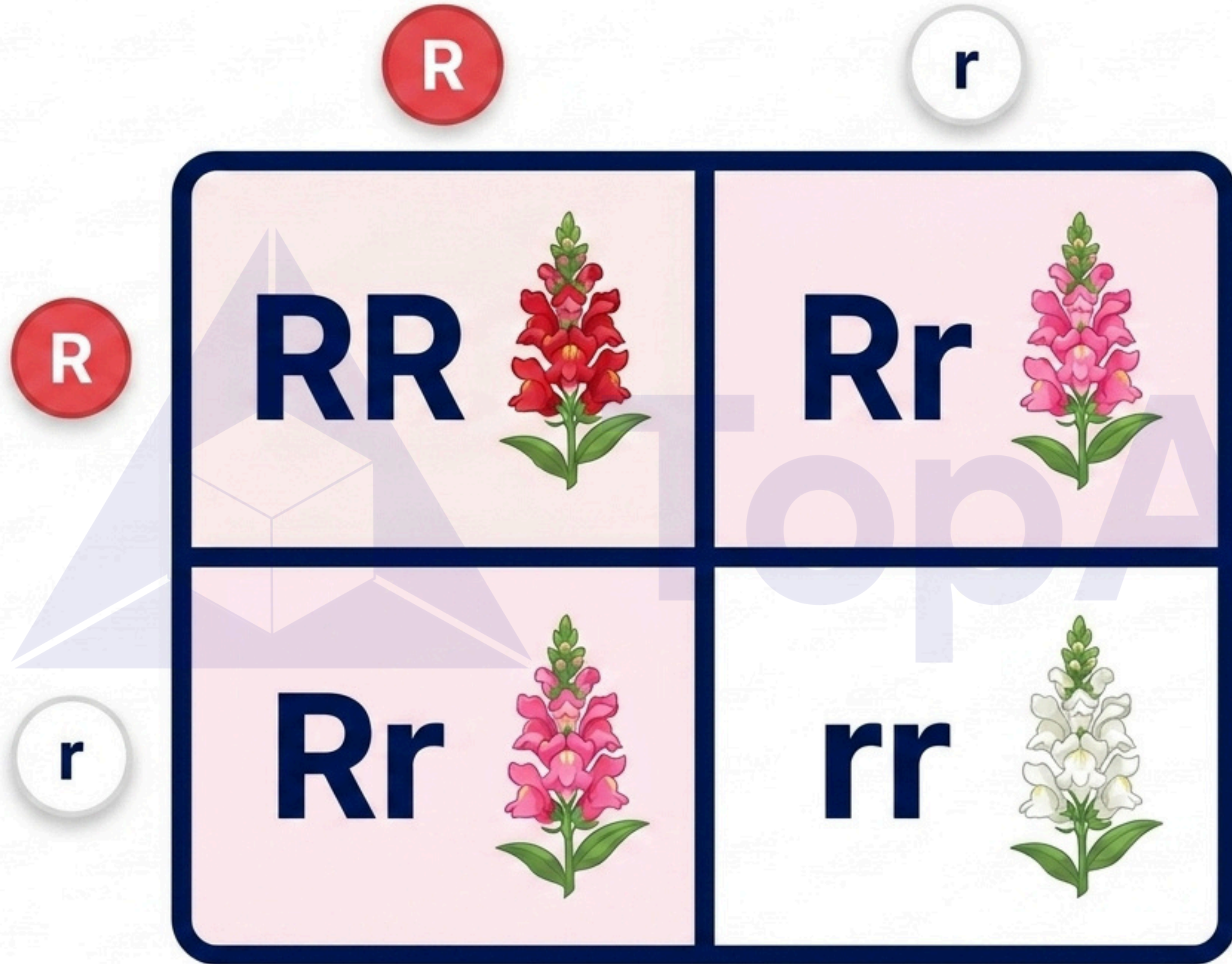
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Self-Pollination



Mistake: Assuming pink is a permanent blending of the genes. If true, crossing Pink x Pink would only yield Pink. Let's look at the data.



Phenotypic Ratio

● 1 Red

●● 2 Pink

○ 1 White

1 : 2 : 1

Genotypic Ratio

1 RR

2 Rr

1 rr

1 : 2 : 1

Key Takeaway

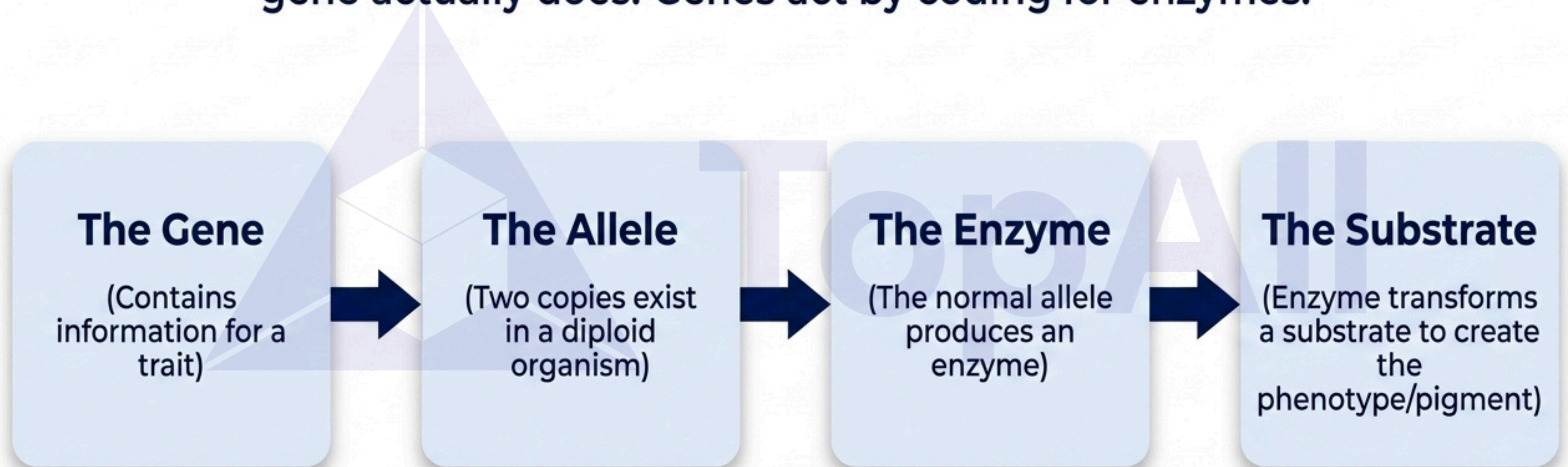


Phenotypic and genotypic ratio both become 1:2:1.

The genotypic ratio remains exactly as expected in any Mendelian monohybrid cross, but the phenotypic ratio has changed from 3:1.

The Molecular Concept of Dominance

To understand incomplete dominance, we must understand what a gene actually does. Genes act by coding for enzymes.



The Modified Allele (e.g., the 'r' gene)

Normal

Produces a normal/less efficient enzyme.
(Phenotype remains the same).

Broken

Produces a non-functional enzyme.

Null

Produces no enzyme at all.

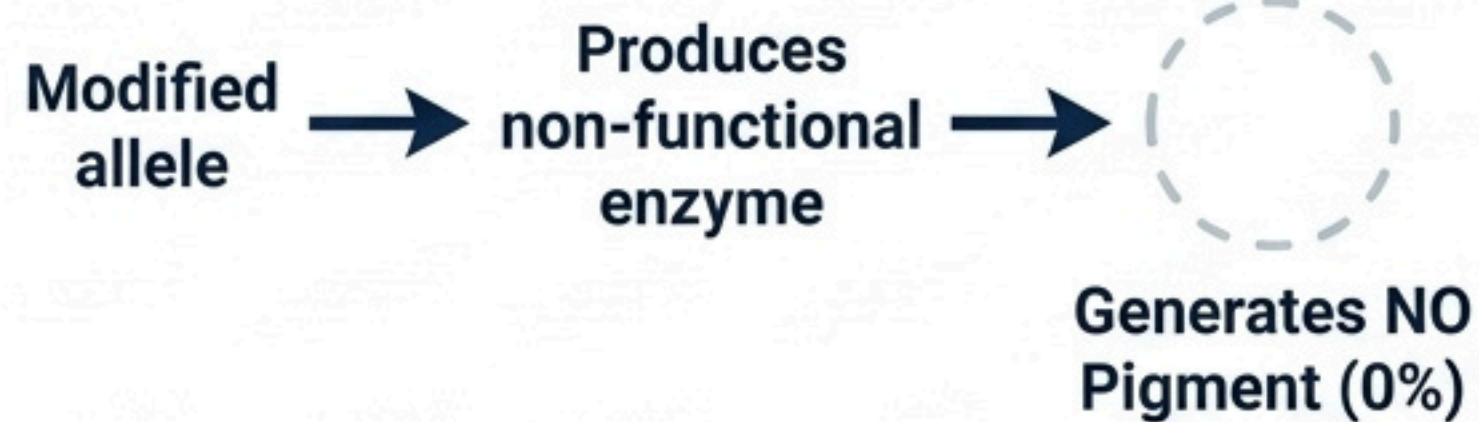


In cases 2 and 3, the phenotype is affected. The original, unmodified allele is dominant, and the modified (broken) (broken) allele becomes the recessive trait.

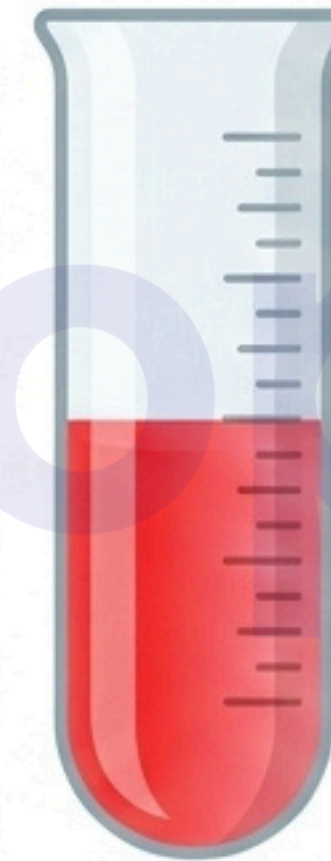
The 'R' Allele



The "r" Allele



The Synthesis: The Heterozygote (Rr)



The single "R" allele only produces 50% of the normal enzyme amount.

→ 50% Pigment Output = Pink Flower. It is a dosage effect, not a blending of the DNA itself!

Comparison: Complete vs. Incomplete Dominance

Parameter	Complete Dominance	Incomplete Dominance
F1 Phenotype	Resembles exactly one parent	In-between the two parents
F2 Phenotypic Ratio	3 : 1	1 : 2 : 1
F2 Genotypic Ratio	1 : 2 : 1	1 : 2 : 1
Molecular Action	One allele masks the other	Reduced enzyme dosage creates an intermediate trait



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