

Introduction to Genetics and patterns of inheritance: Mendelian Genetics



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المزيد من مادة
أحياء:

إعداد: Adel Rania

التواصل الاجتماعي بحسب الصف الثاني عشر



صفحة المناهج
الإماراتية على
فيسبوك

المزيد من الملفات بحسب الصف الثاني عشر والمادة أحياء في الفصل الأول



Introduction to Genetics and patterns of inheritance

Mendelian Genetics



التاريخ

1/9/2026



المعلمة

Rania Adel



الصف

ثاني عشر
أنسباير



المادة

Biology



افهم



اكتشف



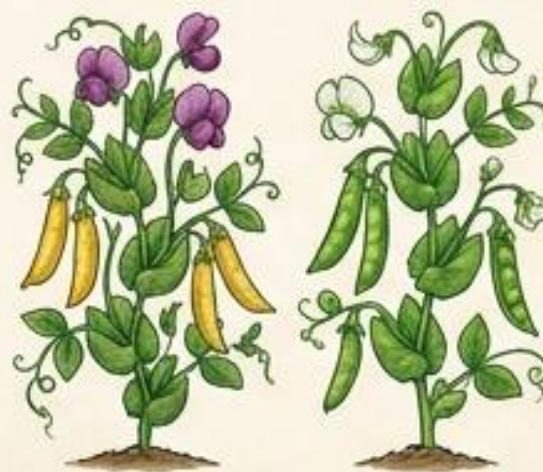
استكشف

MENDELIAN GENETICS

HOW GENETICS BEGAN

HEREDITY

The passing of traits from one generation to the next.



Parents



Offspring

MEET THE FATHER OF GENETICS



NAME: Gregor Mendel



OCCUPATION: Austrian monk



ROLE: Scientist and plant breeder



FAMOUS FOR: Discovering the basic principles of inheritance through experiments with pea plants.



WHY DID MENDEL USE TRUE-BREEDING PLANTS?

TRUE-BREEDING

Varieties that always produced specific forms of a trait, generation after generation.



WHY CHOOSE PEA PLANTS?



Predictable Baselines



Controlled Mating



Distinct Traits

Mendel's Seven Contrasting Traits of Pea Plants

TRAIT	DOMINANT FORM	RECESSIVE FORM
1. Seed Shape 	Round 	Wrinkled 
2. Seed Color 	Yellow 	Green 
3. Flower Color 	Purple 	White 
4. Pod Shape 	Inflated 	Constricted 
5. Pod Color 	Green 	Yellow 
6. Flower Position 	Axial 	Terminal 
7. Stem Length 	Tall 	Dwarf 

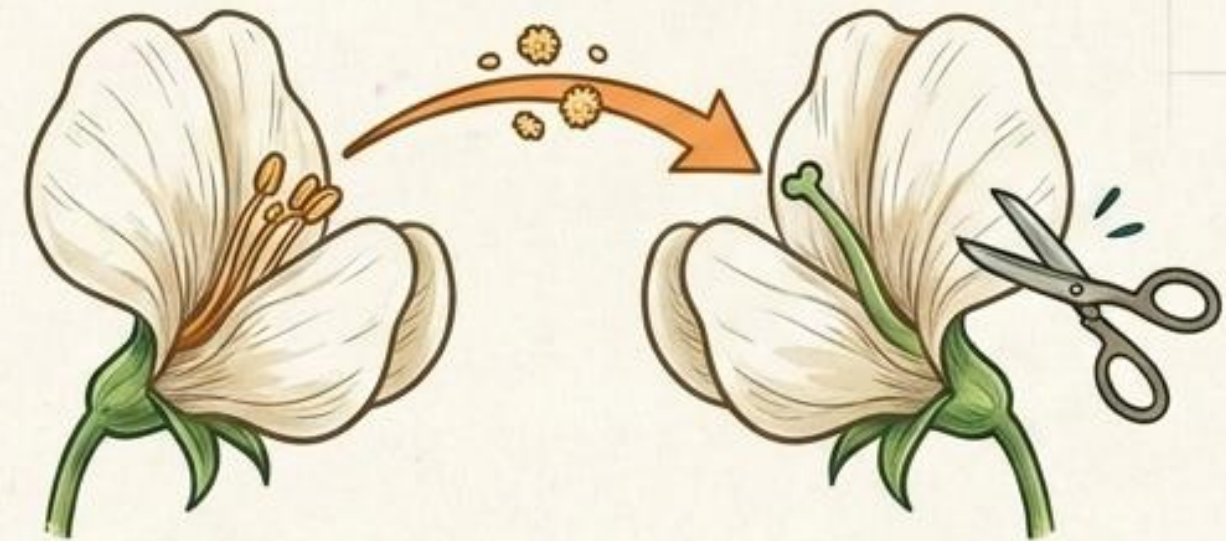
SELF-FERTILIZATION vs CROSS-FERTILIZATION

Self-Fertilization



Pollen transfers within the same plant.

Cross-Fertilization



Pollen transfers between two different plants.

Feature	Self-Fertilization	Cross-Fertilization
Source of pollen	Same flower	Different flower
Mendel's use	Allowed for later generations	Forced by hand for the initial cross

MENDEL'S CLASSIC EXPERIMENT

STEP 1 – PARENTAL GENERATION



P generation (pure-breeding)



STEP 3 – FIRST FILIAL GENERATION



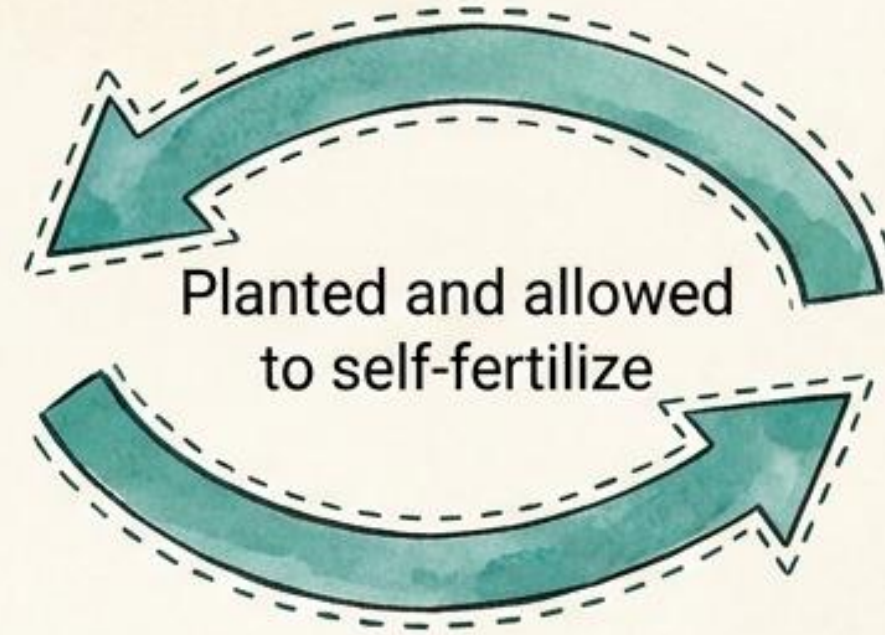
F1 generation

All resulting offspring had yellow seeds. The green-seed trait seemed to have disappeared!

THE RETURN OF THE HIDDEN TRAIT

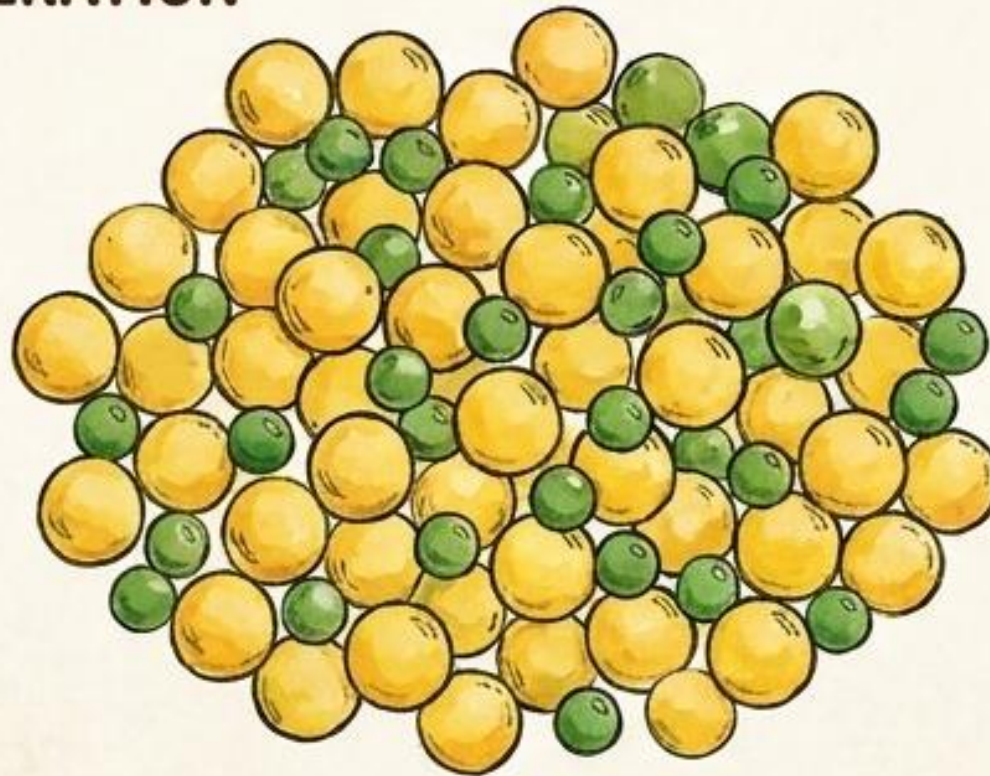
STEP 4 — SELF-FERTILIZATION

F1 generation



STEP 5 — SECOND FILIAL GENERATION

F2 generation



6022 yellow seeds
2001 green seeds

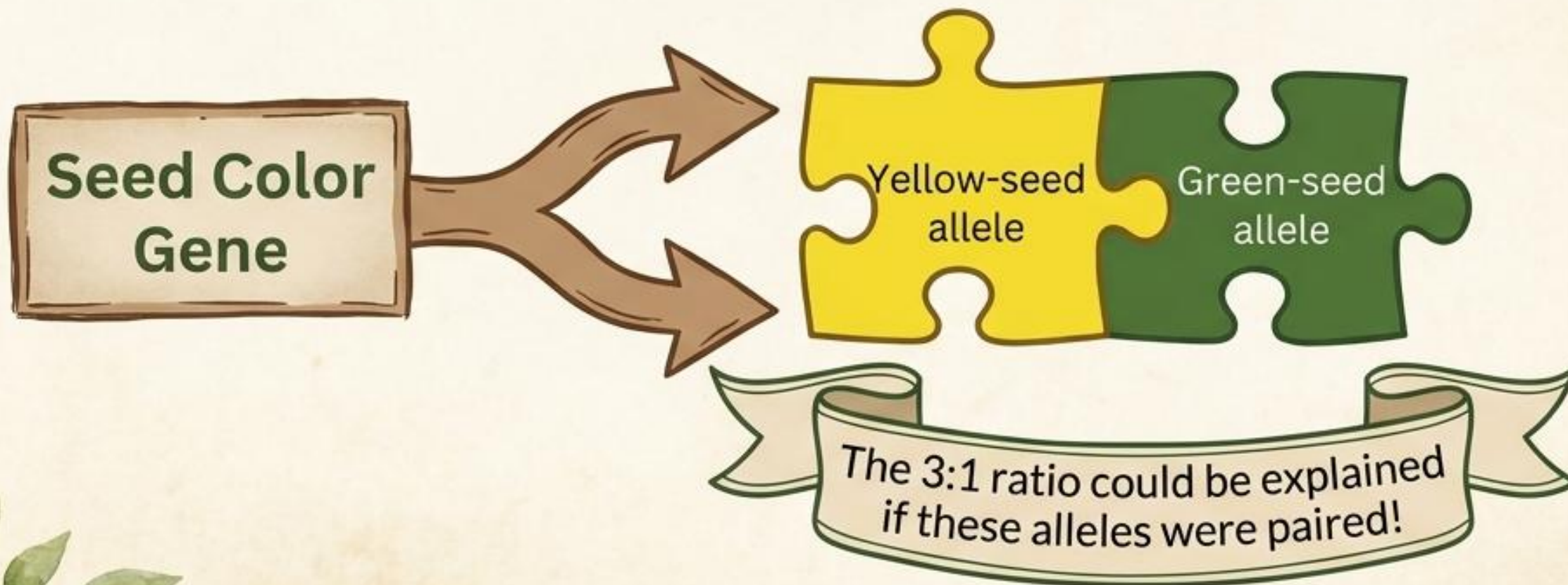
Almost a perfect 3:1
ratio of yellow to
green seeds

HOW ARE TRAITS CONTROLLED?

Mendel concluded that there must be two forms of the seed trait controlled by a factor (now called a gene).

ALLELE

An alternative form of a single gene passed from generation to generation.



DOMINANCE: WHY DID GREEN DISAPPEAR?

DOMINANT



The form of the trait that appeared in the F1 generation.

When present, it masks the recessive allele.

RECESSIVE



The form of the trait that was masked in the F1 generation.

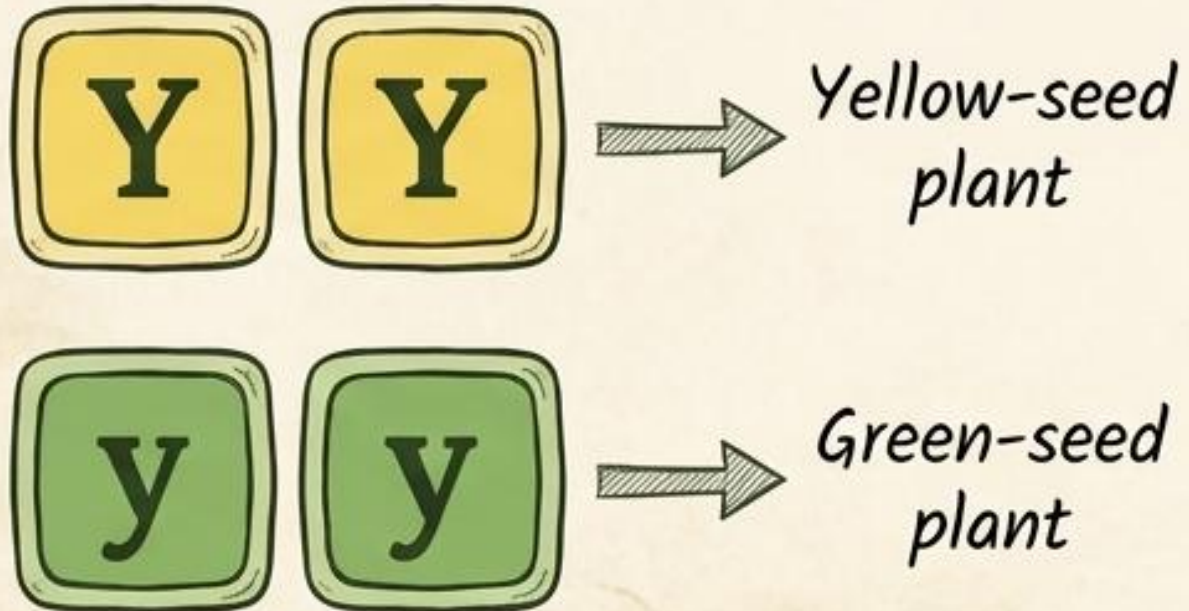
Only shows up if the dominant allele is absent.

PAIRING THE ALLELES

HOMOZYGOUS

(Greek: homos = same)

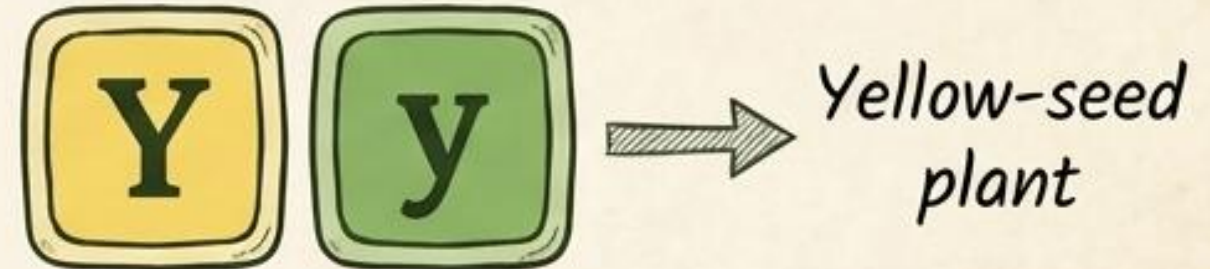
An organism with two of the same alleles for a particular trait.



HETEROZYGOUS

(Greek: hetero = different)

An organism with two different alleles for a particular trait.



These heterozygous organisms are also called hybrids.

WHAT WE SEE vs. WHAT IS HIDDEN

GENOTYPE



The organism's allele pairs.

Hidden genetic makeup:
YY, Yy, yy

PHENOTYPE



The observable characteristic or outward expression of an allele pair.

Physical appearance:
Yellow seeds, Green seeds.

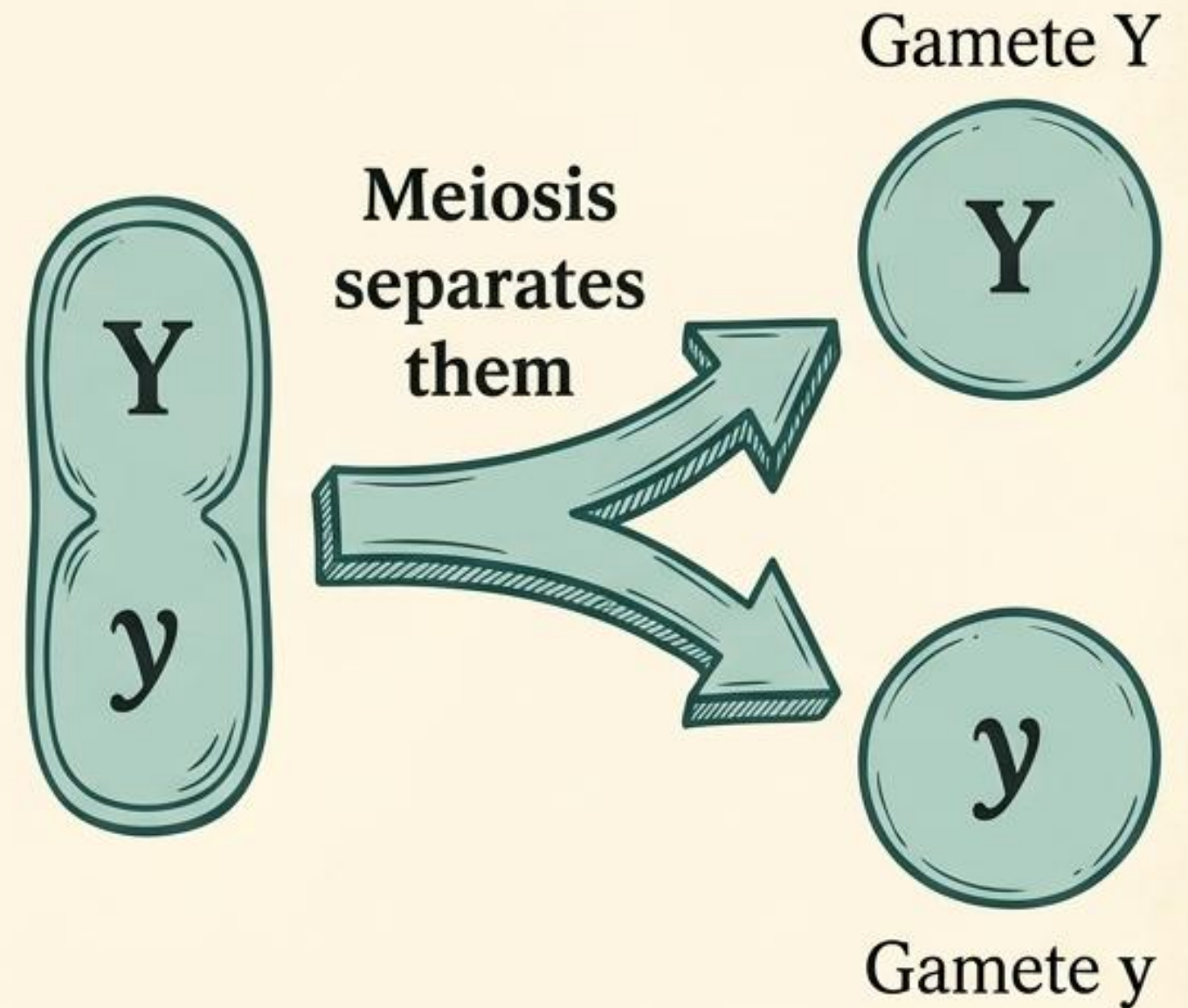
THE GENETICS REFERENCE GUIDE

Genotype	Pairing	Phenotype
YY	Homozygous	Yellow 
Yy	Heterozygous (Hybrid)	Yellow 
yy	Homozygous	Green 

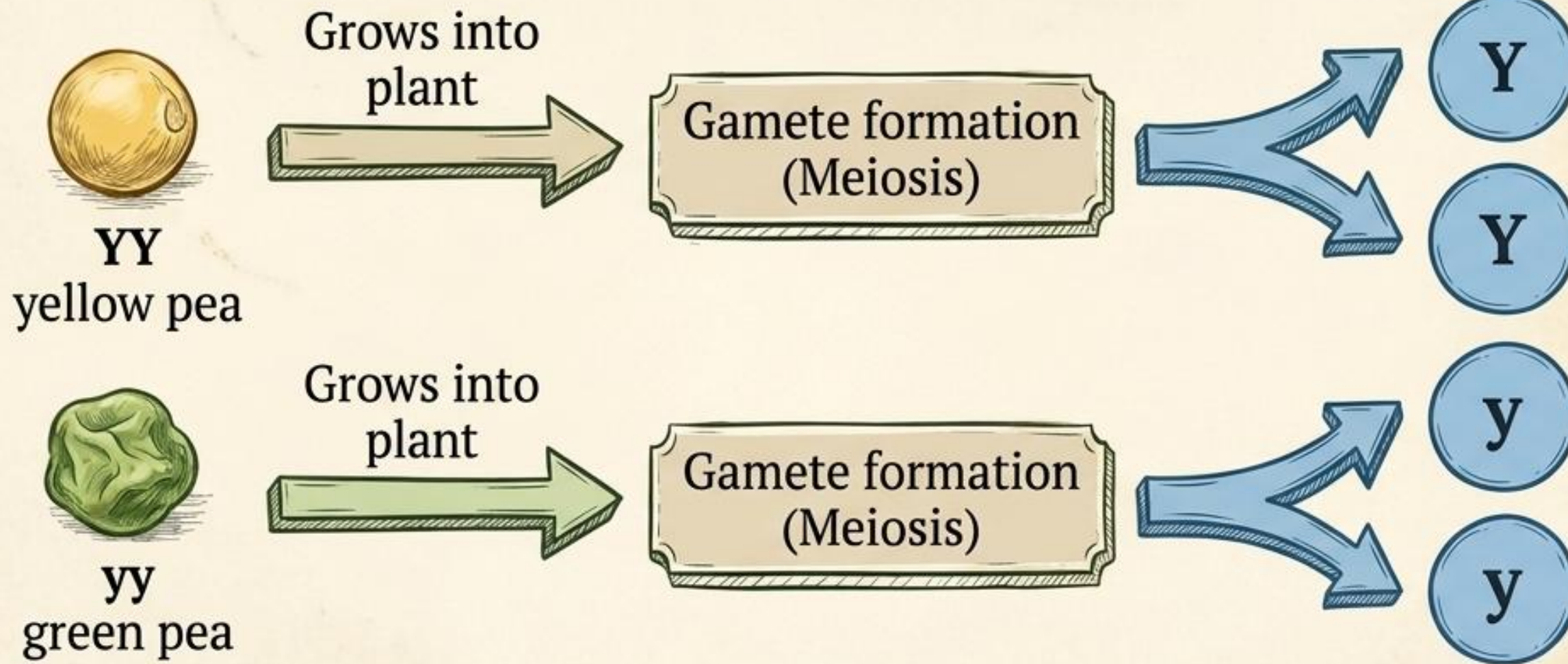
When alleles are present in the heterozygous state (**Yy**), the dominant trait will be observed, and the recessive trait will be masked!

MENDEL'S LAW OF SEGREGATION

Mendel's law of segregation states that the **two alleles** for each trait separate during **meiosis**. During fertilization, two alleles for that trait **unite**.

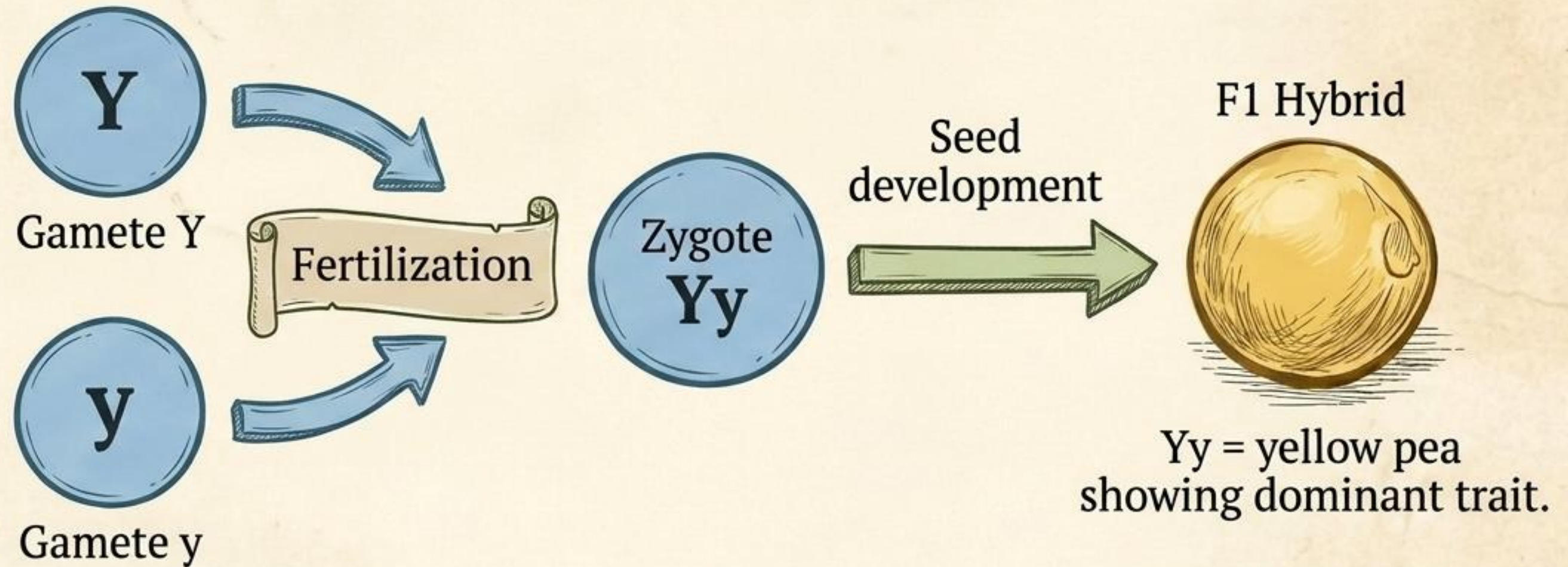


THE LAW IN ACTION: GAMETE FORMATION



The gametes that are generated during meiosis contain only one allele from each pair.

THE LAW IN ACTION: FERTILIZATION



Two alleles for the trait unite during fertilization, creating a heterozygous hybrid.

LESSON SUMMARY: THE BLUEPRINT OF INHERITANCE

1. The Experiment



- Crossed True-breeding (P) plants.



- F1 generation showed only the dominant trait.



- F2 generation revealed a 3:1 ratio.

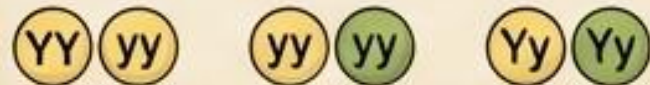
2. The Vocabulary

- **Alleles:** Alternative forms of a gene (Dominant Y, Recessive y).  

- **Genotype** (hidden pairs) vs. **Phenotype** (visible trait).

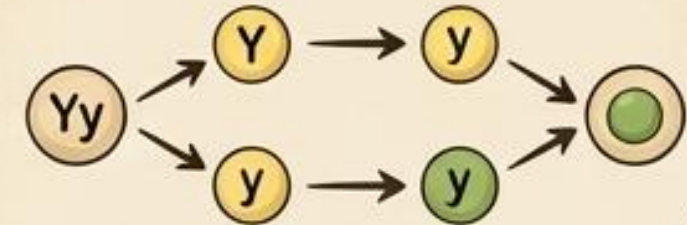


- **Homozygous** (same) vs. **Heterozygous** (hybrid).



3. The Rule

- **Law of Segregation:** Alleles separate during meiosis (forming gametes) and unite during fertilization.





Teacher Rania Adel