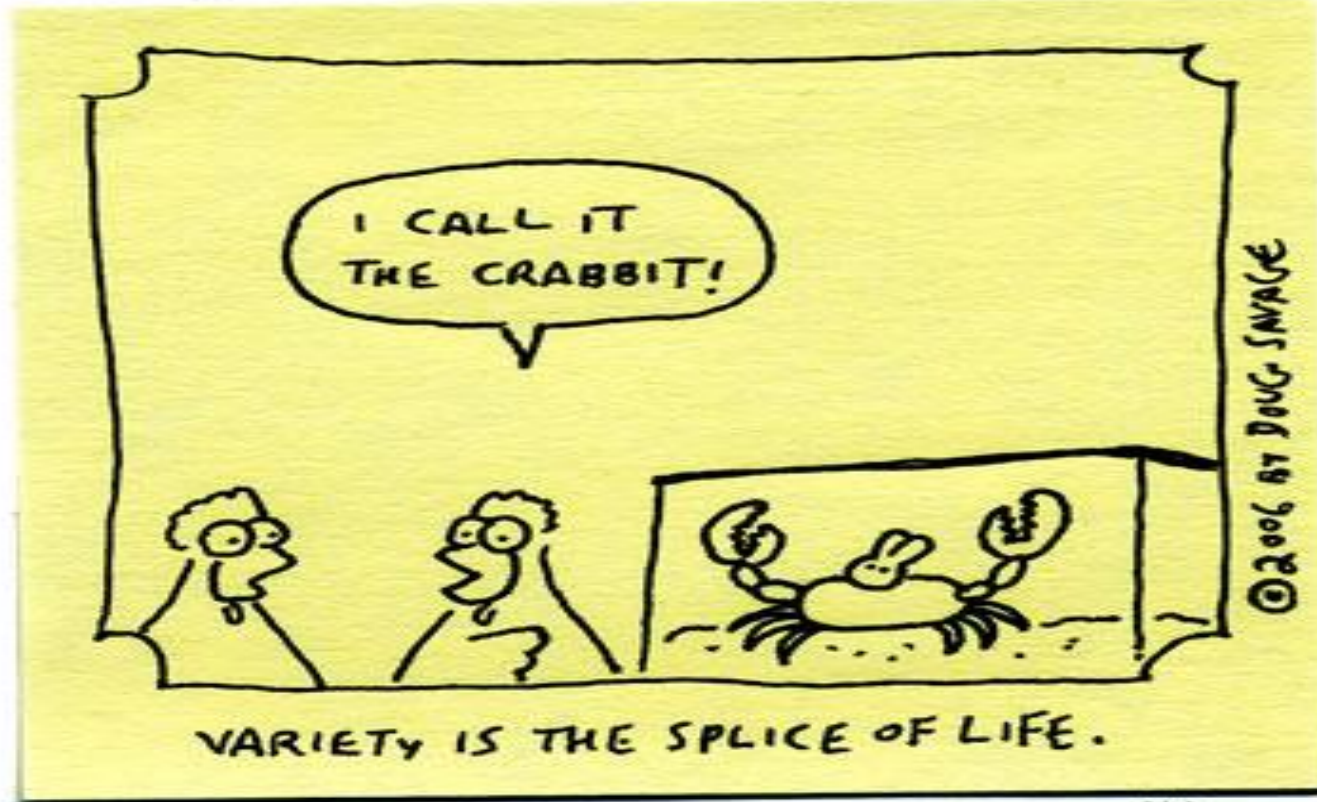


INTRODUCTION TO GENETICS

Savage Chickens

by Doug Savage

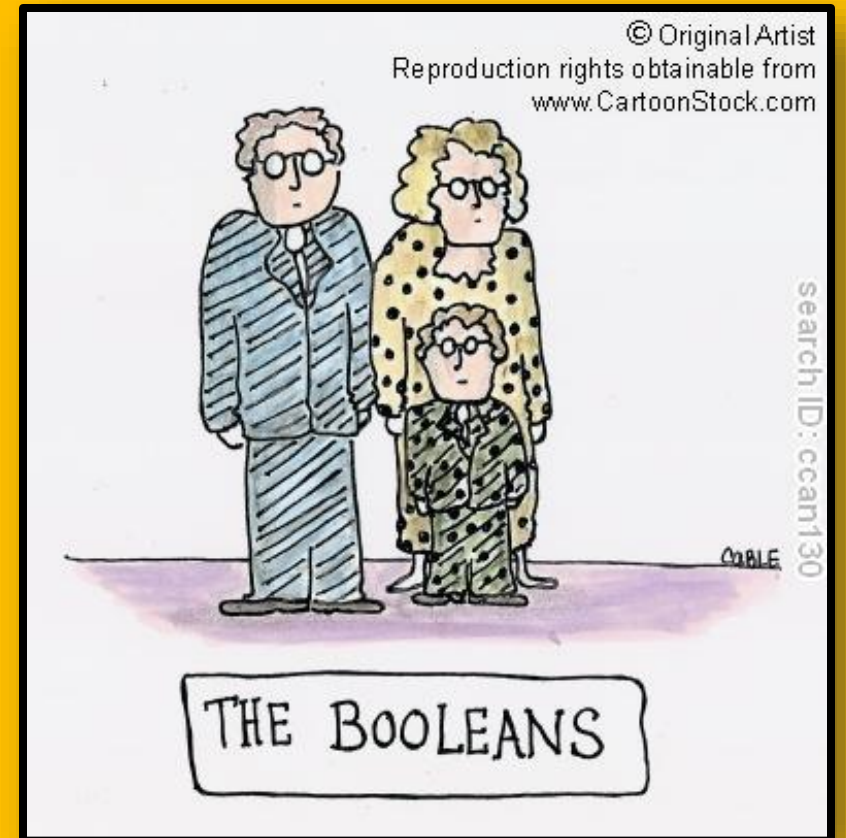


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www.savagechickens.com

GENETICS AND HEREDITY

- **Heredity:** the passing of traits from parent to offspring.
- **Genetics:** The scientific study of heredity
- **Traits:** specific characteristics (ex: hair color, height)



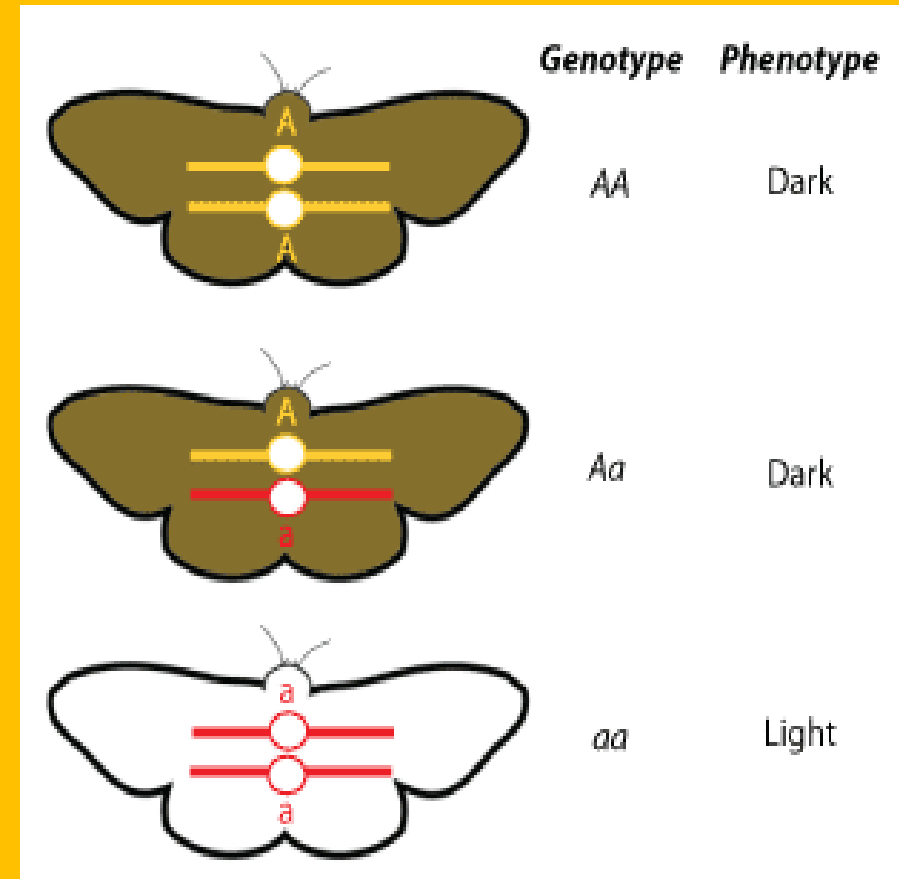
TERMINOLOGY

Genotype:

What allele's you actually have (BB)

Phenotype:

The trait you end up with (Black Hair)



TERMINOLOGY

- **Gene:** characteristic (height)
- **Allele:** form of the characteristic (tall or short)
 - You have spots for two alleles per gene. One from your mother and one from your father.

P: Parent Generation

F1: Offspring of parent generation (kids)

F2: Offspring of two F1's reproduction. (grandkids)

Gene

Allele

Dominant Allele

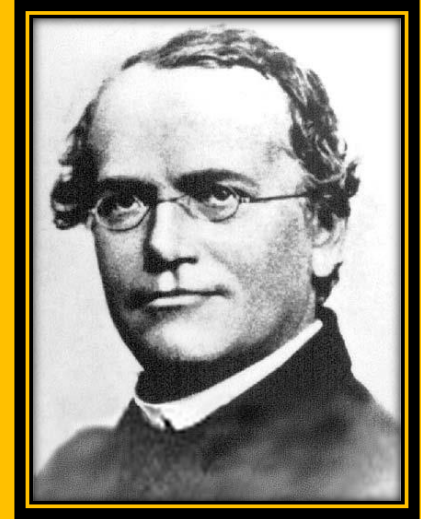
	Seed Shape	Seed Color	Seed Coat	Pod Shape	Pod Color	Flower Position	Plant Height
P	Round X	Yellow X	Gray X	Smooth X	Green X	Axial X	Tall X
	Wrinkled	Green	White	Constricted	Yellow	Terminal	Short
F ₁	Round	Yellow	Gray	Smooth	Green	Axial	Tall

TERMINOLOGY

- Organisms that have two of the same alleles for a particular gene (TT) or (tt) are **homozygous**.
 - Think: “homo” or “same”
- Organisms that have two different alleles for the same gene (Tt) are **heterozygous**.
 - Think: “hetero” or “different”

GENETICS HISTORY: GREGOR MENDEL

- *Gregor Mendel* 1822-1884
- Born to farmhands in Heinzendorf, Austria
- Despite family wishes, studied to be a monk.
- Ended up studying to be a teacher, and taught secondary school at the monastery















GENETICS HISTORY: GREGOR MENDEL

While teaching at the monastery, Mendel started some experiments growing garden peas.



MENDEL'S CROSSBREEDING

- Mendel's garden had an array of different types of peas
 - Tall vs. short
 - Round vs. wrinkled seeds
 - Green vs. yellow seed color
 - Pod shape & color
- Mendel cross-bred plants with different characteristics (crossed a tall plant with a short plant)
- Offspring of **cross-bred plants** are called hybrids.

Height	Seed Shape	Seed Color	Seed Coat Color	Pod Shape	Pod Color
 Tall	 Round	 Yellow	 Green	 Inflated (full)	 Green
 Short	 Wrinkled	 Green	 White	 Constricted (flat)	 Yellow

- If the parent plants are true-breeding, their alleles will look like this:

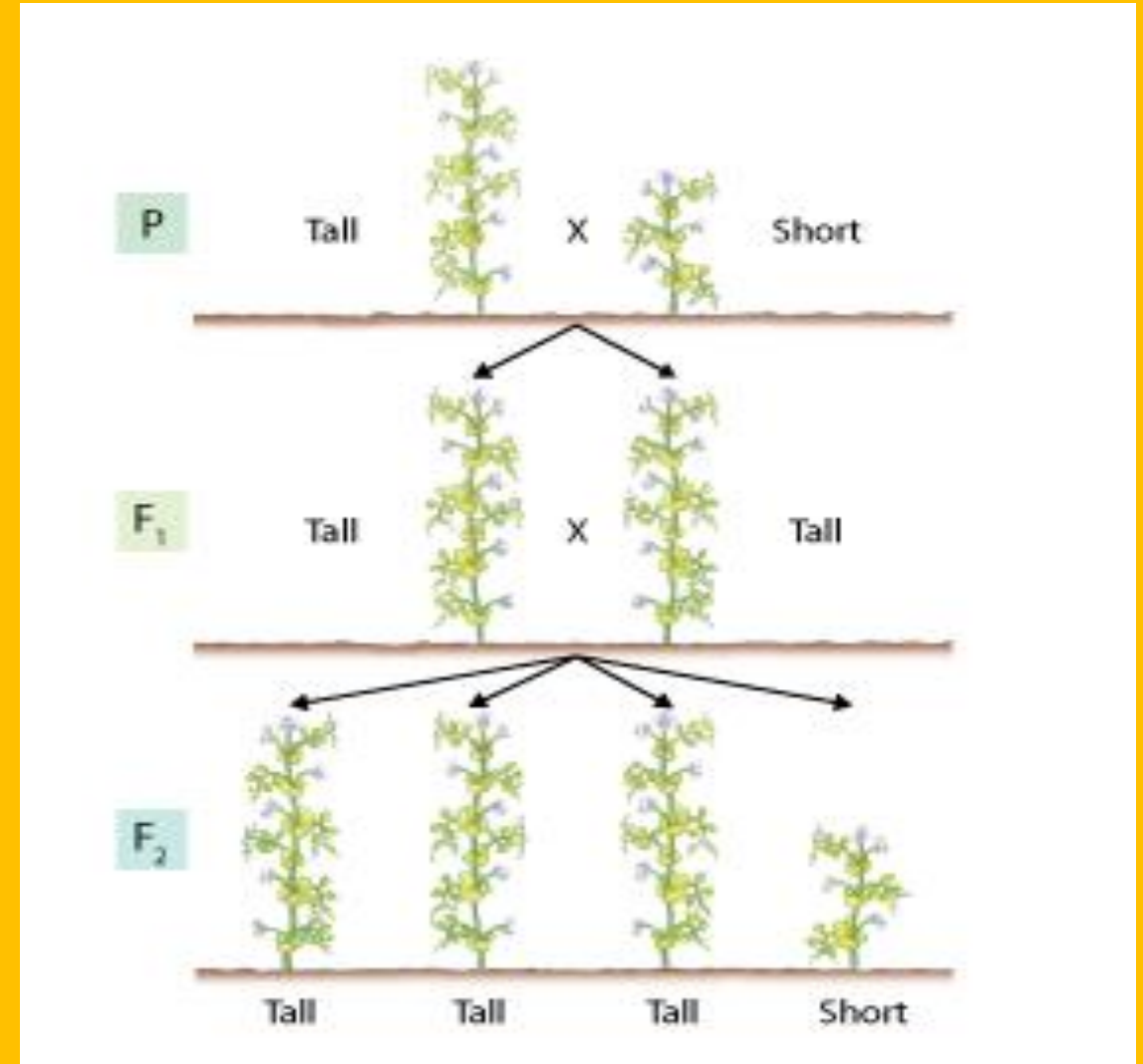
Tall: TT Short: tt

- Each offspring will inherit half of the parent's alleles (or genes).

F₁:

(Plant 1): Tt (Plant2): Tt

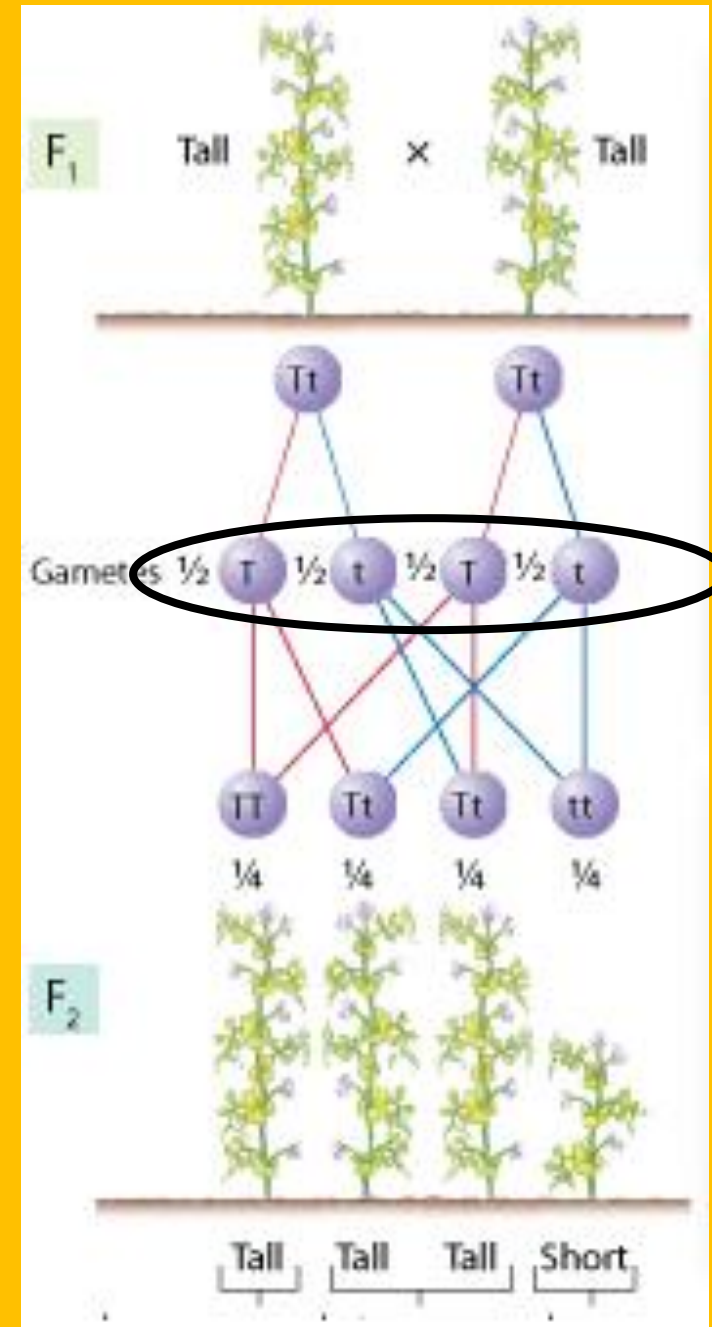
Since the offspring in F₁ were tall, what was the dominant allele?



THE F₁ CROSS

- Both **F₁** plants have one “T” and one “t” (each inherited from the parents)
- How many different combinations of children can we put together from our parent F₁ plants?

TT Tt Tt tt



MENDEL'S CROSSBREEDING RESULTS

- Mendel found when he crossed a tall plant with a short plant, that the F1 offspring were all tall.

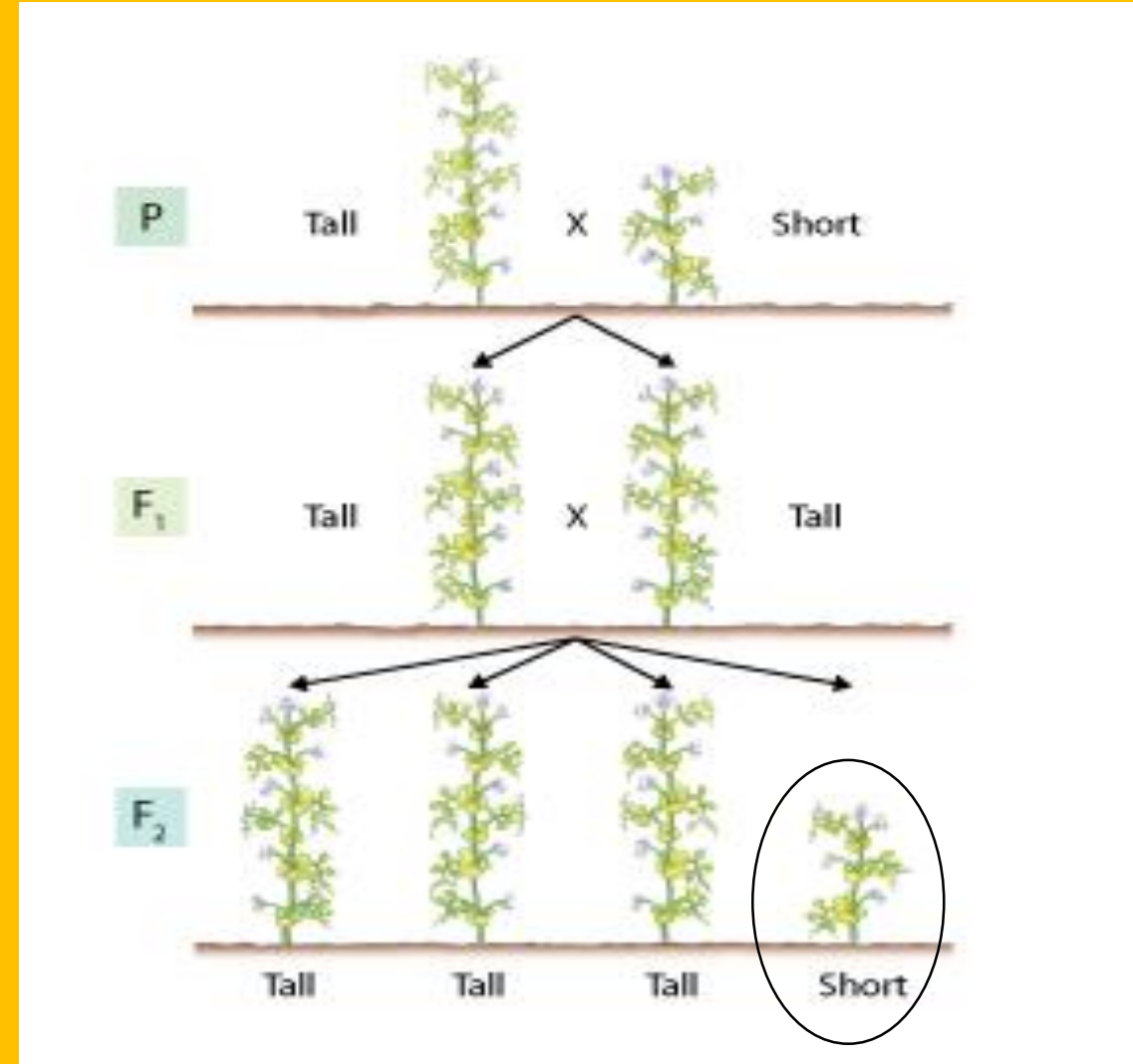
He reasoned that...

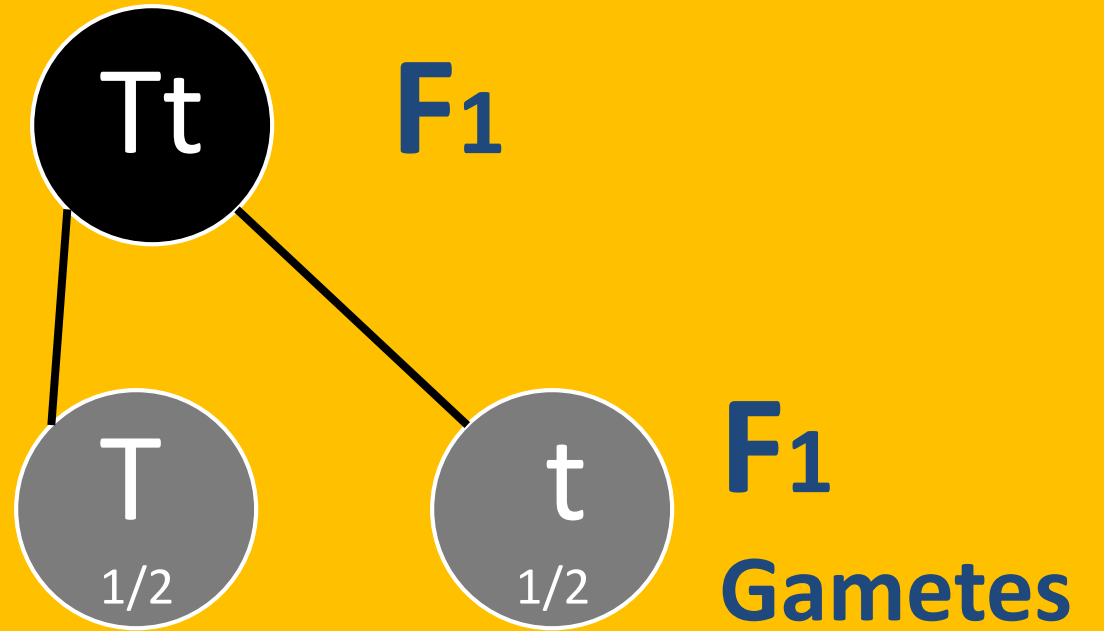
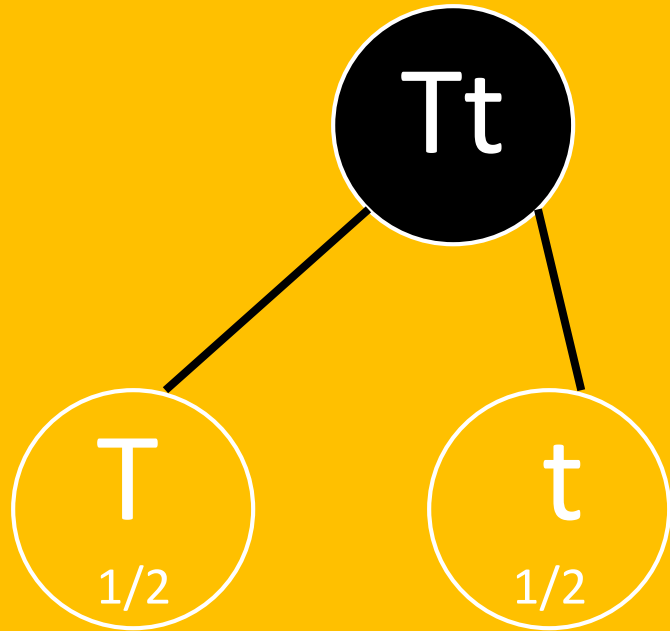
- Tallness must be the “stronger” gene
- Shortness must be the “weaker” gene

Then Mendel crossed two tall F₁ offspring

-3 were tall, and 1 was short

How was one F₂ offspring short if both F₁ parents were tall?





Mendel's Findings

Principle of Dominance: Some alleles are dominant over others

The appearance of different traits has to do with dominance (how strong one gene is over another)

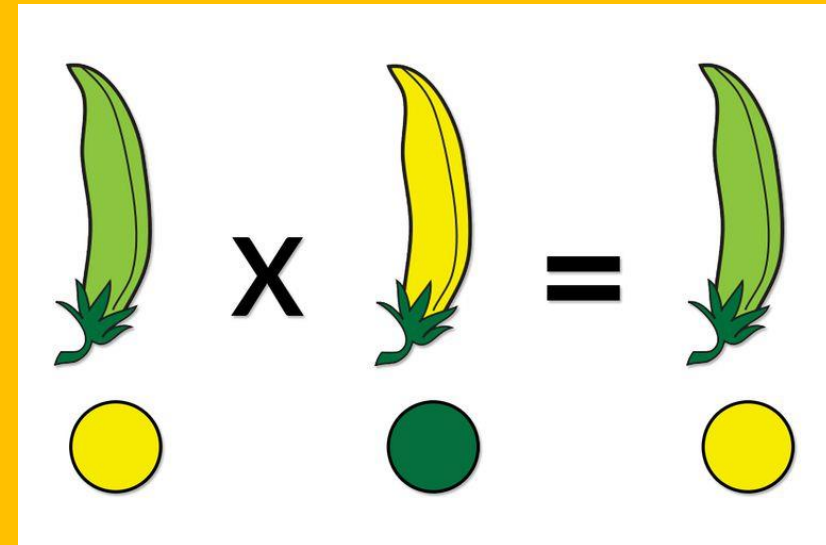
- **Dominant alleles** (or characteristics) always show in the offspring if the allele is present.
 - They are always symbolized by a capital letter.
- **Recessive alleles** (or characteristics) only show in the offspring when the dominant allele is NOT present.
 - They are always symbolized by a lower-case letter.

Mendel's Findings

Principle of Independent Assortment

-Different genes are inherited independently of one another.

ex: How you inherit hair color does not affect how you inherit eye color.



DOMINANT & RECESSIVE ALLELES

- Which allele is dominant?
- How do you get blue eyes?
- Can you get blue eyes if both of your parents have brown eyes?
 - How?

