

Mendelian Genetics

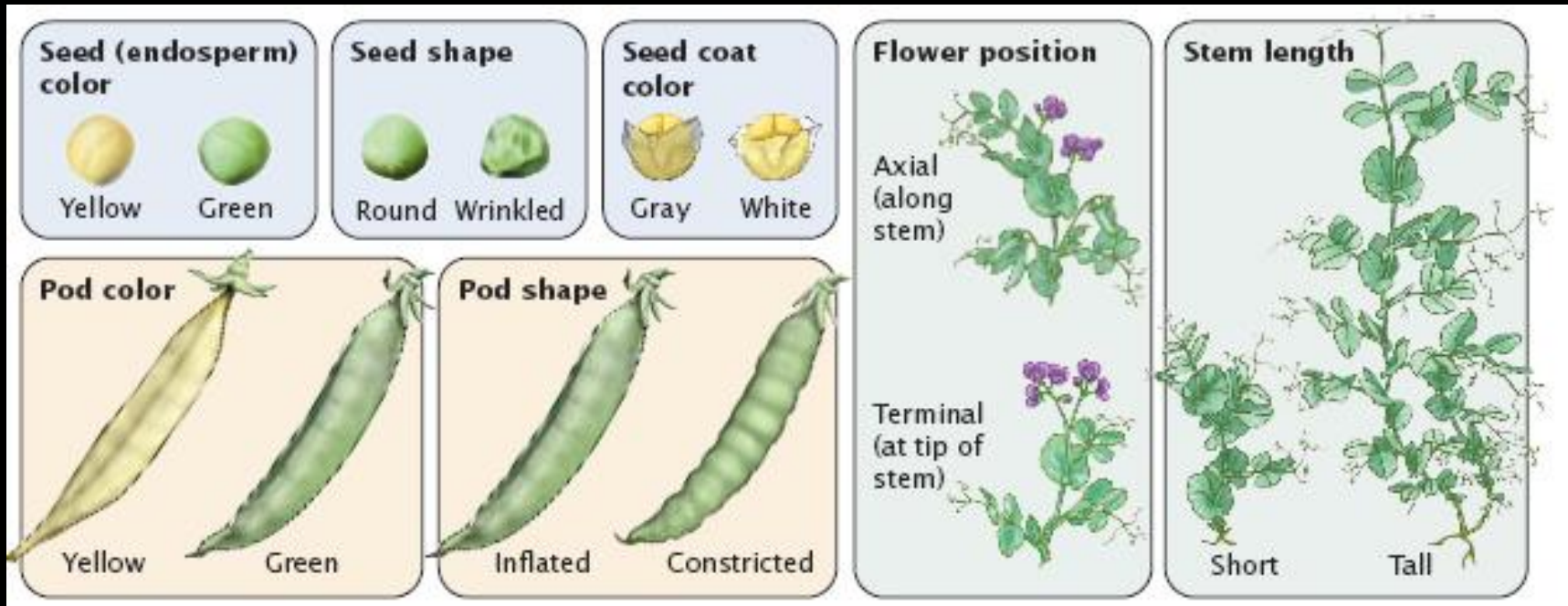
Part 2



Learning Objectives

- Describe the results of Mendel's crosses on pea plants.

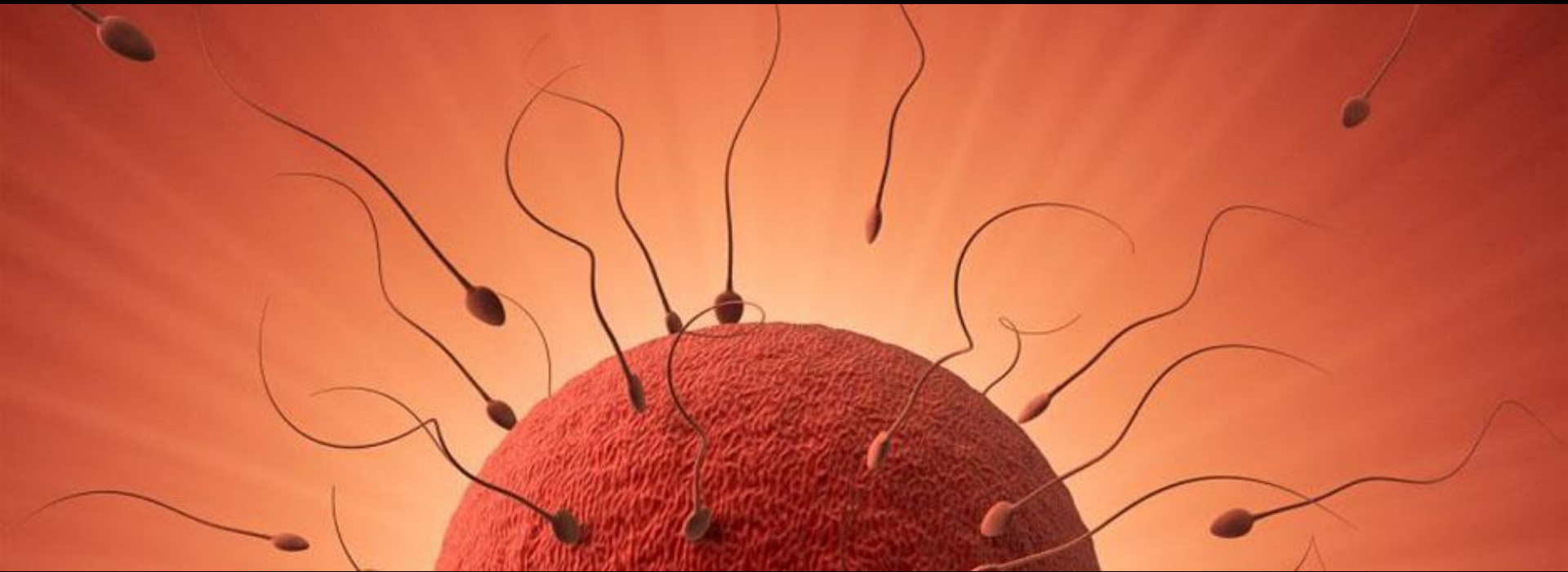
Mendel's 7 Traits



Mendel crossed plants with contrasting traits and studied their offspring.

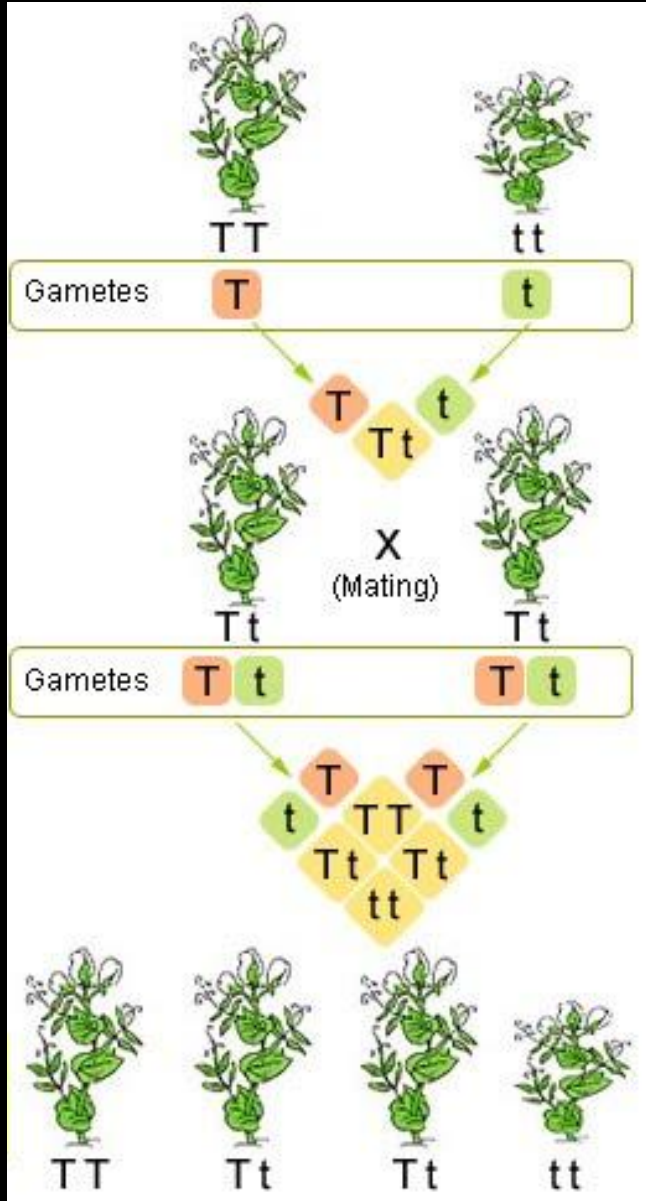
Review:

What are Gametes?



Gametes - reproductive cells (sperm & egg) that unite at fertilization to form a new organism.

Mating Vocabulary

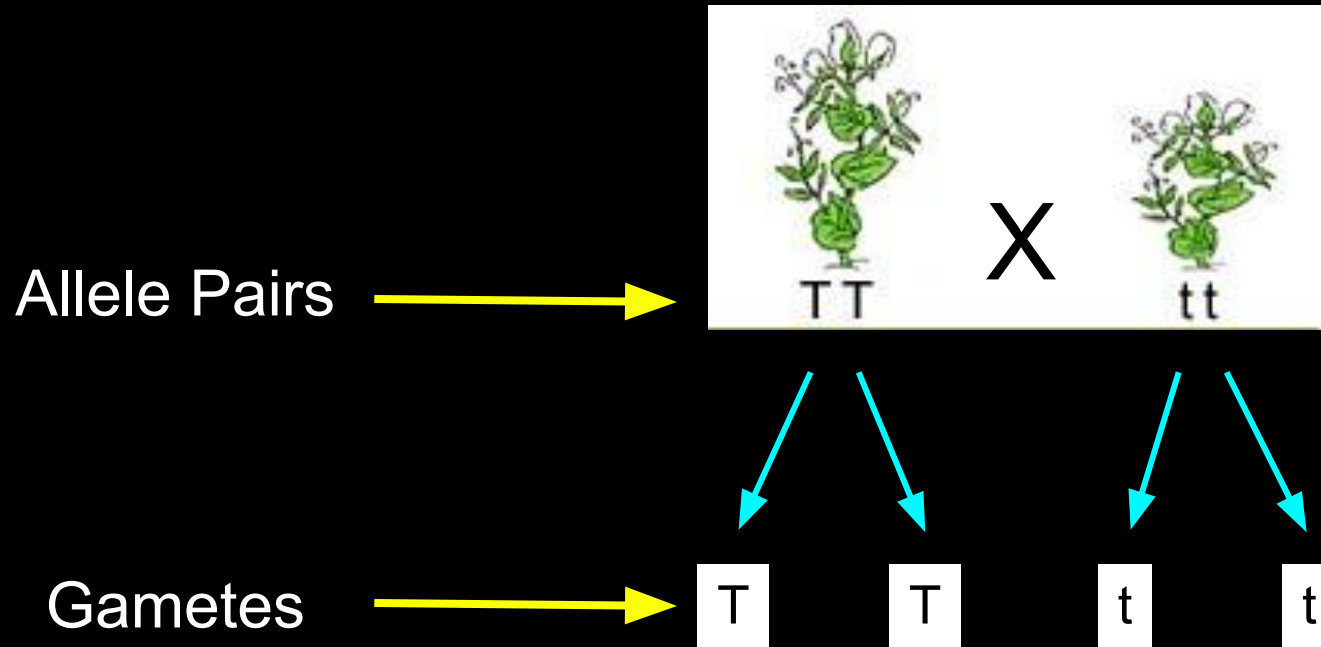


Parental (P) - original pair of purebred plants

First Filial (F1) - first generation offspring

Second Filial (F2) - second generation offspring

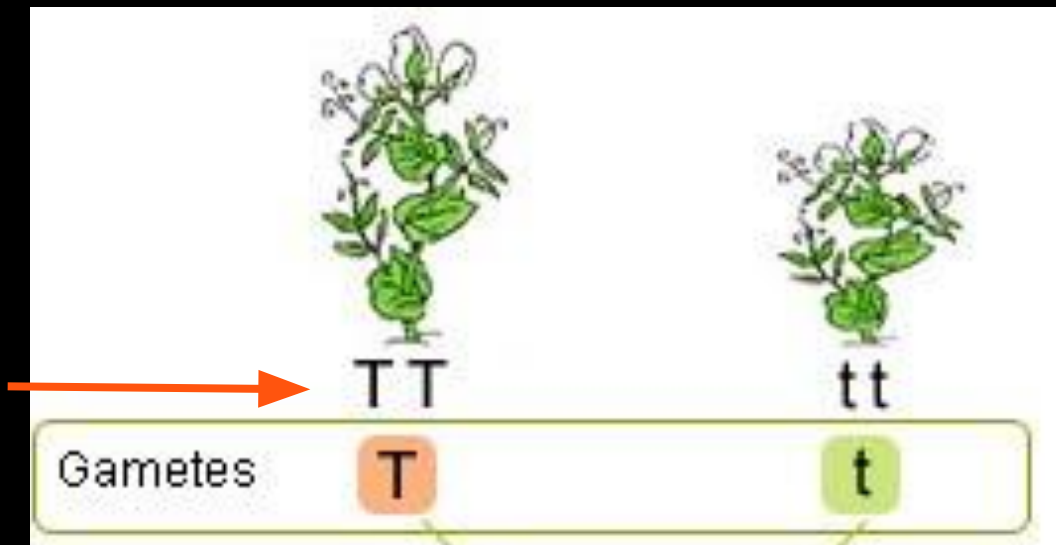
Mendel's Law of Segregation



Allele pairs separate during gamete formation and randomly unite at fertilization.

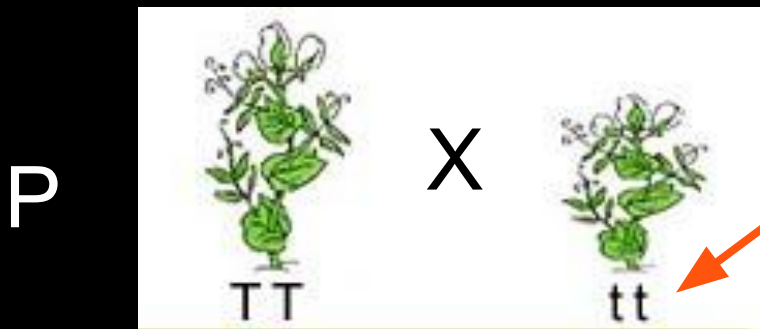
Cross of Parental Tall and Short Pea Plants

Homozygous
Allele Pairs



Each parental (P) plant produces 1 type of gamete

Parental Cross

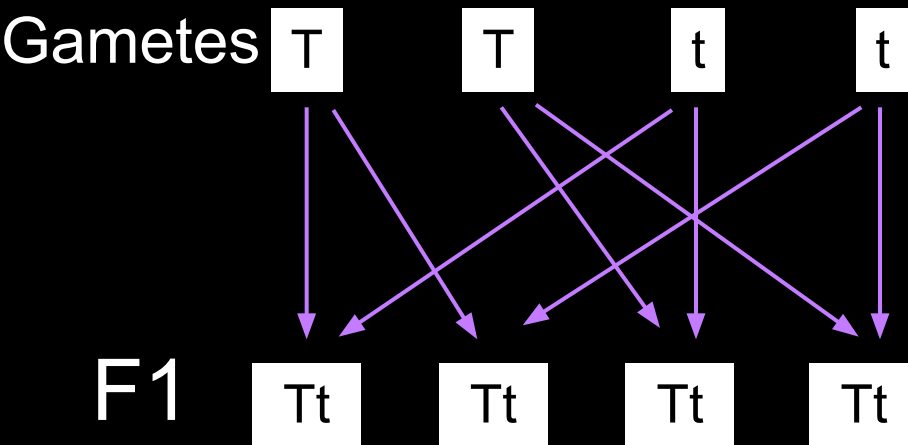


Alleles:

T = tall t = short

1. Cross parental plants.

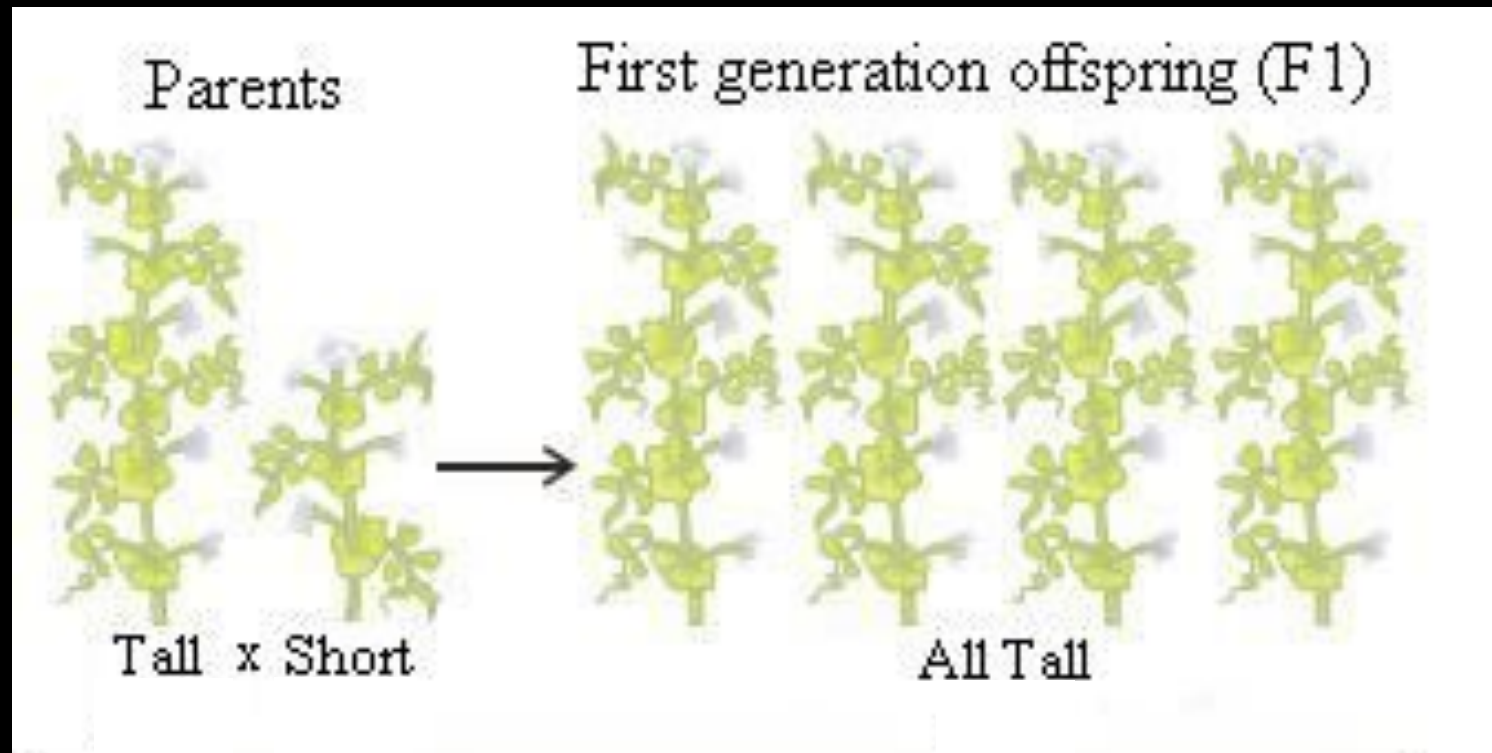
2. Allele pairs separate.



Gametes carry a single copy of a gene






















3. All F1 offspring carry the dominant allele.

Result of Parental Cross



Purebred parental tall (TT) X purebred parental short (tt) = all tall offspring (Tt).

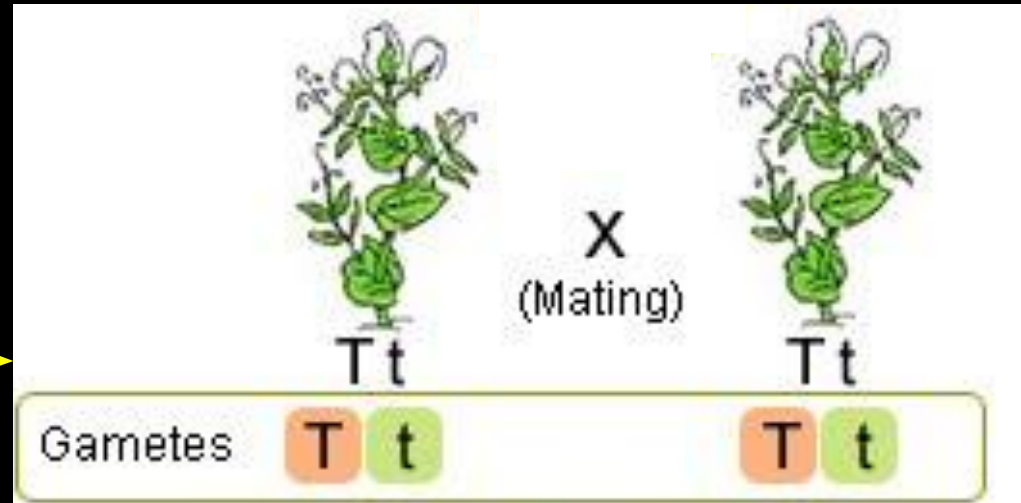
Crosses on 7 Traits

	Flower color	Flower position	Seed color	Seed shape	Pod shape	Pod color	Stem length
P	Purple  ×  White	Axial  ×  Terminal	Yellow  ×  Green	Round  ×  Wrinkled	Inflated  ×  Constricted	Green  ×  Yellow	Tall  ×  Dwarf
F ₁	 Purple	 Axial	 Yellow	 Round	 Inflated	 Green	 Tall

100% of the F₁ offspring showed dominant phenotype

Cross of F1 Generation Pea Plants

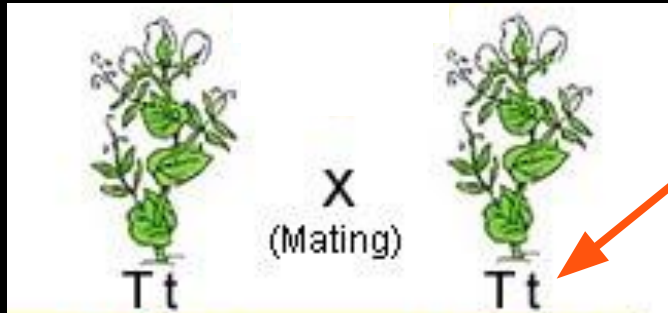
Heterozygous
Allele Pairs



Each First Filial (F1) plant produces
2 types of gametes

First Generation (F1) Crosses

F1

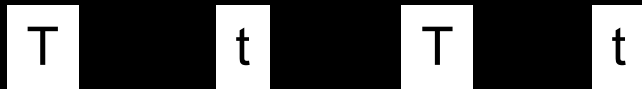


Alleles:

T = tall t = short

1. Cross F1 plants.
2. Allele pairs separate.

Gametes



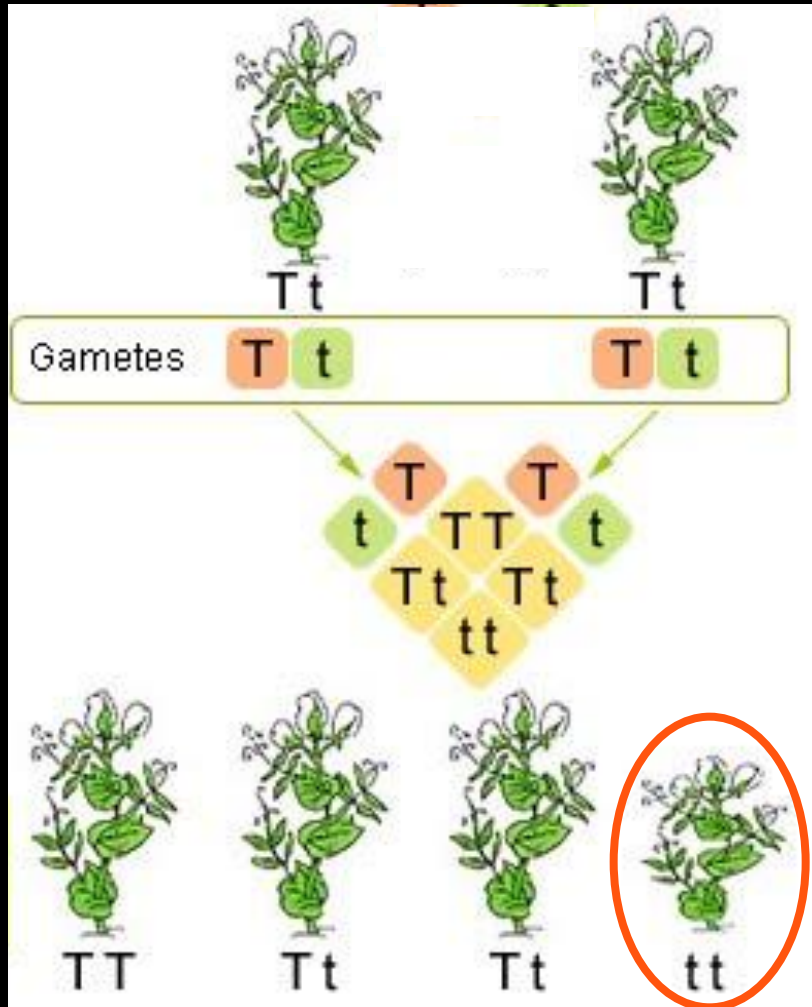
Gametes pair up during fertilization

F2



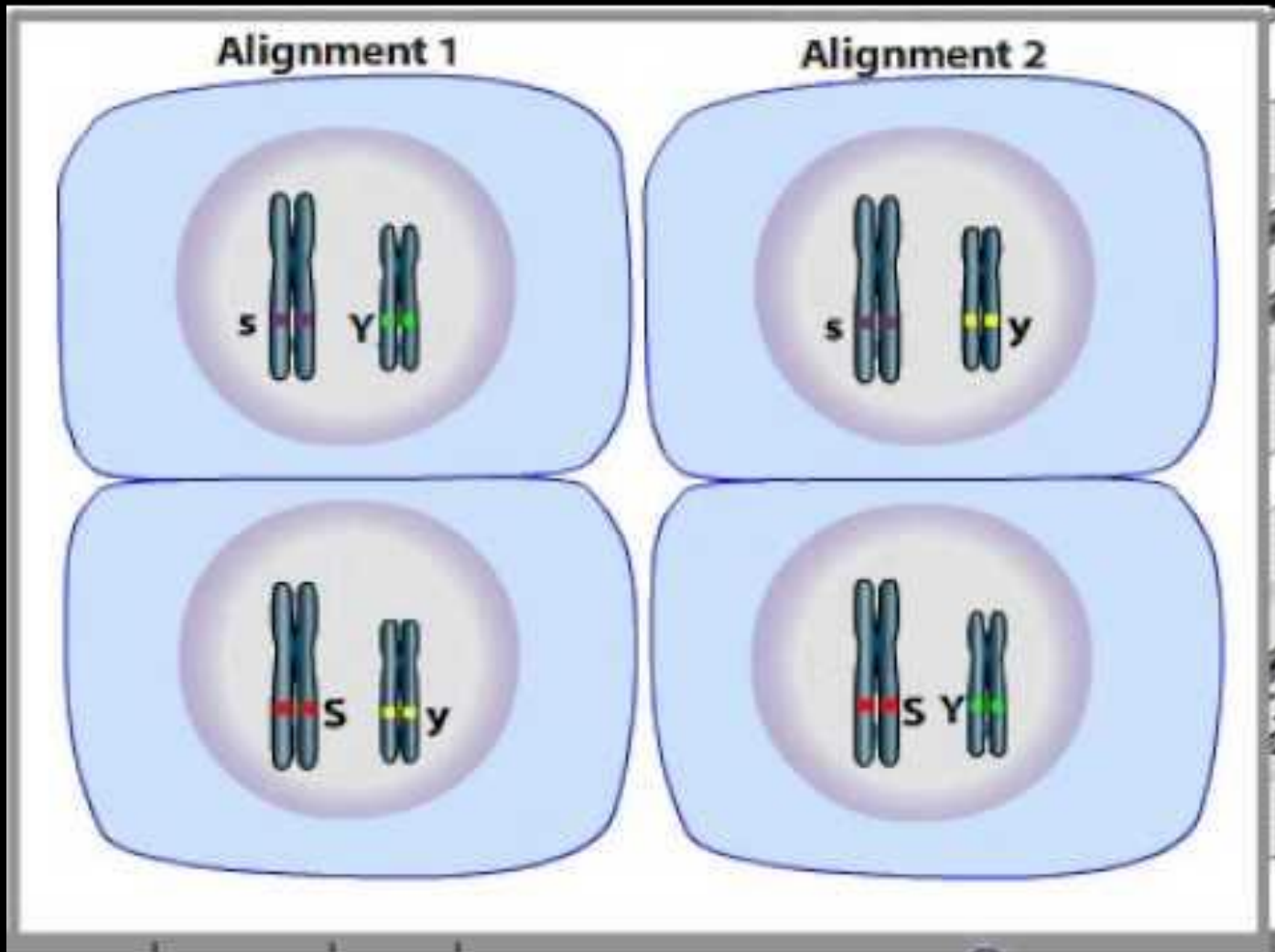
3. $\frac{1}{4}$ of F2 offspring carry the recessive allele.

Result of F1 Cross



The recessive trait (short) reappeared in 1/4 of the F2 plants.

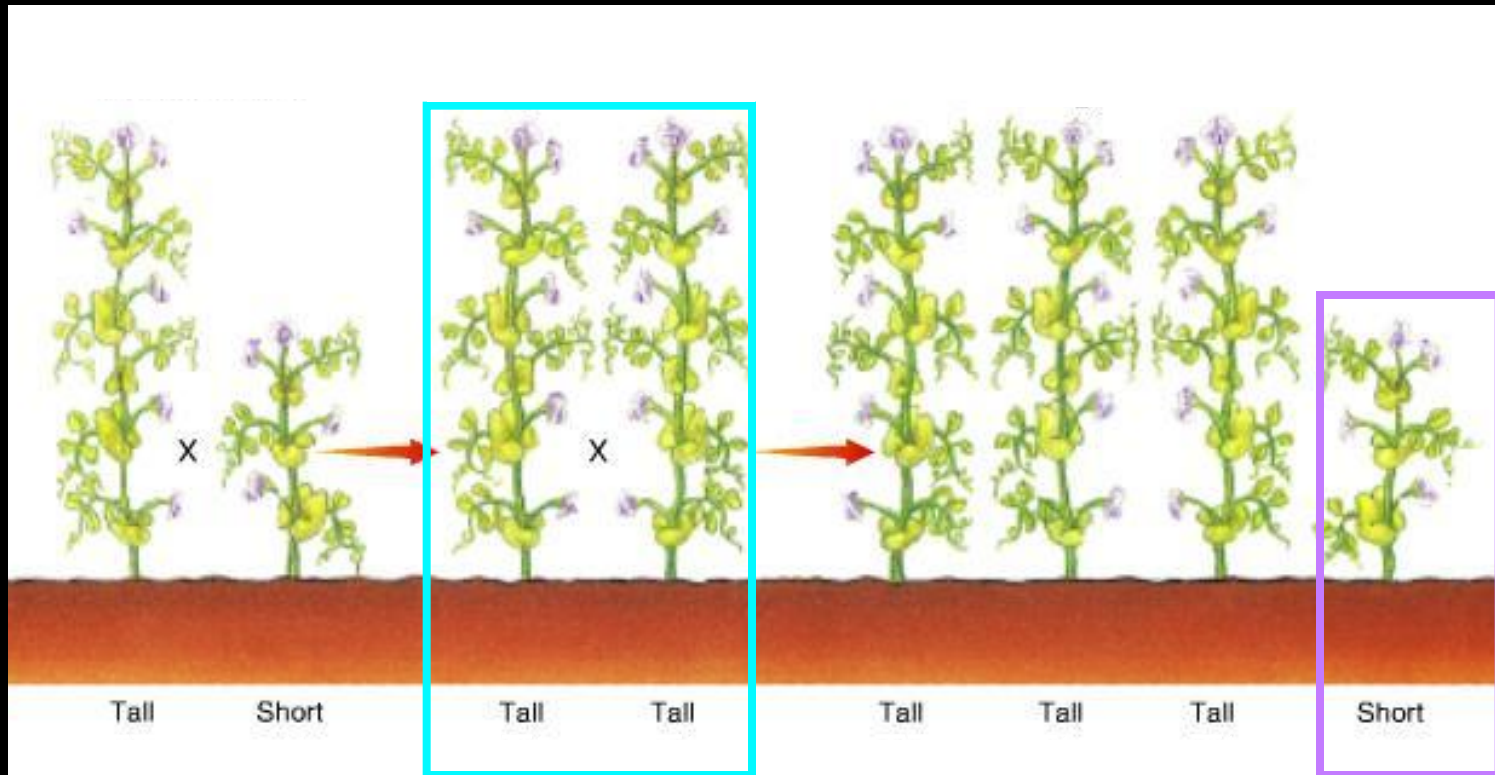
YouTube Video



Stop Here



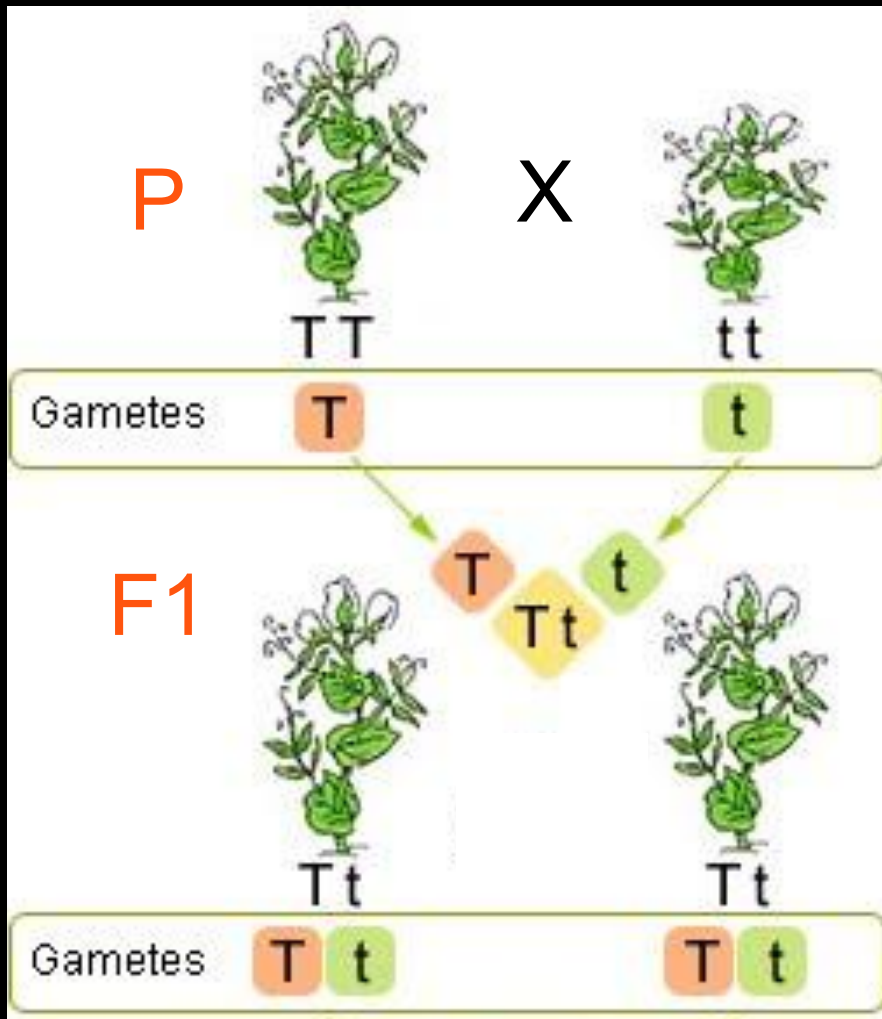
Mendel's Law of Dominance



The dominant allele (T) had masked the recessive allele (t) in the F1 generation.

The recessive trait (tt) reappeared in the absence of the dominant allele (T).

Parental Cross Phenotype



Mendel crossed the parental tall with the parental short pea plant producing the F1 generation.

All F1 plants were tall.