NOTES 5.1

Chapter 5 - Genetics
Lesson I - Mendel and His Peas

Early Ideas About Heredity

Q: Have you ever wondered why some family members look very similar while others look very different?

In 1851, **Gregor Mendel** a young priest/teacher began taking care of the garden where he grew 100's of pea plants. He became curious as to why some of the plants had different physical characteristics, also known as **traits**.

Q: What are traits?
A: a characteristic that an organism can pass on to its offspring through its genes

He noticed that some plants grew tall while others were short and some produced green seeds, while others produced yellow.

He further observed that the pea plants' traits were often similar but on occasion different to those of their parents, also known as **heredity**.

Q: What is heredity?
A: the passing of traits from parents to offspring

Mendel studied these pea plants for more than 10 years to understand the process of heredity. His work formed the foundation of **genetics**.

Q: What is genetics?
A: the scientific study of how traits are passed from parents to offspring; the study of heredity

Mendel's Experimental Methods

Mendel studied genetics by doing controlled breeding experiments with pea plants. Pea plants were ideal for genetics studies because they –

- **reproduce** quickly

Mendel was able to grow many plants and collect a lot of data.

- have easily observed **traits**

Mendel was able to observe whether or not a trait was passed from one generation to the next.

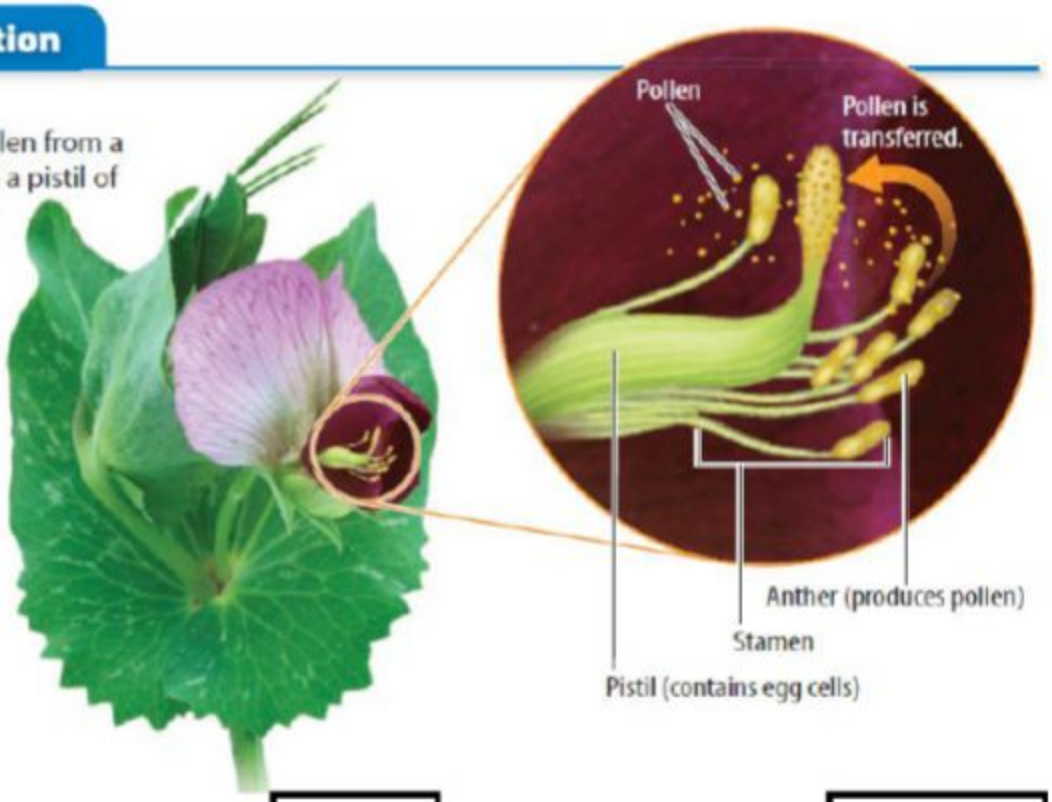
- can be **controlled** by choosing which pairs of plants reproduced Mendel was able to find out which traits came from which plant pairs.

So how did Mendel study these pea plants?

In nature, plants **self-pollinate** This means plants contain both male and female parts.

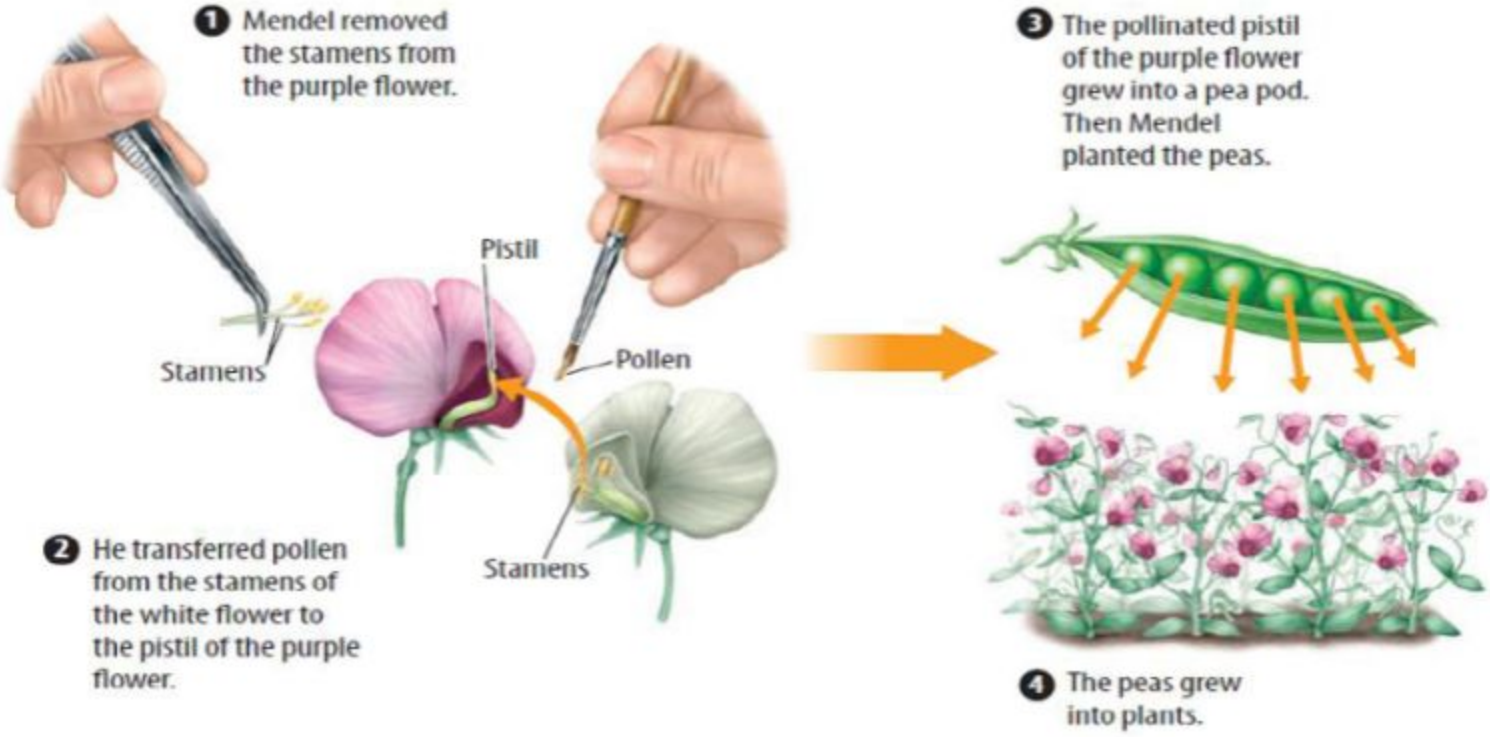
Self-Pollination

Self-pollination occurs when pollen from a stamen lands on a pistil of the same flower or on another flower on the same plant.



To eliminate self-pollination by removing the **male** parts of one flower and the **female** parts from the other, this way he was in control of the results.

Cross-Pollination



So remember... Mendel wanted to study the inheritance of traits. So how did he do it?

Mendel decided to cross opposite forms of a **trait**.

Ex. **Tall plants** x **Short plants**

He started his experiments with **purebred** plants.

Q: What is a purebred plant?
A: a plant that always produces offspring with the same form of a trait as the parent

By using purebred plants Mendel knew that the offspring's traits would always be identical to that of the parents.

Mendel's Results

parental generation →
(*P* generation)

Purebred tall x **Purebred short**

1st *filial* generation →
(F_1 generation)

All tall plants

2nd *filial* generation →
(F_2 generation)

3 tall plants **1 short**

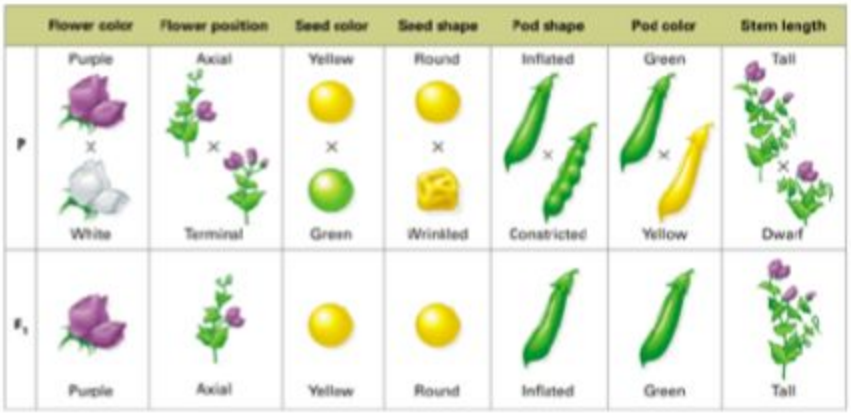
Mendel's Conclusions

From his results, Mendel reasoned that individual **factors** must control the inheritance of **traits** in pea plants. These factors exist in **pairs** – 1 from the female and 1 from the male. 1 factor in each pair can mask or hide another.

Ex. tall vs. short

Mendel studied 7 total traits in pea plants –

- stem height
- seed shape
- seed color
- seed coat color
- pod shape
- pod color
- flower position



Traits are either –

dominant or **recessive**

Q: What is a dominant trait?
A: a genetic factor that blocks another genetic factor; a trait that always shows up in the organism when it is present

Q: What is a recessive trait?
A: a genetic factor that is blocked by the presence of a dominant factor; a trait that is masked or covered up whenever the dominant factor is present

A **trait** controlled by a **recessive** trait will only show up if the organism does not have the **dominant** trait.

In pea plants, the trait for tall stems is dominant over the trait for short stems.

Therefore, only pea plants that inherit 2 recessive traits for short stems will be short.