

## Why do you look like your family?

For a long time people understood that traits are passed down through families. The rules of how this worked were unclear, however. The work of Gregor Mendel was crucial in explaining how traits are passed down to each generation.

## Mendel's Experiments

What does the word "inherit" mean? You may have inherited something of value from a grandparent or another family member. To **inherit** is to receive something from someone who came before you. You can inherit objects, but you can also inherit traits. For example, you can inherit a parent's eye color, hair color, or even the shape of your nose and ears!

**Genetics** is the study of inheritance. The field of genetics seeks to explain how traits are passed on from one generation to the next.

In the late 1850s, an Austrian monk named Gregor Mendel (**Figure below**) performed the first genetics experiments.

















[Figure 2]

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Gregor Mendel, the "father" of genetics.

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To study genetics, Mendel chose to work with pea plants because they have easily identifiable traits (**Figure below**). For example, pea plants are either tall or short, which is an easy trait to observe. Furthermore, pea plants grow quickly, so he could complete many experiments in a short period of time.

Seed		Flower	Pod		Stem	
Form	Cotyledon	Color	Form	Color	Place	Size
						
Round	Yellow	White	Full	Green	Axial pods	Tall
						
Wrinkled	Green	Violet	Constricted	Yellow	Terminal pods	Short
1	2	3	4	5	6	7

[Figure 3]

Characteristics of pea plants.

Mendel also used pea plants because they can either **self-pollinate** or be **cross-pollinated**. Self-pollination means that only one flower is involved; the flower's own pollen lands on the female sex organs. Cross pollination is done by hand by moving pollen from one flower to the stigma of another (just like bees do naturally). As a result, one plant's sex cells combine with another plant's sex cells. This is called a "cross." These crosses produce **offspring** (or "children"), just like when male and female animals mate. Since Mendel could move pollen between plants, he could carefully control and then observe the results of crosses between two different types of plants.

He studied the inheritance patterns for many different traits in peas, including round seeds versus wrinkled seeds, white flowers versus purple flowers, and tall plants versus short plants. Because of his work, Mendel is considered the "Father of Genetics."

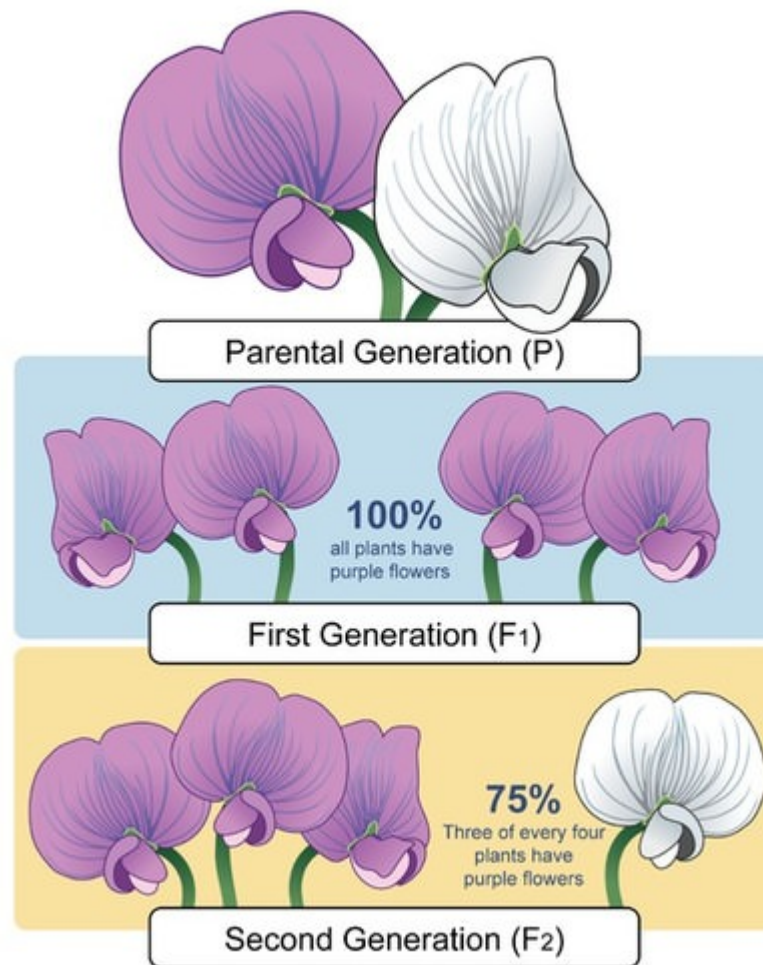
## Mendel's First Experiment

In one of Mendel's early experiments, he crossed a short plant and a tall plant. What do you predict the offspring of these plants were? Medium-sized plants? Most people during Mendel's time would have said medium-sized. But an unexpected result occurred. Mendel observed that the offspring of this cross (called the **F1 generation**) were all tall plants!

Next, Mendel let the F1 generation self-pollinate. That means the tall plant offspring were crossed with each other. He found that 75% of their offspring (the **F2 generation**) were tall, while 25% were short. Shortness skipped a generation. But why? In all, Mendel studied seven characteristics, with almost 20,000 F2 plants analyzed. All of his results were similar to the first experiment—about three out of every four plants had one trait, while just one out of every four plants had the other.

For example, he crossed purple flowered-plants and white flowered-plants. Do you think the colors blended? No, they did not. Just like the previous experiment, all offspring in this

cross (the F1 generation) were one color: purple. In the F2 generation, 75% of plants had purple flowers and 25% had white flowers (**Figure below**). There was no blending of traits in any of Mendel's experiments.



[Figure 4]

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The results of Mendel's experiment with purple flowered and white flowered-plants numerically matched the results of his experiments with other pea plant traits.

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## Summary

- Gregor Mendel was the father of the field of genetics, which seeks to explain how traits are passed on from one generation to the next.
- To study genetics, Mendel chose to work with pea plants because they have easily identifiable traits.