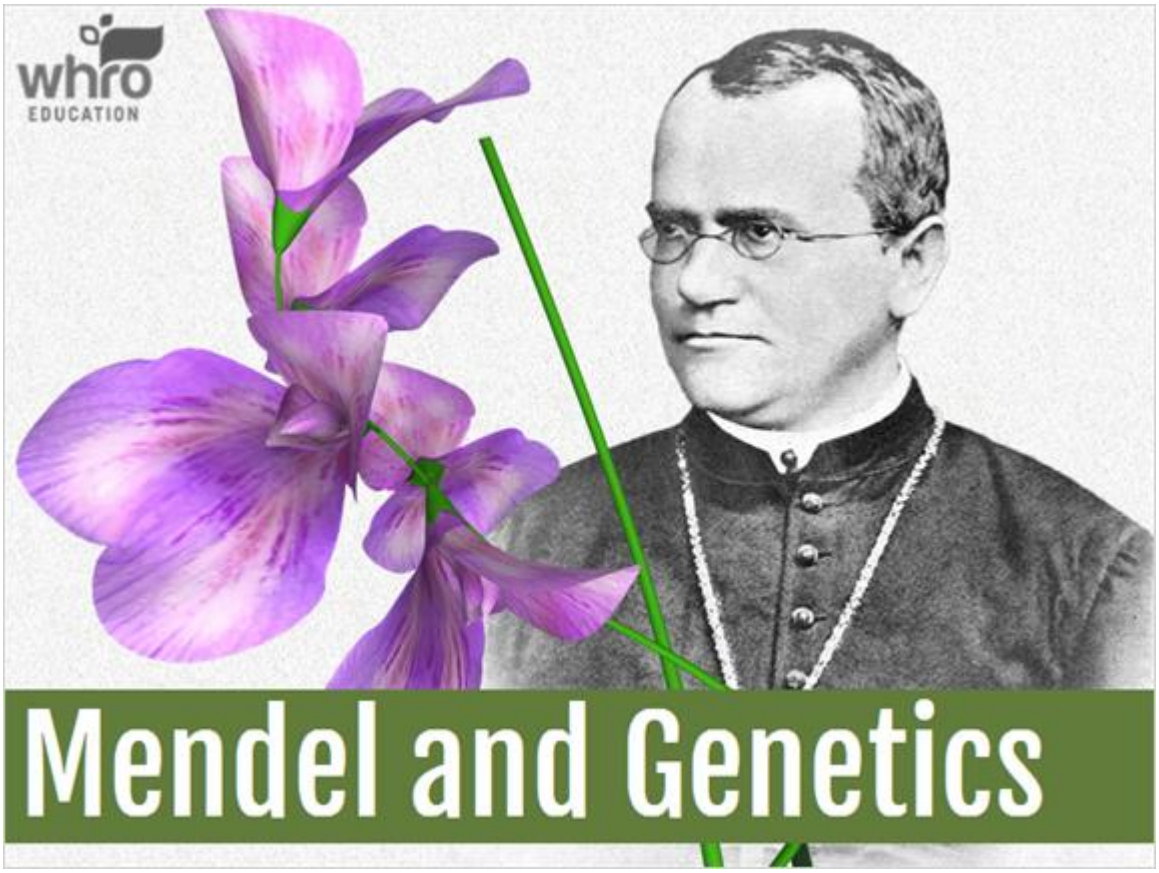
Module 5: Mendelian Genetics and Genetic Disorders

Topic 1 Content: Mendel and Genetics Notes



Mendel and Genetics

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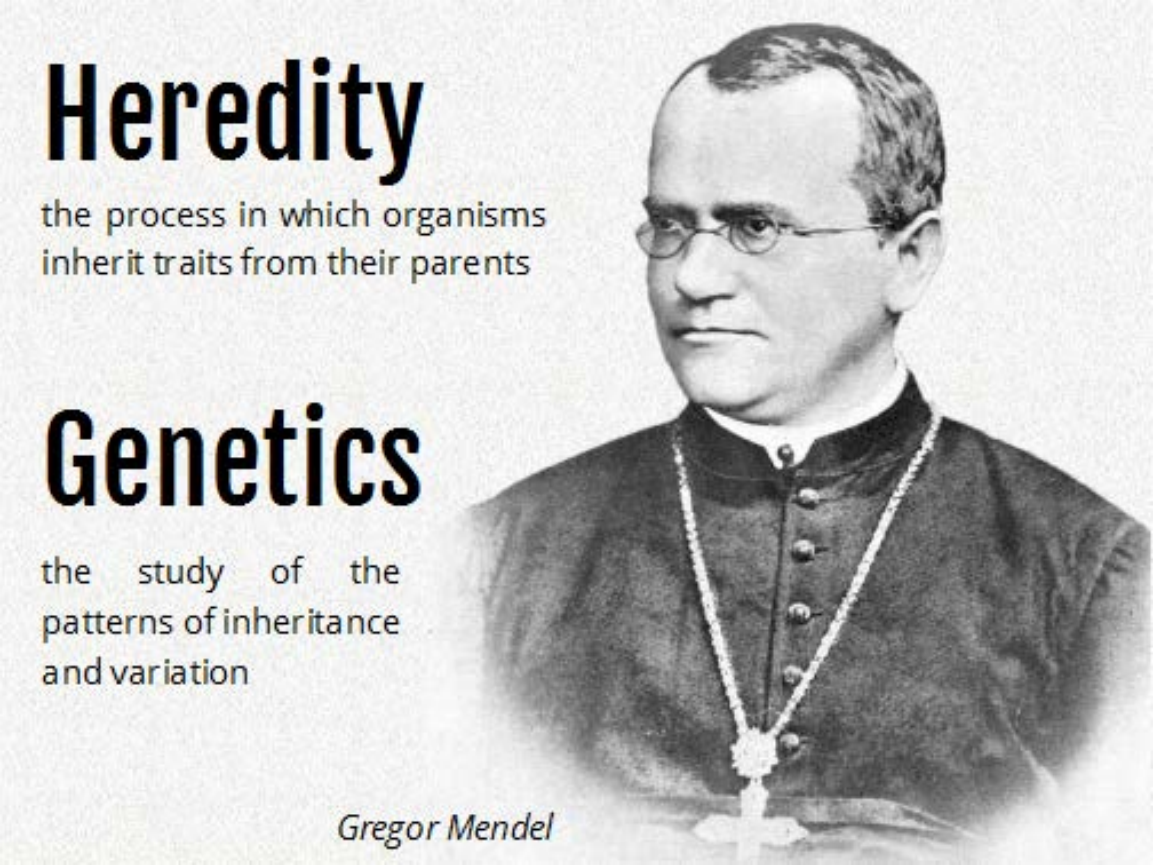

The understanding of heredity is due in large part to the work of Gregor Mendel. Heredity is the process from which organisms inherit traits from their parents. The study of the patterns of inheritance and variation is called genetics. To simplify, genetics is the study of heredity.

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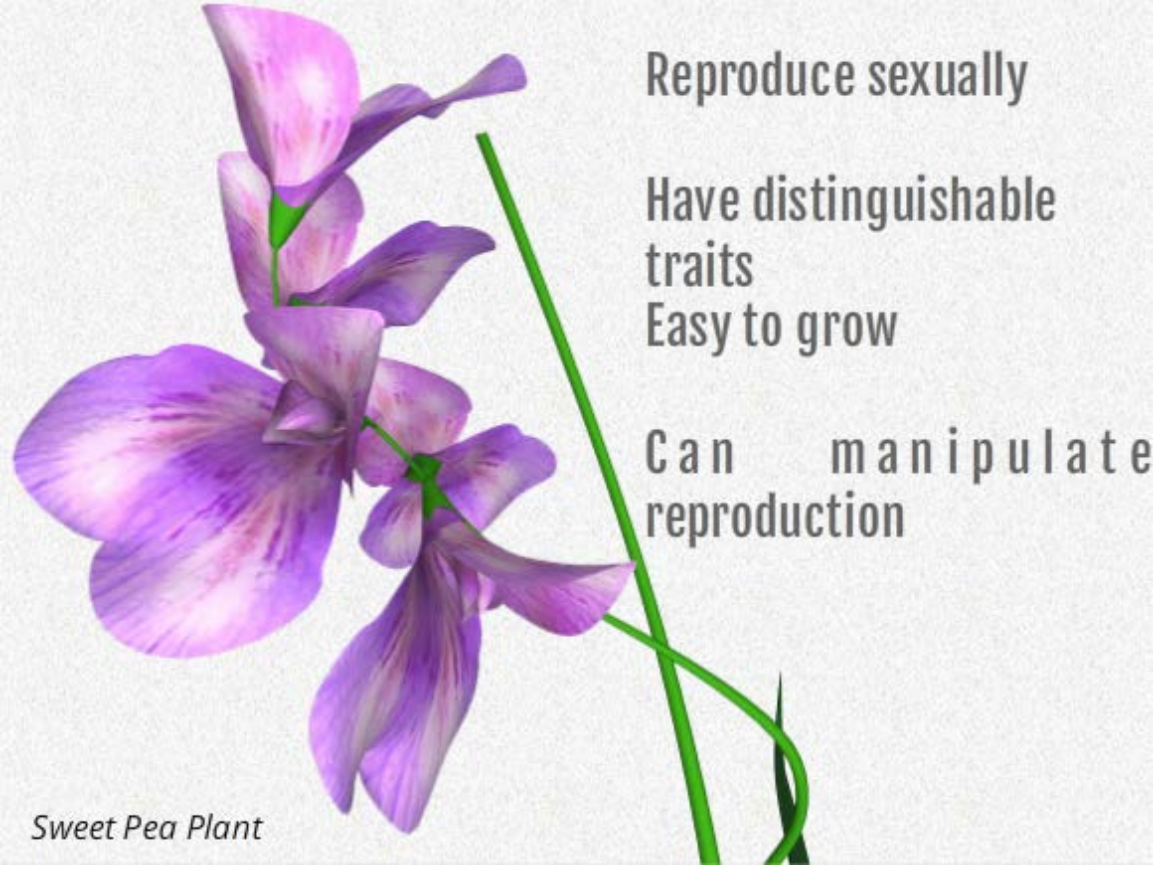
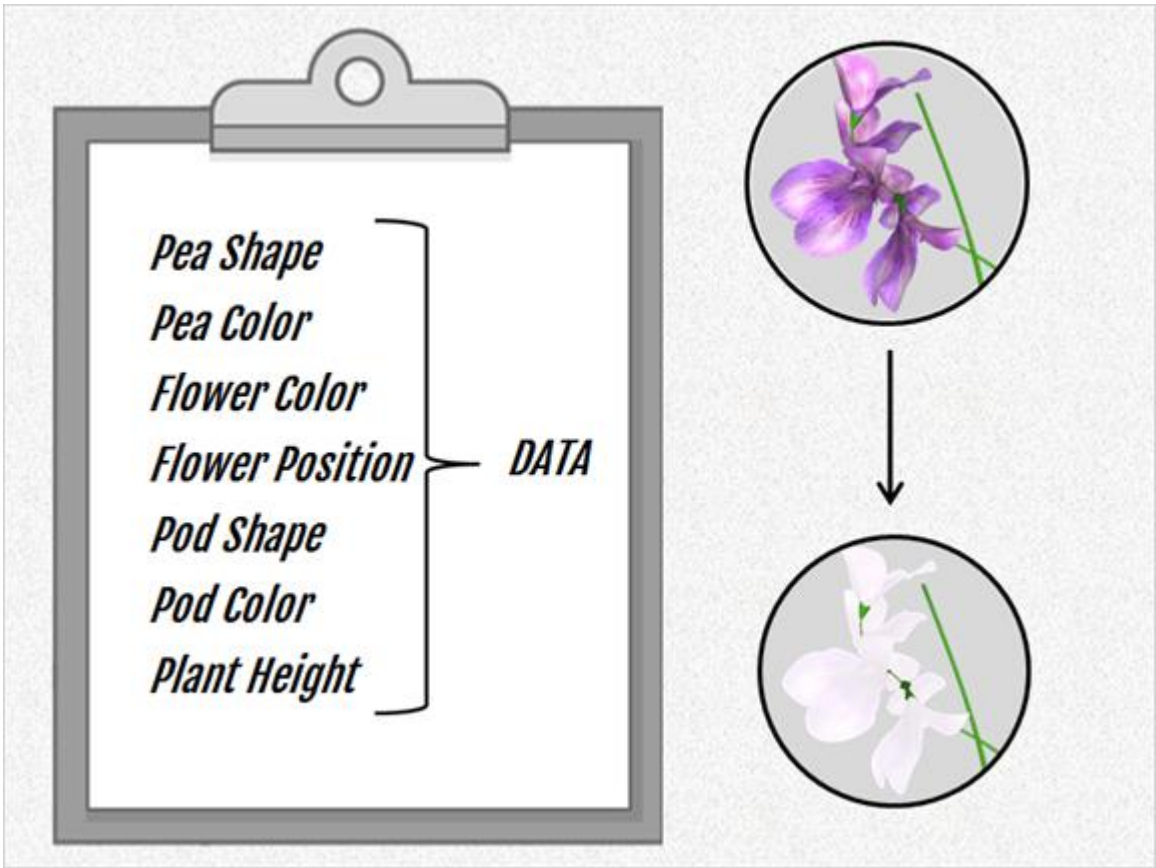
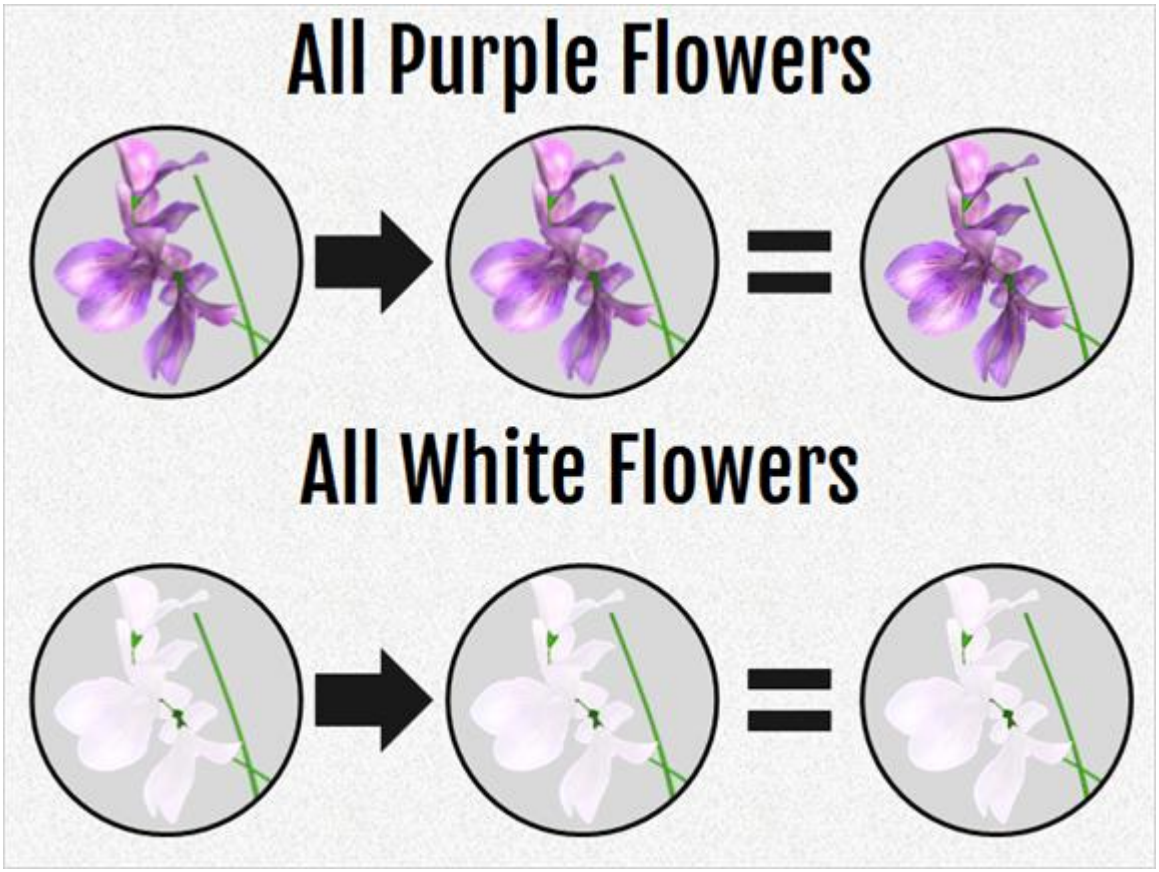


In the late 1880s, the Austrian monk, Gregor Mendel studied the genes and traits of organisms. He grew and interbred more than 30,000 pea plants. He chose to work with pea plants because they reproduce sexually, they have very distinguishable traits which are expressed in contrasting forms, they are easy to grow, and he could manipulate the sexual reproduction, or crosses, he made with each plant.

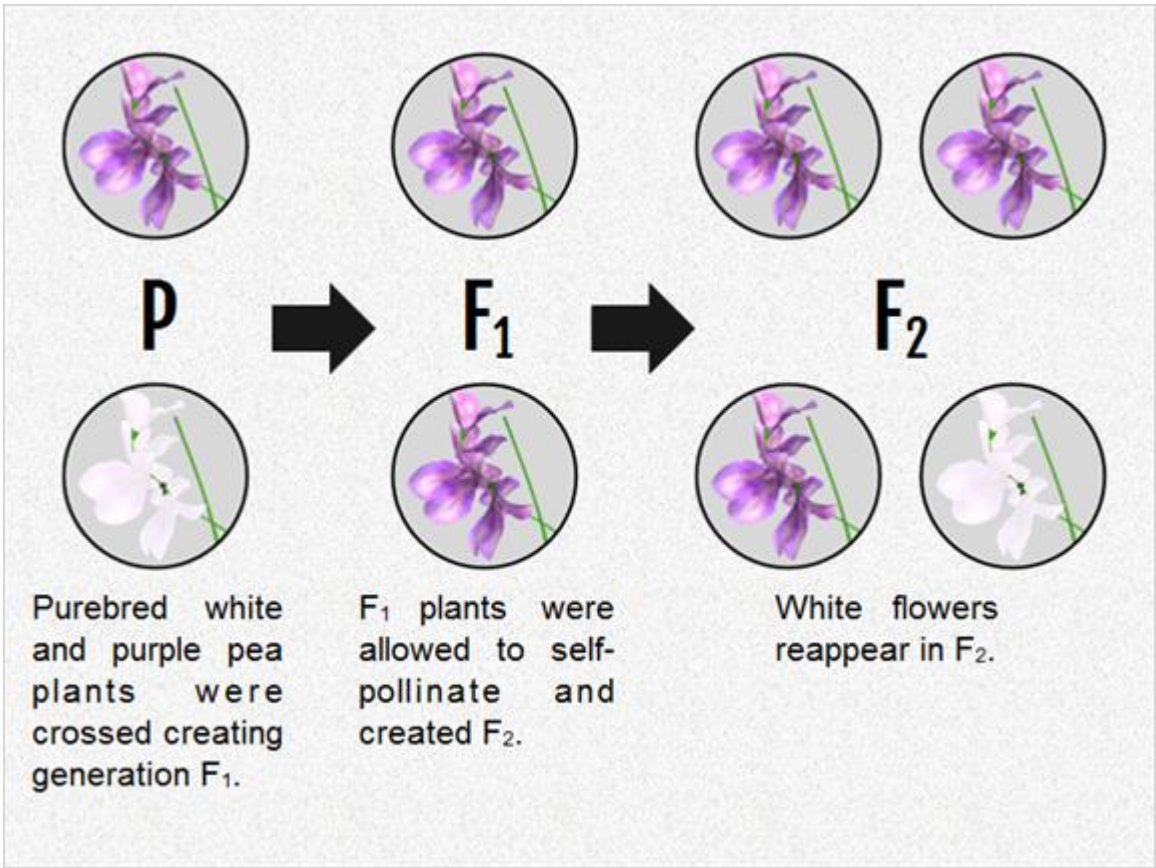
Mendel was able to cross-pollinate the pea plants using true breeding plants. True breeding, also known as pure breeding, is a method of breeding in which an organism always passes down certain traits to its offspring.



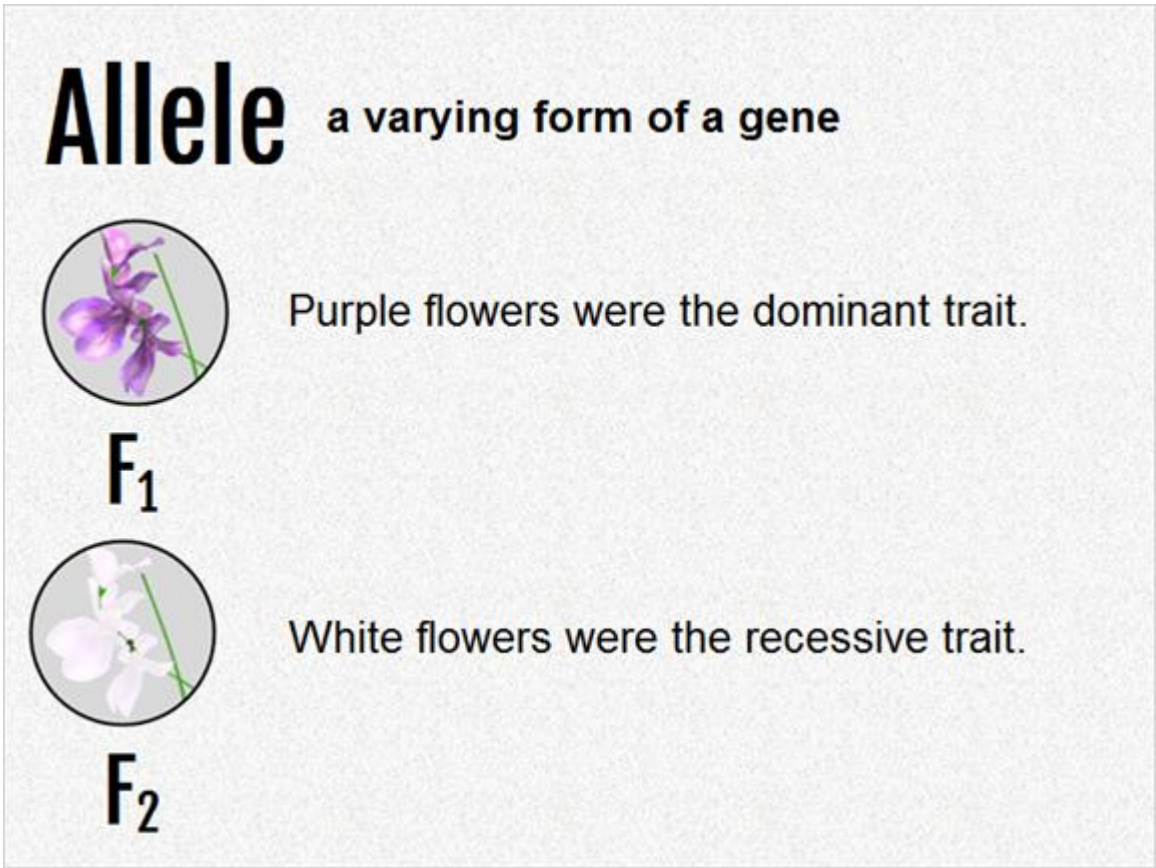
Mendel examined several different traits, including pea shape, pea color, flower color, flower position, pod shape, pod color, and plant height. He studied how crossing plants with other pea plants with differently expressed traits affected the offspring. When he conducted his pea plant experiments, he made sure to have plenty of data and consistency by experimenting on large numbers of pea plants.



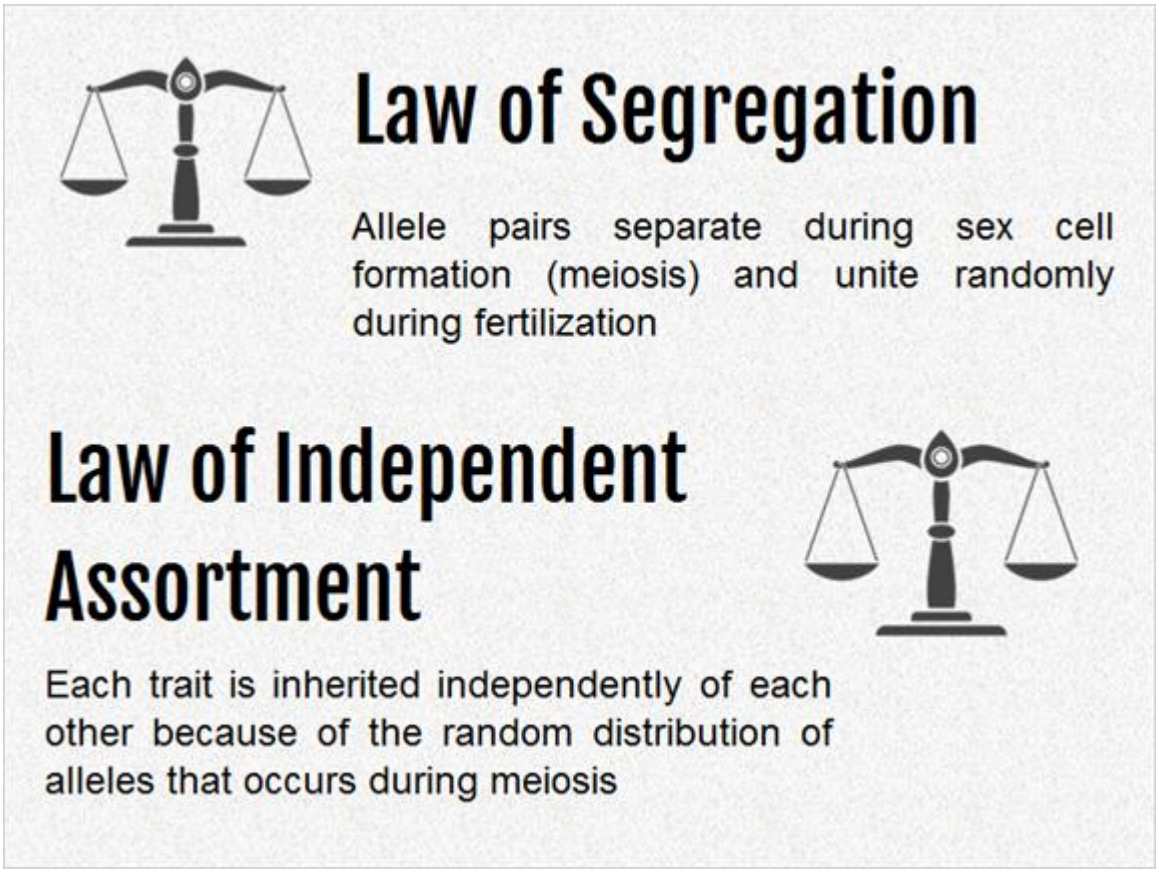
Mendel grew seeds from pea plants that had all purple flowers and pea plants that had all white flowers. A cross, or the mating of two organisms, between two purebred pea plants with purple flowers produced plants that only had purple flowers. A cross between two purebred pea plants with white flowers produced plants that only had white flowers.



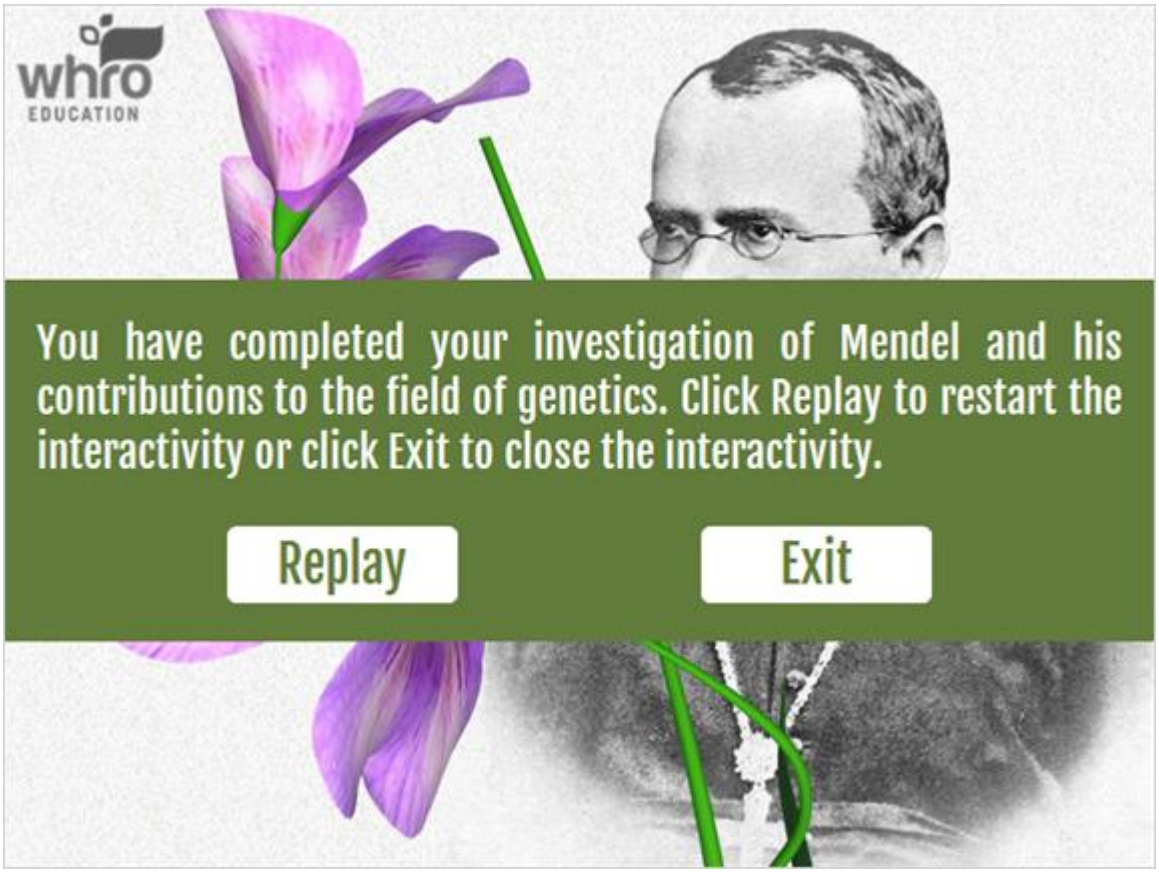
Mendel then crossed a purebred pea plant that produced purple flowers with a purebred pea plant that produced white flowers. The plants in this initial cross are referred to as the parental generation, represented by the letter P, and the offspring from this cross is referred to as the F_1 generation. Mendel observed that all the plants in the F_1 generation expressed the purple flower trait. It was as if the white flower trait had disappeared. Mendel then allowed plants from the F_1 generation to self-pollinate, and the resulting offspring, the F_2 generation, had plants with both purple and white flowers.



From his studies, Mendel determined that there were two forms of a trait. These contrasting forms of the trait are now referred to as alleles. An allele is a varying form of a gene. Mendel called the form of the trait that was expressed in the F_1 generation the dominant trait, and the form of the trait that was masked in the F_1 generation recessive. By allowing the F_1 generation to self-pollinate, Mendel demonstrated that the recessive form of the trait had not disappeared, but was masked in the presence of the dominant purple flower trait.



After his experimentation with pea plants, Mendel came up with two different laws of genetics. Mendel's first law, the Law of Segregation, states that allele pairs separate during meiosis and unite randomly during fertilization. Mendel's second law, the Law of Independent Assortment, states that each trait is inherited independently of others because of the random distribution of alleles that occurs during meiosis. These laws became the basis for the study of genetics.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EDUCATION
You have completed your investigation of Mendel and his contributions to the field of genetics. Click Replay to restart the interactivity or click Exit to close the interactivity.
Replay
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