

Lesson Outline for Teaching

Lesson 1: Mendel and His Peas

A. Early Ideas about Heredity

1. Heredity is the passing of traits from parents to offspring.
2. In the 1850s, Gregor Mendel, an Austrian monk, performed experiments that helped answer questions about how traits are inherited.
3. Genetics is the study of how traits pass from parents to offspring.

B. Mendel's Experimental Methods

1. Pea plants were ideal for genetic studies because they reproduce quickly; they have easily observed traits; and the experimenter can control which pairs of plants reproduce.
2. Mendel controlled which plants pollinated other plants.
 - a. When a(n) true-breeding plant self-pollinates, it always produces offspring with traits that match the parent.
 - b. By cross-pollinating plants himself, Mendel was able to select which plants pollinated other plants.
3. With each cross-pollination Mendel did, he recorded the traits that appeared in the offspring.

C. Mendel's Results

1. Mendel's crosses between true-breeding plants with purple flowers produced plants with only purple flowers. Crosses between true-breeding plants with white flowers produced plants with only white flowers.
2. Crosses between true-breeding plants with purple flowers and true-breeding plants with white flowers produced plants with only purple flowers.
3. The first-generation purple-flowering plants are called hybrid plants.
4. When Mendel cross-pollinated two hybrid plants, the trait that had disappeared in the first generation always reappeared in the second generation.
5. Mendel analyzed the data from many experiments on seven different traits. He always noted a 3:1 ratio; for example, purple flowers grew from hybrid crosses three times more often than white flowers.

D. Mendel's Conclusions

1. After analyzing the results of his experiments, Mendel concluded that two factors control each trait.
2. Mendel also proposed that, when organisms reproduce, each reproductive cell—sperm or egg—contributes one factor for each trait.
3. A genetic factor that blocks another genetic factor is dominant.

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4. A genetic factor that is blocked by the presence of a dominant factor is called recessive.
5. For the second generation, Mendel cross-pollinated two hybrids with purple flowers. About 75 percent of the second-generation plants had purple flowers. These plants had at least one dominant factor. Twenty-five percent of the second-generation plants had white flowers. These plants had the same two recessive factors.

Discussion Question

What is the difference between self-pollination and cross-pollination?

Self-pollination occurs when pollen from one plant lands on the pistil of a flower on the same plant. Cross-pollination occurs when pollen from one plant reaches the pistil of a flower on a different plant.