



SECTION
6.3

MEDEL AND HEREDITY
Reinforcement

KEY CONCEPT Mendel’s research showed that traits are inherited as discrete units.

Traits are inherited characteristics, and **genetics** is the study of the biological inheritance of traits and variation. Gregor Mendel, an Austrian monk, first recognized that traits are inherited as discrete units. We call these units genes. Mendel conducted his experiments with pea plants, which were an excellent choice because they are easily manipulated, produce large numbers of offspring, and have a short life cycle. Mendel made three important decisions that helped him to see patterns in the resulting offspring.

- Use of purebred plants: Mendel used pea plants that had self-pollinated for so long that they had become genetically uniform, or **purebred**. This meant that the offspring looked like the parent plant. Because of this characteristic, Mendel knew that any differences he observed in the offspring were the result of his experiments.
- Control over breeding: At the start of his experiments, Mendel removed the male flower parts from the pea plants. He then pollinated the female flower part with pollen from a plant of his choosing, which produced offspring referred to as the F₁ generation.
- Observation of “either-or” traits: Mendel studied seven traits that appeared in only two forms. For example, flowers were white or purple; peas were wrinkled or round.

Mendel observed that when he mated, or **crossed**, a purple-flowered plant with a white-flowered plant, for example, all of the F₁ offspring had purple flowers. Mendel next allowed the F₁ offspring to self-pollinate; that is, the plant mated with itself. In the resulting offspring, the F₂ generation, approximately three-fourths of the flowers were purple and one-fourth were white. Mendel continued to find this 3:1 ratio for each of his crosses, regardless of the specific trait he was examining.

Based on his results, Mendel concluded that traits are inherited as discrete units. He also developed what is known as Mendel’s first law, or the **law of segregation**. This law states the following:

- Organisms inherit two copies of each unit (gene), one from each parent.
- The two copies separate, or segregate, during gamete formation. As a result, organisms donate only one copy of each unit (gene) in their gametes.

1. In which generation of offspring did Mendel observe a 3:1 ratio in the appearance of the offspring?

2. What is segregating in the law of segregation? When does this segregation occur?
