MODULE 10

Introduction to Genetics and Patterns of Inheritance

1 Mendelian Genetics

BEFORE YOU READ

Think about what you have learned about the scientific method. On the lines below, list some of the steps Mendel might have used to learn about the natural world. In this lesson, you will learn about Gregor Mendel's experiments.

WHAT YOU'LL LEARN

- the law of segregation and the law of independent assortment
- how to use a Punnett square

READ TO LEARN

How Genetics Began

Gregor Mendel, an Austrian Monk, lived in the 1800s. He experimented with pea plants in the monastery gardens.

Pea plants usually reproduce by self-fertilization. This means that the female gamete is fertilized by a male gamete in the same flower. Mendel discovered a way to cross-pollinate peas by hand. He removed the male gametes from a flower. He then fertilized the flower with the male gamete from a different flower.

Through these experiments, Mendel made several hypotheses about how traits are inherited. In 1866, he published his findings. That year marks the beginning of the science of **genetics**, the science of heredity. Mendel is called the father of genetics.

The Inheritance of Traits

Mendel used true-breeding pea plants—plants whose traits stayed the same from generation to generation. Mendel studied seven traits—flower color, seed color, seed pod color, seed shape, seed pod shape, stem length, and flower position.

◀ FOCUS

As you read this lesson, highlight any parts you do not understand. After you have read the lesson, reread the parts you have highlighted.

Get It?

1. **Infer** why it is important that Mendel's experiments used a true-breeding plant.

What did Mendel find when he crossed pea plants with different traits?

Mendel called the original plants the parent, or P, generation. The offspring were called the F_1 generation. The offspring of the F_1 plants were called the F_2 generation.

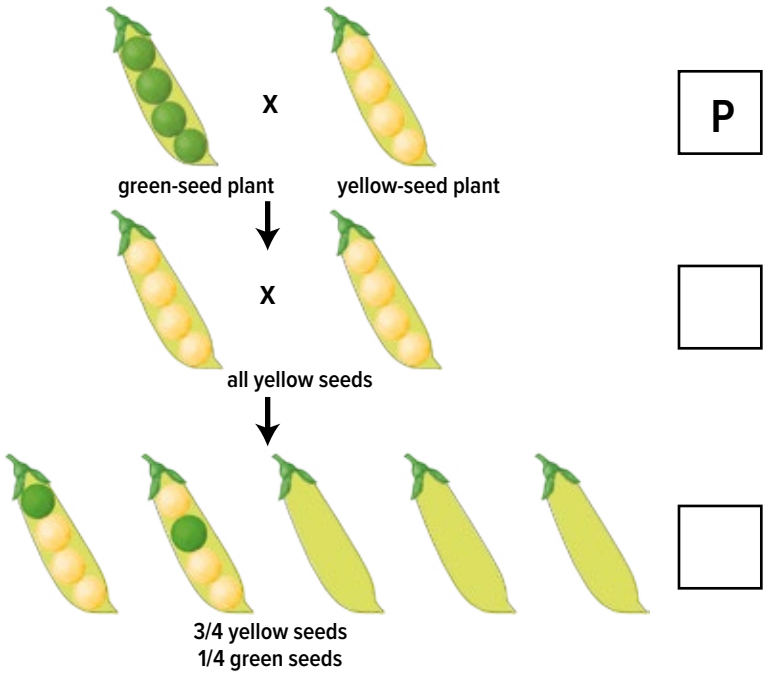
In one experiment, Mendel crossed yellow-seeded and green-seeded plants. All the F_1 offspring had yellow seeds. The green-seed trait seemed to disappear.

Mendel allowed the F_1 plants to self-fertilize. He planted thousands of seeds from these plants. He saw that in these offspring, the F_2 generation, three-fourths of the plants had yellow seeds and one-fourth had green seeds, a 3:1 ratio.

Mendel performed similar experiments for other traits. Each time, he observed the same 3:1 ratio.

TAKE A LOOK

2. Label Fill in the boxes with the name of each generation of offspring. Draw the peas you would expect to see in the empty pods. Use shading to indicate a green pea.



How did Mendel explain his results?

Mendel proposed that there were two forms of each trait, and each form was controlled by a factor, which is now called an allele. An **allele** (uh LEEL) is a different form of a gene passed from generation to generation. Yellow-seed plants have a different allele than green-seed plants.

Mendel proposed that each trait was controlled by two alleles. The **dominant** form is the version of the trait that appears in the F_1 generation. The **recessive** form is the version that is hidden in the F_1 generation.

THINK IT OVER

3. Apply In Mendel's experiment with green and yellow seeds, what was the dominant trait?