

11.1

Genetic Variation Within Populations

VOCABULARY

gene pool
allele frequency

KEY CONCEPT A population shares a common gene pool.

MAIN IDEAS

- ▶ Genetic variation in a population increases the chance that some individuals will survive.
- ▶ Genetic variation comes from several sources.

Connect to Your World

You may think that if you've seen one penguin, you've seen them all. However, penguins can differ in body size, feather patterns, and many other traits. Just like humans, penguins are genetically different from one another. What is the nature of genetic variation in populations? And how is this variation measured by biologists?

▶ MAIN IDEA

Genetic variation in a population increases the chance that some individuals will survive.

Body size and feather patterns in penguins are each examples of phenotypes. A phenotype is a trait produced by one or more genes. In a population, there may be a wide range of phenotypes. For example, some penguins may be short and rounded. Others could be tall and slim.

Natural selection acts on different phenotypes in a population. However, in order to have different phenotypes, a population must have genetic variation. A population with a lot of genetic variation likely has a wide range of phenotypes. The greater the variation in phenotypes, the more likely it is that some individuals can survive in a changing environment. For example, in an unusually cold winter, short, rounded penguins might be better able to stay warm than tall, slim penguins. But if there is a shortage of food, tall, slim penguins might be better divers, allowing them to catch more fish.

Genetic variation is stored in a population's **gene pool**—the combined alleles of all of the individuals in a population. Different combinations of alleles in a gene pool can be formed when organisms mate and have offspring. Each allele exists at a certain rate, or frequency. An **allele frequency** is a measure of how common a certain allele is in the population. As shown in **FIGURE 1.1**, you can calculate allele frequencies. First count the number of times an allele occurs in a gene pool. Then divide by the total number of alleles for that gene in the gene pool.

Analyze What is the relationship between allele frequencies and a gene pool?

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