

11.1 GENETIC VARIATION WITHIN POPULATIONS

KEY CONCEPT A population always has a common gene pool.

In most populations, individuals have different characteristics, or traits, or phenotypes. In a trait controlled by one or more genes, and a single population may have a range of phenotypes for any given trait. In order for natural selection to occur, a population must have different phenotypes to be selected for or against. In this way, a variety of phenotypes makes it more likely that certain individuals will survive different environmental pressures.

In order for a population to have a variety of phenotypes, it must have genetic variation. Genetic variation comes in the form of different alleles for any given gene. A population's **gene pool** is the combined alleles of all the individuals in a population.

Biologists measure the genetic diversity of a population by calculating the frequency, or ratio, of each allele in the gene pool. An **allele frequency** is therefore a measure of how common a certain allele is in the gene pool.

Genetic variation comes from two main sources:

- **Mutations** are random changes in DNA. Some mutations cause a new allele to form. If a mutation occurs in a reproductive cell, it can be passed on to offspring.
- **Recombination** is a process by which new allele combinations can form in offspring. Most recombination occurs during meiosis, when the alleles in each parent's genome are arranged in new ways.

Some biologists are studying hybridization as another source of genetic variation. Hybridization occurs when individuals of two related but different species mate.

1. What makes up a population's gene pool?
2. How is genetic variation measured in a population?
3. How do two mutations and recombination provide genetic variation in populations?
4. Why must a population have genetic variation in order for natural selection to occur?

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