Key Features of Natural Selection

- Natural selection is a process in which individuals that have certain heritable traits survive and reproduce at a higher rate than do other individuals because of those traits.
- Over time, natural selection can increase the frequency of adaptations that are favorable in a given environment (Figure 22.12).
- If an environment changes, or if individuals move to a new environment, natural selection may result in adaptation to these new conditions, sometimes giving rise to new species.

One subtle but important point is that although natural selection occurs through interactions between individual organisms and their environment, individuals do not evolve. Rather, it is the population that evolves over time.

A second key point is that natural selection can amplify or diminish only those heritable traits that differ among the individuals in a population. Thus, even if a trait is heritable, if all the individuals in a population are genetically identical for that trait, evolution by natural selection cannot occur.

Third, environmental factors vary from place to place and over time. A trait that is favorable in one place or time may be useless—or even detrimental—in other places or times. Natural selection is always operating, but which traits are favored depends on the context in which a species lives and mates.

▲ Figure 22.12 Camouflage as an example of evolutionary adaptation. Related species of moths have diverse shapes and colors that evolved in different environments, as seen in this dead-leaf moth (*Oxytenis modestia*) in Peru **(a)** and buff-end moth (*Phalera bucephala*) in Scotland **(b)**.

Artificial Selection

Humans have modified other species over many generations by selecting and breeding individuals that possess desired traits, a process called **artificial selection** (Figure 22.9). As a result of artificial selection, crops, livestock animals, and pets often bear little resemblance to their wild ancestors.

► **Figure 22.9 Artificial selection.** These different vegetables have all been selected from one species of wild mustard (*Brassica oleracea*). By selecting variations in different parts of the plant, breeders have obtained these divergent results.