Adaptation and Evolution of Populations

Dana Desonie, Ph.D.
Why would an organism match its background? Wouldn’t it be better to stand out?

An organism that blends with its background is more likely to avoid predators. If it survives, it is more likely to have offspring. Those offspring are more likely to blend into their backgrounds. This butterfly appears to be well adapted to its environment. It is less likely to be eaten by a bird than a butterfly that stands out against the tree.

**Variation and Adaptation**

Every organism is different from every other organism. Every organism’s genes are different, too.

**Variations**

There are variations in the traits of a population. For example, there are lots of variations in the color of human hair. Hair can be blonde, brown, black, or even red. Hair color is a trait determined by genes.
Mutations

At some time in the past, a variation probably came from a mutation. A **mutation** is a random change in an organism’s genes (Figure 1.1). Mutations are natural. Some are harmful, but many are neutral. If a mutation is harmful, the organism may not live to reproduce. If the mutation is beneficial, that organism may have a better chance to survive. An organism that survives is likely to have offspring. If it does, it may pass the mutation on to its offspring. The offspring may be more likely to survive.

Adaptations

Some of the characteristics an organism has may help it survive. These characteristics are called **adaptations**. Some adaptations are better than others.

Many adaptations protect organisms from the external environment (Figure 1.2).
Other adaptations help an organism move or gather food. Reindeer have sponge-like hooves that help them walk on snowy ground without slipping and falling. Fish at the bottom of the ocean are tiny and use very little energy because there is very little food. Organisms have special features that help them avoid being eaten. Some plants have poisonous or foul-tasting substances in them that keep animals from eating them. Their brightly colored flowers serve as a warning. The same is true of some frogs, which can be poisonous (Figure 1.3).

![Poison dart frog image](http://www.ck12.org/flx/render/embeddedobject/116513)

**FIGURE 1.3**
Poison dart frogs have toxins in their skin. Their bright colors warn potential predators not to take a bite!

How Adaptations Develop

Adaptations develop this way. Think about a population of oak trees. Imagine that a fungus has arrived from Asia to North America. Most of the North American oak trees are killed by the fungus. But a few oak trees have a mutation that allows them to survive the fungus. Those oak trees are better adapted to the new environment than the others. Those trees have a better chance of surviving. They will probably reproduce. The trees may pass on the favorable mutation to their offspring. The other trees will die. Eventually, the population of oak trees will change. Most of the trees will have the trait to survive the fungus. This is an adaptation. Over time, traits that help an organism survive become more common. Traits that hinder survival eventually disappear.

Thousands of northern elephant seals—some weighing up to 4,500 pounds—make an annual migration to breed each winter at Año Nuevo State Reserve in California. Marine biologists are using high-tech tools to explore the secrets of these amazing creatures.

**MEDIA**
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Summary

- Different members of a population have different genes for the same trait.
- Some of these differences are due to mutations.
- Some traits allow an individual organism to be better adapted to its environment. That individual will be more likely to survive and to reproduce.

Review

1. How do adaptations develop?
2. What does it mean to say that an organism is well adapted to its environment?
3. What is a mutation?

References

2. Hana Zavadska; Christopher Auyeung. CK-12 Foundation . CC BY-NC 3.0