Traits Vary Within Populations and Species

Chapter 4

Pete is a young emperor penguin. He is very similar to his sister, Polly. Pete and Polly inherited traits from their parents. The parents, Pete, and Polly are very much alike. But each of them is different in small ways. Traits vary among family members.

The penguin family lives on the Ross Ice Shelf in Antarctica. Many other emperor penguin families live there, too. All the penguin families that live there make up a **population** of emperor penguins.

All members of this population of emperor penguins look pretty much alike. Yet, as with families, members of this population vary in their traits. Traits vary within any population of living things.

Many families make up a population of emperor penguins.

Big Question

How do traits vary within groups of the same type of organism?

Vocabulary

population, n. a group of a single type of organism living in the same place at the same time

The penguins in Pete's population live with other populations in the same area. They live with populations of plankton, fish, squid, seals, algae, and orca. All the populations in this place interact with each other. To interact means to affect each other.

All the living and nonliving things in an area make up an ecosystem. The penguin population is just one small part of the Ross Ice Shelf ecosystem.

Word to Know

An *ecosystem* is all the living and nonliving things that interact in the same place.

Penguin populations and seal populations share the same ecosystem in Antarctica.

Traits Vary Within Populations

Katydids live in a meadow ecosystem. The katydid is a leaf-eating insect. Like all living things, any one katydid resembles its parents and siblings. It also resembles other katydids in the population it belongs to. A katydid might have a green body that looks like a leaf. But each katydid is different from all other katydids in its population. The trait of color can vary sharply within the katydid population. Some are pink! A pink katydid is not able to hide on a leaf as well as a green katydid can. The green katydid is less likely to be eaten, and the pink one is more likely to be eaten in a meadow with lots of green leaves. This means the green katydid may live long enough to reproduce. The offspring of the green katydid are more likely to be green, so they will be good hiders, too. But perhaps the pink katydid is more hidden when resting on a pink flower!

You can see that some traits can give an individual in a population a greater chance to survive than individuals with different traits. The ones who survive pass their traits on to offspring.

Pink katydids are more likely to be eaten when resting on a green leaf, so they are less likely to reproduce than green katydids.

Traits Vary Within Populations and Across Species

Here is another example of variation of traits in a population. The flamingo is a pink bird that lives in shallow water ecosystems. Flamingos have long, skinny legs and webbed feet. These traits help flamingos wade through water in search of their favorite food—shrimp! With webbed feet, they can walk on top of the soft mud without sinking and getting stuck.

Most adult flamingos in a population have about the same size feet. But some have smaller feet, and others have larger feet. Foot size, like the colors of katydids, is a trait that varies in a population.

A variation of a trait can help an individual in the population. For example, flamingos with larger webbed feet can stir up more mud. They may have a better chance of finding more shrimp! And that means they may have a better chance to survive and reproduce. But perhaps flamingos with small feet can fly away faster when they have to. This is another example of how some traits give some individuals an advantage in life.

Would feet the same shape as a flamingo's be an advantage to a hawk that needed to capture food with its feet?

More Trait Variation in Populations and Across Species

The saguaro is the largest cactus in the United States. It grows in hot, dry desert climates. Look at the picture of several saguaros. How do they vary?

These saguaros are the same species and around the same age, but they are different heights.

Saguaros have a way to survive seasons with little rain. They collect water through their roots in the soil when it rains. Then they store the water inside their green trunks. Saguaros' roots are shallow in the ground, only four to six inches deep. This lets them easily get water from the topsoil when it rains. The roots also reach far around the saguaro. The roots stretch out as far as the saguaro is tall.

Height is a trait that varies in saguaros. Saguaros grow very slowly. Over many years, they can grow up to sixty feet tall! Some saguaros can grow taller than others, even if they are the same age. Tall saguaros will have longer roots than shorter saguaros. Saguaros with longer roots can collect more water when it rains than saguaros with shorter roots. Saguaros that collect more water have a better chance of surviving in the desert.

Traits Vary Within Species

All the penguins in the world's many emperor penguin populations are part of the same species. A species is a group of living things that can reproduce together to make offspring that can also reproduce together. Human beings are all members of the same species.

You know that traits vary within families and within populations. Traits also vary among individuals of the same species. For example, the picture shows three frogs of the same species. Frogs of the same species all look similar and can reproduce together.

Wherever members of this species live, individuals with some traits have a better chance to survive and reproduce than other members of the species.

Three frogs of the same species have varied traits.

Environments and Traits

Chapter 5

Flamingos are wading birds. These two are the same species. But they come from different **environments**. How can you tell?

Big Question

How does the environment affect the traits of living things?

Vocabulary

environment, n. a surrounding area that contains living and nonliving things

The color of the flamingos' feathers is a trait that can change depending on what they eat.

One flamingo has feathers that are bright pink. The other has feathers that are pale pink. These flamingos have been getting their food from different places. Their colors are different because of what the flamingos eat!

Some environments contain more shrimp than others. The flamingos that live in these areas will be darker pink than other flamingos. This is how the environment can affect the color of a flamingo's feathers. Some traits can vary because of where an individual lives. Flamingo color traits are not completely inherited.

A Living Thing's Weight Can Be Affected by the Environment

There are many ways the environment can influence the traits of living things.

Look at the cat in the picture. This indoor cat is fed a lot of food!

Any animal that is given too much food and has too little exercise can become overweight.

The cat has certain traits that won't change much, such as its fur color and eye color. But the cat's weight is a trait that varies because of its environment. This trait of being this large is not inherited.

Since this cat lives indoors, it does not hunt for its own food. It also does not jump, climb, or run as much as it would outdoors. The cat's owner provides more food than the cat needs. As a result, the cat has a high body weight. The cat's weight is a trait that varies because of its environment.

A macaque /muh*kak/ is a species of monkey. Its natural environment is the jungles of Asia. Many macaque populations have found their way into human cities, though.

These macaques are heavier than macaques that live in wild jungle areas.

Monkeys in a jungle are very active moving from tree to tree. But the city is a new environment for monkeys. Now, they can find and eat foods that people eat. These foods are not healthy for them. Monkeys that live in the city tend to weigh more than monkeys that live in the wild.

A Living Thing's Behavior Can Be Affected by the Environment

You know that the environment can affect a living thing's physical traits. An animal's behavior also can be affected by the environment. Behavior is how animals act. Behavior patterns are traits. Some are inherited, and some can be the result of the environment.

Meerkats burrow into the ground. Their burrows help them stay safe from predators and stay cool in hot environments.

The meerkat is a small animal that lives in the deserts of southern Africa. Meerkats live in large groups. By living in a group environment, meerkats first learn and then teach other meerkats behaviors that help them survive.

Certain meerkats look out for danger while others in the group search for food. Some individuals stand guard to keep groups safe. They look up into the sky for dangerous birds. If they see a predator bird, they make a warning sound. This behavioral trait keeps the food hunter meerkats safe.

The prairie dog is another animal that has varying behavioral traits depending on the conditions of the environment. Prairie dogs are small rodents that burrow underground. Like meerkats, prairie dogs learn from living in large groups.

Prairie dogs live with many groups of families underground.

Prairie dogs first learn and then teach each other about what to eat and where to find food.

Living in groups also helps young prairie dogs learn how to make burrows with connected tunnels. Burrowing is a skill that helps them survive.

Prairie dogs use tunnel systems for shelter and survival.

Environment Can Affect a Plant's Traits

Plants need water to grow and survive. In the picture of potted plants, can you tell which plant got enough water and which one did not?

Sometimes environments have dry seasons with very little water, or they have rainy seasons with a lot of water. When an environment does not have enough water, it changes the traits of the plants that live there. The plants might dry out. They can turn brown, lose their leaves, and stop growing. They will no longer be as green and healthy as they once were.

Too much water is not good for plants either! An environment can get too much water during a season that is very rainy. Even though plants need water to live, too much water can make plants die.

When the amount of water in an environment changes, it can change the physical traits of the plants in that area.

When too much water stays in certain areas, plant roots may not get enough oxygen.