

# Characteristics for Survival

## 4.1

All organisms have characteristics that help them survive in their environments. These characteristics are called adaptations. Some adaptations are structures. For example, some plants have brightly coloured flowers to attract birds and insects for pollination. Cacti, which grow in dry areas, have fleshy stems to store water and short prickly leaves to reduce water loss.

Some adaptations are behaviours that help organisms survive.

**Behaviours** are what organisms do, whether it is swimming, flying, or sleeping. Hibernation is an example of a behaviour that helps some organisms survive cold winter temperatures. The great variety of structures and behaviours of organisms is responsible for the diversity of life on Earth.

### LEARNING TIP

Check that you understand the two types of adaptations that help organisms survive by explaining them to a classmate.

### TRY THIS: LOOK AT A HUMAN ADAPTATION

**Skills Focus:** observing, inferring

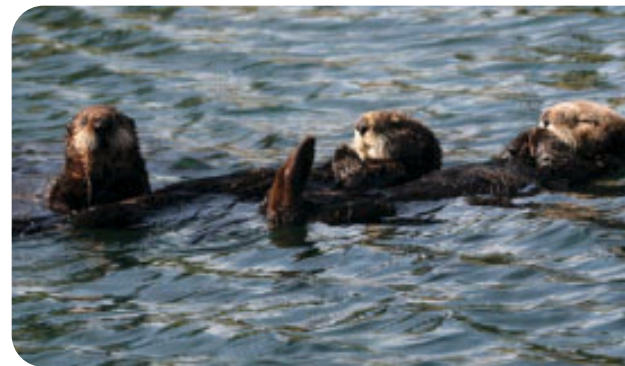
Take a look at your thumb. It is called an opposable thumb because it can touch all the fingers on the same hand. Your thumb makes it possible for you to do many things that animals without opposable thumbs cannot do.

Have a partner time how long you take to untie one of your shoes, take it off, put it on again, and tie it again. Record your time. Now tape your thumb firmly to the rest of your hand so that you cannot use it. Try the shoe-tying task again. Record how long you take.

1. How useful is having an opposable thumb?
2. Apes, chimpanzees, and other primates (including humans) have opposable thumbs. How is this adaptation useful for helping these animals survive?

## Feet for Many Purposes

Animals have feet of many sizes and shapes that are perfect for swimming, perching, climbing, grasping, or walking on mud. These adaptations have allowed the animals to survive in their environments. For example, whales and dolphins have flippers. Ducks and penguins have webbed feet that are great for swimming and for walking in muddy areas or snow without sinking. Sea otters also have webbed feet to help them swim quickly through the water (**Figure 1**).



**Figure 1**

Sea otters use their feet like paddles.



Some feet have special toes. A heron has long, spread-out toes that help it stay on top of mud (**Figure 2**). A thrush has three toes that face forward and one toe that faces backward. This shape allows the thrush to perch safely in trees, even while sleeping! A porcupine has sharp claws on its feet to help it climb.



**Figure 2**

A heron relies on its feet to keep it from sinking in mud.

What about feet for speed? One of the fastest creatures on Earth is the cheetah (**Figure 3**). How are a cheetah's feet built for speed?



**Figure 3**

A cheetah can run at speeds of 110 km an hour.

## Some Owl Advantages

Owls are adapted to live in a variety of habitats, from the Arctic to the dry regions of southern deserts. There are over 140 species of owls in the world. Owls range in size from the large eagle owl of Eurasia, which grows up to 70 cm in length, to the northern pygmy owl, which is no larger than a sparrow. What adaptations make owls so successful? Let's look at some of the structural adaptations that enable owls to survive in so many different habitats.

## Eyesight

Like most birds, owls have very large eyes (**Figure 4**). Unlike other birds, which have one eye on each side of the head, an owl's eyes are at the front. Owls cannot move their eyes. They have to turn their heads to look sideways. Owls can turn their heads almost all the way around to see what is behind them. This adaptation helps to protect owls from possible predators sneaking up on them.

Owls can see well in the daylight, but their nighttime vision is amazing. Most owls are active at night. The pupil in an owl's eye can open very wide, allowing the owl to use all the available light. They can recognize and swoop down on a potential meal in almost complete darkness.

## Wings, Feet, and Beaks

Owls have wide wings, powerful feet, and a strong, hooked beak (**Figure 5**). These structures help to make owls very good hunters. Owls also have fine, fringed feathers on the underside of their wings. These feathers help to muffle the sound of the air flowing over their wings, so that owls are almost silent when flying. Consider the advantage that this adaptation gives owls when hunting! This adaptation is not present, however, in the few owl species that hunt during the day.

As an owl sneaks up on an animal, it extends its razor-sharp talons to grip its prey. If the animal is too large to swallow whole, the owl can easily rip the animal into bite-sized pieces with its powerful beak.



**Figure 4**

Owls, such as this screech owl, have very large eyes on the front of their heads.



**Figure 5**

The barn owl is an excellent night-time hunter, feeding mostly on rodents.





**Figure 6**

The burrowing owl blends in with its surroundings.

## Colouring

Many species of owls have **colouration** that helps them blend in with their environments. This special colouring is called **camouflage**. For example, the head, wings, and back of a burrowing owl are sandy brown, and its chest is white with large brown speckles (**Figure 6**). This colouring provides excellent camouflage in the dry grassland where the owl lives.

The snowy owl has dappled white colouring—perfect for its snowy surroundings (**Figure 7**). Unfortunately, the colour advantage is lost when summer arrives. As the snow melts in the spring, however, the snowy owl moves to sit on patches of snow or ice. Scientists are unsure whether the snowy owl does this to camouflage itself or whether it is just trying to keep cool.



**Figure 7**

The colouration of the snowy owl provides camouflage in snow.

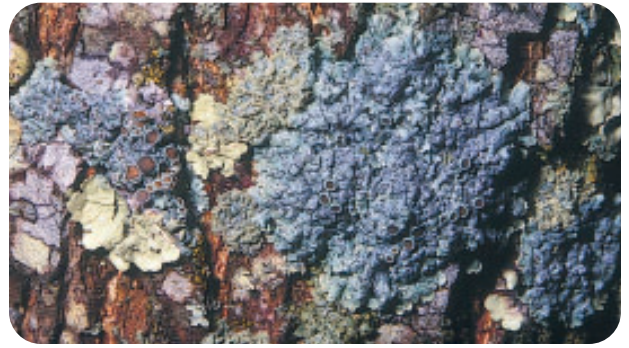
### ▶ LEARNING TIP

The word "symbiosis" comes from the Greek and means "living together."

## Symbiosis: A Behaviour for Survival

Symbiosis [SIM-by-O-sis] is an example of a behaviour that helps some organisms survive. In symbiosis, two organisms live together and help each other. Some birds help to keep other animals clean. For example, the oxpecker feeds on ticks and other insects on a rhinoceros' skin. The oxpecker gets food, and the rhinoceros gets rid of the irritating insects.

Lichens [LIE-kuhns] are organisms that result from the symbiotic relationship between a fungus and a green alga (**Figure 8**). The fungus provides the alga with water, while the plant-like alga provides the fungus with food. This relationship allows both the fungus and the alga to survive in environments where they wouldn't be able to survive alone. You will learn more about other survival behaviours in Section 4.3.



**Figure 8**

Lichens survive in a wide variety of environments including rocks and tree trunks.

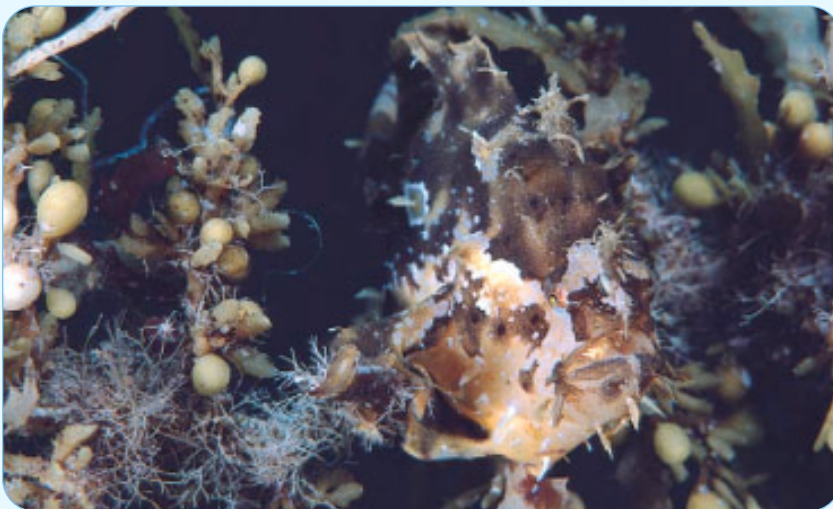
### **CHECK YOUR UNDERSTANDING**

1. Describe four adaptations that show why the owl is a successful organism.
2. Look at the sketches of feet shown in **Figure 9**. Describe how the structure of each foot would be an advantage in a particular environment.



**Figure 9**

3. Can you spot the fish in **Figure 10**? What adaptation has increased its chances of survival?



**Figure 10**

4. A cow has billions of micro-organisms in its stomach to help it digest its food. What is this relationship called? How do the micro-organisms help the cow? How does the cow help the micro-organisms?