**ACTIVITY: Animal and plant adaptations**

**Activity idea**

In this activity, students learn about animal and plant adaptations in Antarctic species and use these ideas to design their own unique animal or plant.

By the end of this activity, students should be able to:

* use reading skills to locate and integrate information
* discuss some ways in which animals and plants are adapted to live in cold, dry climates like Antarctica
* use this information to design their own unique animal or plant capable of living in Antarctic conditions.

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**Introduction/background**

People who go to Antarctica find themselves in an environment of extremes, such as the very low temperatures, and to combat this, they can adapt and wear big heavy clothes to keep warm. Animals and plants that live in this environment all year round don’t have the benefit of thick jackets and sturdy boots – so what can they do?

Forget the four seasons. In Antarctica, there are really only two seasons – light and cold and dark and colder. Summer consists of about 4 months of 24-hour daylight, and winter is 4 months of 24-hour night, with 2 months at either end where the Sun is either coming or going. So, how can anything survive in a place that does not see the sunlight for months, with freezing temperatures that can be below -80°C?

Adaptation is an evolutionary process whereby an organism becomes increasingly well suited to living in a particular habitat. Natural selection results in helpful traits becoming more common in a population. This occurs because individuals with these traits are better adapted to the environment and therefore more likely to survive and breed. The timeframes for different types of adaptation are variable – behavioural adaptation can be a very quick process, whereas structural changes may occur over a very long period of time. Adaptation is also a common term to describe these helpful or adaptive traits. In other words, an adaptation is a feature of an organism that enables it to live in a particular habitat.

**What you need**

* Access to the articles [Seals](https://www.sciencelearn.org.nz/resources/1042-seals), [Penguins](https://www.sciencelearn.org.nz/resources/1043-penguins) and [Life in the freezer](https://www.sciencelearn.org.nz/resources/944-life-in-the-freezer)
* Copies of the student handouts [My trip to Antarctica](#handout) and [Antarctic adaptations](#worksheet)
* Drawing materials

**What to do**

1. Discuss some of the animals and plants living in Antarctica and what students know about them. (Refer to the articles [Seals](https://www.sciencelearn.org.nz/resources/1042-seals), [Penguins](https://www.sciencelearn.org.nz/resources/1043-penguins) and [Life in the freezer](https://www.sciencelearn.org.nz/resources/944-life-in-the-freezer) if students need extra information.)
2. Discuss the concept of adaptation and how it allows an organism to become increasingly well suited to its particular habitat.
3. Hand out copies of the student handouts [My trip to Antarctica](#handout) and [Antarctic adaptations](#worksheet). As they read about the trip, students record which adaptations the Antarctic visitor learned about and which animals or plants have these adaptations. (With younger students or less able readers, use an IWB to read through the [My trip to Antarctica](#handout) handout as a group, annotating adaptations. Alternatively, the [My trip to Antarctica](#handout) handout is a Word document that can be altered to suit your students’ needs.)
4. Discuss whether students think these animals could survive anywhere else in the world.
5. Design and draw an animal adapted to live in Antarctica, using labels to explain the adaptations.

**Extension ideas**

The diary mentions that adaptations can be behavioural or structural. Adaptations can also be physiological. Older students may like to explore these concepts. The articles [Earthworm adaptations](https://www.sciencelearn.org.nz/resources/17-earthworm-adaptations), [Marine organisms and adaptations](https://www.sciencelearn.org.nz/resources/142-adaptations-of-marine-organisms) and [Native bird adaptations](https://www.sciencelearn.org.nz/resources/1162-native-bird-adaptations) discuss the three adaptation categories with reference to specific terrestrial and marine animals.

Humans live in Antarctica all year round. Discuss the following:

* What allows us to live in Antarctica?
* Are these adaptations?
* How does this relate to human evolution?

**Student handout: My trip to Antarctica**

***Day 1***

Dear Diary, today I arrived in Antarctica. I am here for a week and staying with a group of scientists at the Scott Base. Each day, I will get to go and see different animals and places, and I am really excited about it. I’m hoping to write a little every day about what I do so that I will be able to remember as much as I can about this adventure.

***Day 2***

Dear Diary, today I got to go out on the ice near the water’s edge. I was amazed at all the animals I saw! First, we saw a huge orca that was in the water. We kept walking, and we saw some seals lying on the ice, and it looked like they were sunbathing. That got me thinking, if I was lying on the ice, I’d be freezing, so how is it that all these animals can handle such cold temperatures?

I asked one of the scientists and he told me that the animals have adaptations – ways in which their bodies and behaviours are modified to survive in this harsh environment. Some of the adaptations were easy to spot (like feathers on penguins that help to keep them warm). Some of the other adaptations were quite unusual, such as special chemicals in the blood of some fish that stopped them from freezing.

Most of the animals down here have blubber, which is layers of fat that keep them warm. It works just like the insulation we have in our houses back home to keep the heat in. In addition to blubber, the birds have feathers, which they can puff up and trap air. Lots of the animals have water-repelling fur or feathers so their coats don’t freeze.

***Day 3***

Dear Diary, well, there are lots of penguins down here, and they make a lot of noise. I found out that their ‘tuxedos’ were a sort of camouflage. When a predator like a whale is in the water and looks up, the white belly of the penguin blends in with the light from the sky above. The reverse is true for looking down onto the black back of the penguin from above – the black blends into the darkness. I thought *that* was cool but not as cool as how they keep their bodies warm.

Penguins have blubber and feathers, but they also huddle in groups for body warmth. They rock back on their heels and rest on their tails to keep their toes off the ice. But the most interesting adaptation of all was a special aspect of the circulatory system called a counter-current system. What happens is their veins (which carry the colder blood that is returning from the feet and flippers back to the heart) wrap around the arteries (which carry warmer blood from the heart to the limbs). By wrapping around, the colder blood gets warmed up and the warmer blood gets cooled down. This clever system means that, despite the ice cold environment, the penguins’ blood temperature doesn’t drop, and less heat is lost to the environment, plus it keeps the penguins’ feet just above freezing point.

***Day 4***

Dear Diary, we didn’t go out today because the winds were too strong. I wonder if any of the penguins got blown away. I know there are some Antarctic birds called terns that fly away and go north during the winter so that they can avoid the harsh winter. Then they come back during the summer. This is called migration. But penguins can’t fly, so I guess they would have to stay in Antarctica or swim to warmer water. They would have to be really good swimmers because it’s pretty far away.

***Day 5***

Dear Diary, well, I was right – some penguins do migrate by swimming. This is a behavioural adaptation unlike lots of the other adaptations I have seen, which have been physiological.

We saw more seals today – we watched one disappear into the water and it didn’t come back up! I was worried at first but then I learnt that some animals can slow down their heart rate and breathing so that they don’t have to come up for air for ages. The Weddell seal can dive 600 metres deep and hold its breath for an hour. It can do this by collapsing its lung.

**Day 6**

Dear Diary, today we went and looked at plants. I didn’t think anything grew down here, but we found all sorts of little plants living where there was no ice. They grew really close to the ground and often in groups – this is to help them keep as much water as possible. They also have cup-like leaves to trap the water. I learned that there is so little water in Antarctica that it is regarded as a desert, and I guess when you grow in a desert, every drop of water matters.

Tomorrow, we are leaving to go home. The week has gone really fast, and I’ve decided that I want to come back to Antarctica soon.

**Student handout: Antarctic adaptations**

Fill in the table below, using the My trip to Antarctica diary to identify different adaptations used by Antarctic animals and plants.

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| **Adaptation** | **Animal/plant** | **Function** |
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