# Science and technology Stage 3 learning sequence – Living world

## How do the structural and behavioural features of living things support survival?

**Learning sequence description**

Students identify and describe adaptations in living things and recognise them as existing structures or behaviours. They describe how, over time, these adaptations support living things to survive in their specific environment. Students complete an investigation to understand how birds’ beaks have adapted to their environment. Students research specific adaptations of native Australian animals and plants.

## Syllabus outcomes and content

**ST3-1WS-S** – plans and conducts scientific investigations to answer testable questions, and collects and summarises data to communicate conclusion

* construct and use a range of representations, including tables and graphs, to represent and describe observations, patterns or relationships in data
* present data as evidence in developing explanations
* communicate ideas, explanations and processes, using scientific representations including multimodal form

**ST3-4LW-S** – examines how the environment affects the growth, survival and adaptation of living things

* describe adaptations as existing structures or behaviours that enable living things to survive in their environment
* describe the structural and/or behavioural features of some native Australian animals and plants and why they are considered to be adaptations
* describe how changing physical conditions in the environment affect the growth and survival of living things

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## Lesson 1 – Adaptations

Students are learning to:

* identify examples of structural and behavioural adaptations in animals and/or plants
* describe how adaptations support animals and/or plants survive in their specific environments
* makes and justifies predictions about scientific investigations.

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 1.1 | An adaptation is a feature or trait, which provides an advantage for a living thing to survive in its environment.  Ask students to consider the following questions. You may need to change the questions to suit your class:  How have polar bears adapted to the cold climate of the Arctic? (white fur – camouflage from their enemies on snow and ice, layers of fat and fur to keep them warm)  How does a puffer fish stay safe in the ocean? (their bodies puff up to escape from their enemies, they have spiky barbs all over their bodies that come up when they are threatened, they are poisonous to eat)  Why do the cactus plant have thorns? (thorns protect the plants so that they don’t lose their moisture, some use their spikes to capture their prey)  After a short discussion, ask students ‘What is adaptation?’ Example of responses could include: camouflage, special features of a plant or animal that helps them to survive, changes in the body. Watch the two videos and ask ‘What is adaptation?’ to refine their responses. |  | Resource 1 – [Meet spiky, thorny and carnivorous plants!](https://education.abc.net.au/home#!/media/86152/) – [ABC Education video]  Resource 2 – [World’s Weirdest: Poisonous Puffer Fish vs. Eel](https://www.nationalgeographic.com/animals/article/eel-battle-pufferfish-red-sea-video) – [National Geographic video] |
| 1.2 | There are two types of adaptations – structural and behavioural adaptations.  Structural adaptations are physical features, such as specialised body parts, that help living things to survive. For example, spines on an echidna or a barbed tail on a stingray helps to protect these animals from predators.  Provide students with an [image of a crocodile](https://bie.ala.org.au/species/urn:lsid:biodiversity.org.au:afd.taxon:989a7126-df02-4f1f-a21f-feca59662947) and ask them to identify three possible structural adaptations.  Provide students with [information about banksia plants](https://www.anbg.gov.au/banksia/). Ask students to read the information then draw a labelled diagram of a banksia plant, showing at least two structural adaptations.  Discuss how adaptations (structural or behavioural features) may provide a survival advantage to the living thing in the environment where they live. For example, long skinny leaves reduce evaporation and water loss in desert plants or the spines on an echidna. |  | Resource 3 – [Saltwater crocodile](https://bie.ala.org.au/species/urn:lsid:biodiversity.org.au:afd.taxon:989a7126-df02-4f1f-a21f-feca59662947)  [web image]  [Atlas of Living Australia]  Resource 4 – [Banksia information sheet](https://www.anbg.gov.au/banksia/)  [Australian National Herbarium website] |
| 1.3 | Behavioural adaptations  Behavioural adaptations are actions taken by living things to support their survival in specific environments. For example, Red kangaroos rest in shade during the hottest part of the day.  Ask students the following questions.  How does our behaviour change when the weather changes?  What do we do when we are hot?  What do we do when we are cold?  Is our behaviour the same? Why or why not?  Many plants are also able to move to reduce evaporation and water loss on hot days. For example, eucalyptus trees are able to turn their leaves side-on, so that the thinnest part of the leaf faces the sun during the hottest part of the day. This helps to reduce evaporation and water loss. |  |  |
|  | Discuss how Aboriginal and Torres Strait Islander Peoples have shown respect and care for living things in Australian environments over many millennia in their role as custodians of the land. For example, over millennia Aboriginal people only hunt what is needed to provide for their daily needs. Aboriginal and Torres Strait Islander Peoples have extensive knowledge of animal and plant adaptations and behaviour. This knowledge of structural adaptations is used in many aspects of daily life such as making clothing or tools.  The knowledge of behavioural adaptations is also used by Aboriginal people to locate food and water sources. For example, people living in desert environments need reliable sources of water. Knowing how and where to find water is critically important for their survival.  The water-holding frog (Resource 6 – scroll to video about Desert frog) lives in these regions. It has adapted the ability to store water underneath its skin. This water can be absorbed into the body when water is scarce. The water-holding frog burrows underground to seek cooler temperatures and reduce evaporation. Early colonisers observed that Aboriginal Peoples found these frogs underground by identifying markings on the surface of the ground or by tapping the ground with the butt of a spear and retrieved and drank the water by gently squeezing it from underneath the skin of the frog. |  | Resource 5 – [Australian Curriculum: Science Aboriginal and Torres Strait Islander Histories and Cultures](https://www.australiancurriculum.edu.au/f-10-curriculum/cross-curriculum-priorities/aboriginal-and-torres-strait-islander-histories-and-cultures/)  [website – links to PDF of elaborations and teacher background information booklet]  Resource 6 – [Plant and animal adaptations – Topic 3 Survival strategies (ABC Education)](https://education.abc.net.au/res/teacher_res/12-adaptations.html)  [web-based, printable document] |
| 1.4 | Birds have different types of beaks and for good reason. Depending on their environment, depends on the type of food that they eat. Their beaks are of different sizes and shapes so that they can capture their food. For example the hummingbird has a long thin beak so that it can get its food from inside a flower while the pelican has a pouch-like beak that can expand when it is trying to scoop up fish. You may like to view Beaks: bird feeding adaptations (Resource 7) with your class for more information.  Explain that students are going to investigate how birds’ beaks have adapted to suit their environment. The investigation is called ‘Stick-bird’ (Resource 8). Before they begin their investigation, students must predict which ‘beak’ was most successful and why. At the end of the investigation, they should check their data against their prediction. Was their prediction correct? If it wasn’t correct, why?  For this investigation, students will pretend to be a hungry stick bird. They will use different types of beaks to pick up as many food items as they can. Explain to students that the resources they need for this investigation is in the PowerPoint. They will need a partner to time them. Students will analyse their data and form a conclusion about which beaks were most successful.  After they have completed their investigation, discuss the results with the students. Ask the following questions.  Which beak type was most successful? Justify your reasons.  Which beak type was least successful? Justify your reasons.  Which parts of this investigation worked well?  What changes could improve this investigation?  What would you change next time for greater success with each beak type? |  | Resource 7 – [Beaks: Bird feeding adaptations](https://safeyoutube.net/w/mGgC) [You Tube video – Cornell University)  Resource 8 – Stick-bird investigation  [PowerPoint resource] |
|  | **Opportunity for monitoring student learning**  Stick-bird investigation – practical activity  In pairs, students investigate bird beak types. They test the individual effectiveness of these structural adaptations for feeding on different foods. Pairs must analyse their data and form a conclusion about which beak types were most successful in picking up certain food types and why. Students describe how certain structural adaptations (beak types) allow birds to thrive in many different habitats.  **What to look for:**   * conducts investigation correctly * collects and analyses data about the effectiveness of different beak types * identifies patterns in beak type data * justifies what worked well and what didn’t work well in the investigation * suggests changes to the investigation for greater success in testing different beak types. * describes how specific adaptations (beak types) support birds to thrive in many different habitats. |  | Resource 8 – Stick-bird investigation  [PowerPoint resource] |

## Lesson 2 – How do adaptations of living things support survival in changing environments?

Students are learning to:

* describe adaptations that help animals and/or plants survive changing environmental conditions
* communicate ideas and explanations, using scientific representations including multimodal form.

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 2.1 | Use Resource 6 (topic 3) to prompt discussion about adaptations (survival strategies) animals and plants use such as migration and hibernation, to survive temporary or seasonal changes in their specific environments. Students identify whether adaptations (survival strategies) are structural or behavioural.  Identify changes that can occur to specific environments such as physical (rising sea levels, drought, deforestation) or chemical (pollution) changes. Describe how animals and plants could adapt to changing conditions in their environment. Discuss what might happen if animals and plants are unable to adapt to changes in their environment. For example, the endangered status of Tasmanian Devils or the extinction of the thylacine in Tasmania. |  | [Resource 6 – plant and animal adaptations (ABC Education)](https://education.abc.net.au/res/teacher_res/12-adaptations.html)  [web-based, printable document] |
| 2.2 | Students demonstrate their understanding of the survival advantage that adaptations can provide to living things. They choose one native animal or plant for their presentation. Students describe the structural and/or behavioural features the animal or plant has that supports their survival. They explain why these features are adaptations and how they help the animal or plant survive in its environment. Students then choose one change to the physical conditions of the environment. For example, drought, flood or rising temperatures. Students predict the adaptations their animal or plant might need if they are to survive the change to the environment.  Students could use Resource 6 or Resource 8 to research native plants and animals and identify their structural and behavioural adaptations. Alternatively, students could use images, books or television shows (ABC iView).  Explain that students will create an information brochure, poster, written report or television news item to describe the structural and/or behavioural adaptations of their chosen animal or plant. |  | Resource 8 – [Atlas of Living Australia](https://www.ala.org.au/)  [online biodiversity database]  [Resource 6 – plant and animal adaptations (ABC Education)](https://education.abc.net.au/res/teacher_res/12-adaptations.html)  [web-based, printable document] |
| 2.3 | **Opportunity for monitoring student learning**  Adaptations of living things– presentation (multi-modal or written report)  Choose one native animal or plant, describe adaptations (both structural and behavioural) and how these adaptations support their survival. Predict new adaptations this animal or plant might need and describe how they might support their survival in a changing environment.  **What to look for**   * presents information in an interesting way * identifies structural and/or behavioural adaptations of their animal or plant * describes how the adaptations support the survival of their animal or plant in its specific environment * predicts how their animal or plant might adapt to changing environmental conditions. |  |  |

**Reflection and evaluation**

These simple questions may help you reflect on your students’ learning and plan for next steps.

What worked well and why?

What didn’t work and why?

What might I do differently next time?

What are the next steps for student learning based on the evidence gathered?