

Classification and adaptation

Self-guided program Stage 4



Teacher Notes

Briefing

On arrival at the Museum the students will be met and briefed about the Museum. Please ensure all students and accompanying adults attend this short this briefing.

Bag Storage

Museum staff will securely store the students' bags.

Exhibitions

Outside of any educator-led sessions students and teachers may explore the Museum's exhibitions. Some special exhibitions incur an extra charge. We suggest that you divide the students into small groups to move through the exhibitions to prevent overcrowding of the displays.

Lunch

We recommend that students bring their recess and lunch and eat it in Hyde Park. Re-entry to the Museum is free. Alternative locations will be provided in wet weather.

Photography

Students are welcome to bring mobile devices to record their excursion. There may be some photography restrictions for special exhibitions.

Free Wi-fi at the Museum

The Museum offers free Wi-fi for onsite visitors. It is available in 30 minute sessions. Students and teachers can log on for more than one session.

Photocopying

Please photocopy the following materials for students and accompanying adults:

- Student Activity Sheets – pages 6–14
- *Surviving Australia* exhibition floorplan – page 15
- Australian Museum Guide Map – page 16

Student Mobile Devices

Students can complete their activities using their mobile device.

Pre-visit student activities

To make the most of your visit to the exhibition we recommend that you prepare your students by completing the suggested pre-visit activities.

Post-visit student activities

After your visit your students will be full of enthusiasm and ideas. We recommend some post-visit activities to harness their interest.

Front cover illustration

Photo: Royal Penguin
Surviving Australia exhibition;
Stuart Humphreys, Australian Museum

Classification and adaptation

Classification and adaptation is a program for Stage 4 Science students. The activities are designed for a self-guided visit to the ***Surviving Australia*** exhibition.

Syllabus links

The exhibition and the student activities are relevant to the following New South Wales Board of Studies Science Years 7–10 Syllabus outcomes:

Knowledge and Understanding

Outcome:

- SC4-14LW: Relates the structure and function of living things to their classification, survival and reproduction

Content:

- LW1: There are differences within and between groups of organisms; classification helps organise this diversity. (ACSSU111)
 - a) identify reasons for classifying living things
 - b) classify a variety of living things based on similarities and differences in structural features
 - c) use simple keys to identify ... animals
 - f) explain how the features of some Australian ... animals are adaptations for survival and reproduction in their environment

Additional Content:

- classify, using a hierarchical system, a range of selected plants and animals to species level

Skills – Working Scientifically

Outcomes:

- SC4-6WS: Follows a sequence of instructions to safely undertake a range of investigation types, collaboratively and individually
- SC4-7WS: Processes and analyses data from a first-hand investigation and secondary sources to identify trends, patterns and relationships, and draw conclusions
- SC4-8WS: Selects and uses appropriate strategies, understanding and skills to produce creative and plausible solutions to identified problems
- SC4-9WS: Presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations

Further information

- <http://australianmuseum.net.au/surviving-australia-exhibition-guide>

Pre-visit Activities

To make the most of your visit to the exhibition we recommend that you prepare your students before their excursion with some of the following suggested activities.

- Introduce concepts related to adaptation and classification
- Introduce or revising relevant terminology used in the *Classification and adaptation* student activity sheets
- Provide a context for the excursion to the Museum including the reasons for visiting the Museum, the tasks to be completed and the expected outcomes.

At the Museum

The *Classification and adaptation* program is designed to be conducted in the *Surviving Australia* exhibition on Level 2 of the Australian Museum.

On-site activities

The *Classification and adaptation* activity sheets are based on displays in the Australian Museum's *Surviving Australia* exhibition.

The activities enable students to explore concepts related to classification, ecosystems, adaptations and biodiversity while surrounded by a rich array of live and prepared specimens.

There are five self-guided activities, each based in a different section of the *Surviving Australia* exhibition. The activities are:

1. Collecting, naming and identifying
2. Invertebrates of the sea
3. Vertebrates from island homes
4. Backyard invertebrates
5. Adapt or die

Surviving Australia exhibition

The *Surviving Australia* exhibition is divided into five main thematic areas:

- Blue Edge
- Island Homes
- Our Backyard
- Dangerous Australians
- Adapt or Die

A separate 16-page Exhibition Guide details the content of the *Surviving Australia* exhibition.

Organisational tips

- Use the supplied Museum floorplan to guide the students to the *Surviving Australia* exhibition on level 2 of the Museum.

- Advise students that there are five activities and each activity is located in a different section of the exhibition. A floorplan located at the end of the activity sheets indicates the various sections needed.
- Organise the students to break into small groups. Each group should be given a different activity to start with then asked to rotate through the various activities in order to avoid overcrowding of the displays.

Note that the *Scientists' Stories* presented in the mini theatrette are shown in a fixed order, so there could be up to a 10-minute wait for the story on collecting insects.

Post-visit activities

After their visit to the exhibition we recommend the following post-visit activities.

- Search the Australian Museum website to find pictures of 3-5 animals from one class of vertebrates (fish, amphibians, reptiles, birds or mammals). Create a dichotomous key to identify each animal selected, then swap with a partner to test each other's key.
- Research how each of the above animals are adapted:
 - to survive environmental conditions in their habitat
 - to find and obtain food
 - to attract / find a mate e.g. calls, colour, behaviour

Classification and adaptation

Stage 4 – Student Activities

General instructions:



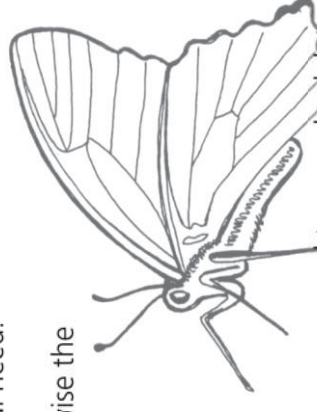
Go to the *Surviving Australia* exhibition on Level 2 of the Australian Museum.



An exhibition floorplan is located at the end of these activity sheets. It shows the locations of the various sections you will need.



Break into small groups. Each group **starts with a different activity** then rotates through the various activities. Otherwise the displays will be crowded and you will not be able to see and explore them properly.



Go to the **Scientists' stories mini theatre** to watch the story **Hunters and Collectors**. The stories are on a loop*, you may need to come back later.
*Story times: Ibis (3min 39s), **Hunters and Collectors** (3min 35s), Fish (4min 9s), Demon duck of doom (3min 23s) and Tasmanian tiger (2min 41s).



Watch the story '**Hunters and Collectors**' about finding, collecting and identifying insects. This story details the role of a taxonomist (a scientist who collects and names species), and features Australian Museum scientist Dr Dan Bickel.

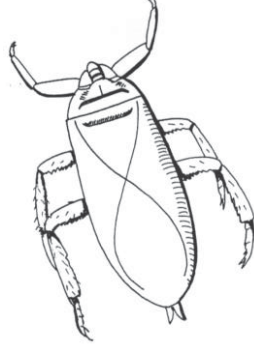
1. While you watch the film, write some notes about why collecting and naming species is important.

○

○

○

2. If you were a taxonomist, what creatures would you like to collect and classify? _____

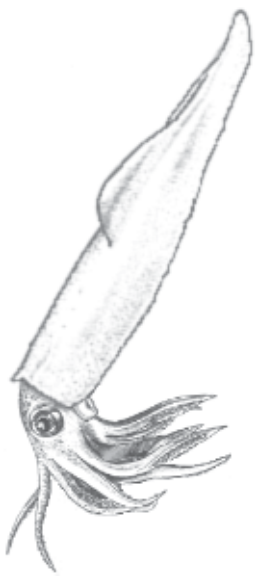
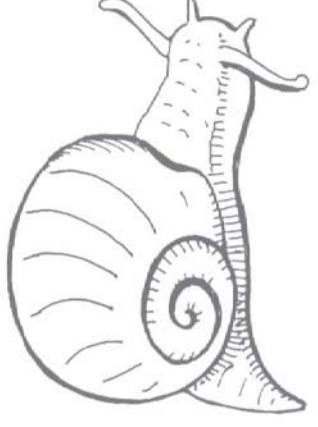
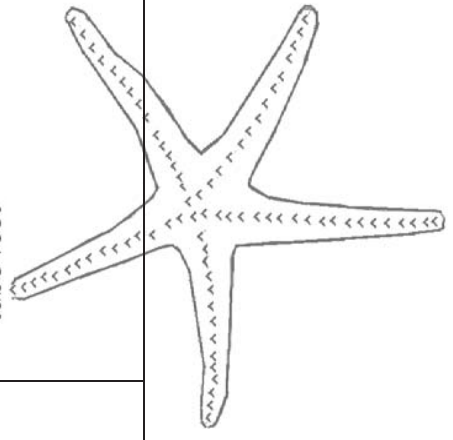


Activity 2: Invertebrates of the sea



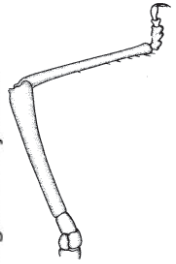
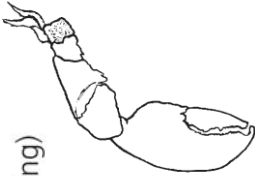
Go to the **Blue edge** section and find one **mollusc** and one **echinoderm** on display in the exhibition using the table below. Tick your choice and look at the features you can see. Name one feature for survival and draw a labelled diagram.

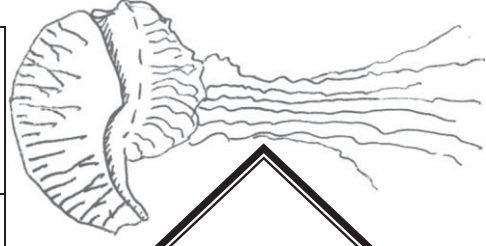
Phylum	Features	Tick the specimen you have chosen. Describe a feature you can see for survival	Draw the example you chose and label the features you can see
Mollusc	• invertebrate (no backbone) • soft body • muscular 'foot' (sometimes divided into muscular tentacles) • some have an external shell	☐ blue-ringed octopus ☐ common Sydney octopus ☐ cone shell Feature you can see that helps it survive: _____	
Echinoderm	• invertebrate (no backbone) • spiny skin (which varies from long, sharp spines through to very short, rounded bumps) • tube feet	☐ sea star ☐ sea urchin Feature you can see that helps it survive: _____	





Look around the displays in the **Blue edge** section to **find animals** that match the list of features given below. Then complete the table.

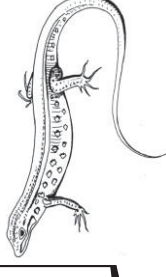
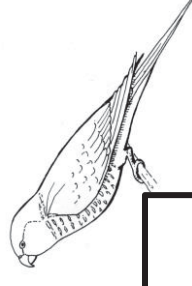
Features	Name an example found in the exhibition:	Draw the example you chose and label the features you can see	Phylum
• invertebrate (no backbone) • exoskeleton (a hard body covering) • legs with joints  	Common name: _____ Scientific name: _____		Arthropod
• invertebrate (no backbone) • soft body • thin tentacles (sometimes with stinging cells) • some float or swim and have hanging tentacles • some stick onto rocks and have a crown of tentacles	Common name: _____ Scientific name: _____		Cnidarian



Invertebrates of the sea challenge questions

1. What is a 'cuttlefish bone'? Find the **Intelligent invertebrates** display to find out. _____
2. If there are 'cuttlefish bones', does this mean that cuttlefish are vertebrates (animals that have a backbone)? What do you think? _____
3. Look around the **Blue edge** section and find one extra **invertebrate** that you haven't already named and drawn. Name it and write down an interesting fact about it. _____

Activity 3: Vertebrates from island homes



Did you know?

Vertebrates are animals that have a backbone. They are divided into **five major groups** that scientists call **classes**. The five vertebrate classes are: fish, amphibians, reptiles, birds and mammals.

Each class has its own special set of features. For example only:

- **mammals** have hair or fur and produce milk to feed their young
- **birds** have feathers and young that hatch from hard-shelled eggs
- **reptiles** have hard scales and young that hatch from leathery eggs.



Go to the **Island Homes** section and look at the display of penguins.

1. Why do you think early explorers thought penguins were fish? _____

2. We now classify penguins as birds. Name two features you can **see** on the penguins that all birds (but no other animals) have: _____

a) _____ b) _____

3. Can you see a predator in the penguin display? What is the name of this animal? _____

Describe two features you can see this animal has that the penguins do not possess:

a) _____ b) _____

What class of vertebrate do you think this animal is from (see 'Did you know?' box above): _____ Why? _____



Look at the **Lord Howe Island** and **Kangaroo Island** table displays along the wall. **Circle** the class of animal featured in each and fill in their names.

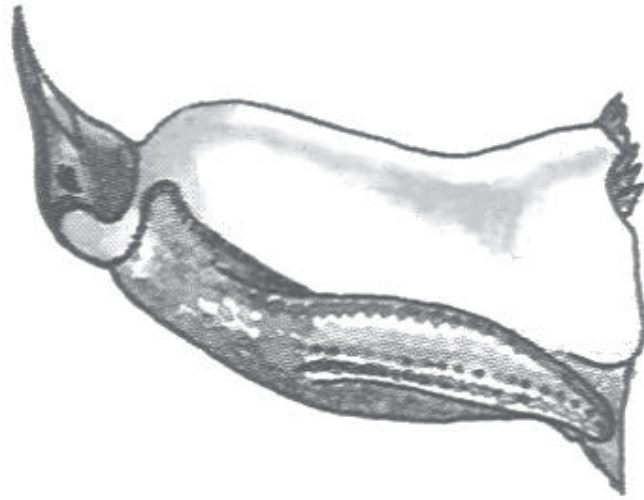
1. The endangered animal living on Lord Howe Island is a fish / amphibian / reptile / bird / mammal called the _____

2. The two fish / amphibians / reptiles / birds / mammals in the Kangaroo Island display are the _____ and the _____



Return to the penguins display. What **features can you see** on the penguins that are **adaptations** for life in the ocean? Complete the table below - one example is given. (**Hint:** In the water they need to - swim, move through water quickly and easily, camouflage from above and below, stay dry, eat).

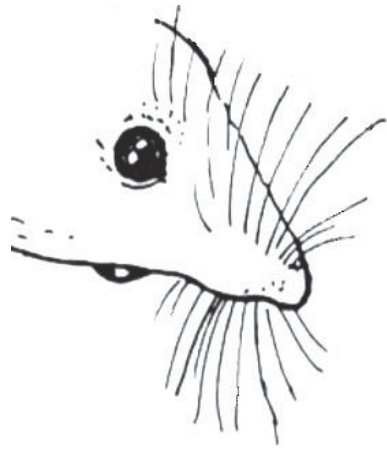
Penguin adaptations to ocean life:	Reason for being an adaptation:
Dense plumage (feathers)	Traps air which insulates the body and improves buoyancy



Vertebrates from island homes challenge questions

Compare the birds and mammals found in the **Island homes** section of the exhibition.

1. Do the mammals have eye-lashes and/or whiskers? _____
2. Do the birds have eye-lashes and/or whiskers? _____
3. Eye-lashes and/or whiskers are only found in one vertebrate **class**. What is the link between eye-lashes / whiskers and the type of body covering these vertebrates have?



Activity 4: Backyard invertebrates



Go to the **Our backyard** section. Use the following displays:

My, what big eyes you have!, **Water beetles**, **Dragons and damselflies**, **Water spiders**, and **Cacophonous cicadas** and make sure you look closely at the specimens.



Fill in the gaps in the key of backyard invertebrates by using words from the word list.

Word list:

dragonflies

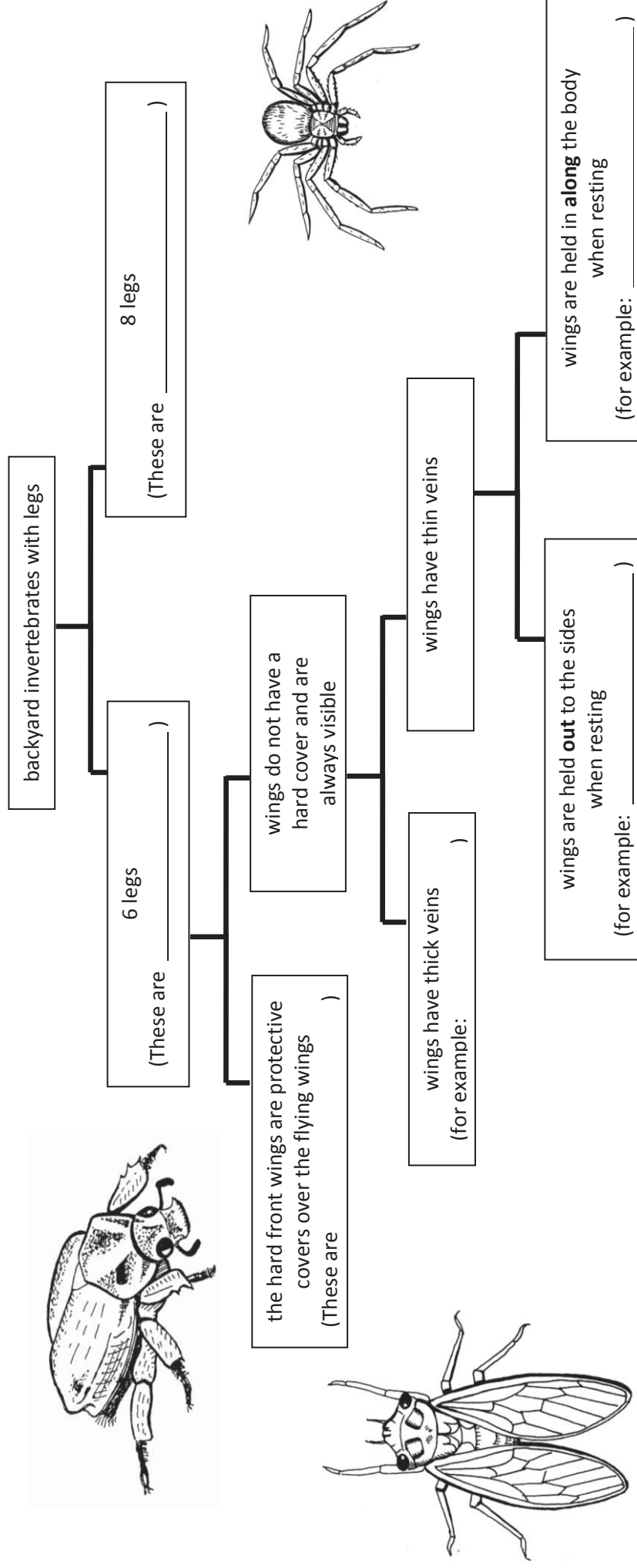
damselflies

beetles

insects

spiders

cicadas



Classification keys divide things into smaller and smaller groups and are very useful tools to identify creatures.

A **dichotomous key** is a type of key that keeps subdividing things into two groups at each step of the key.



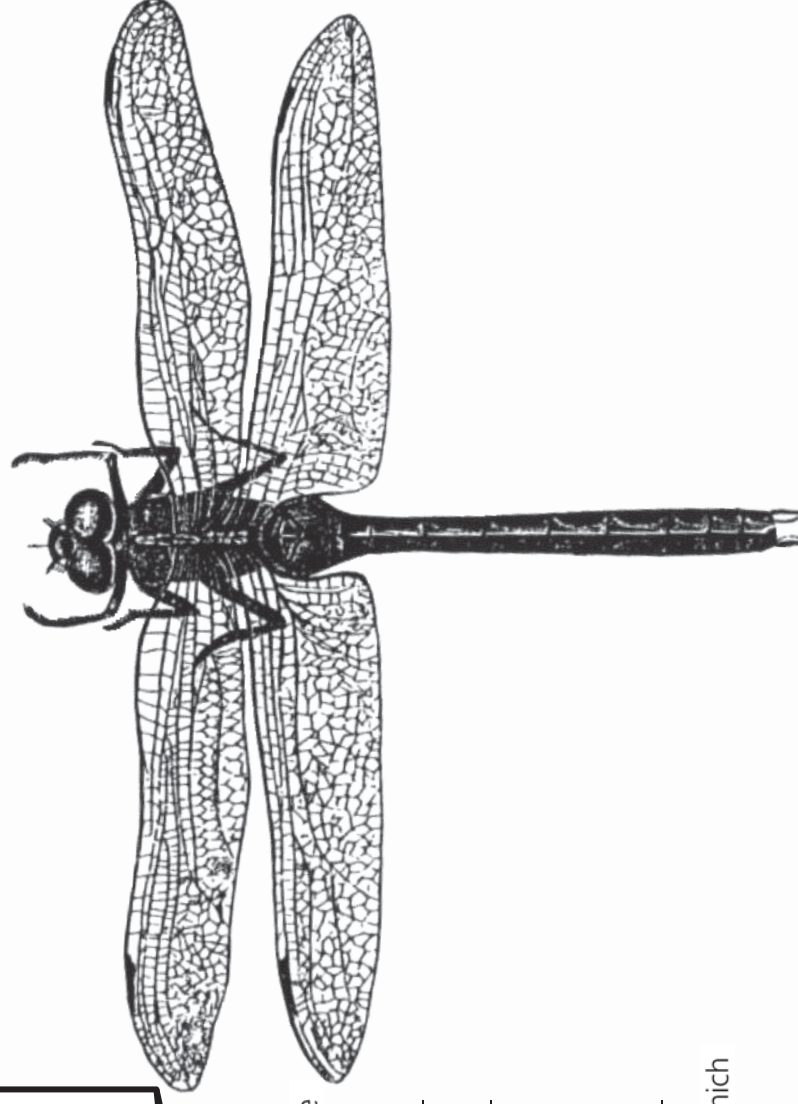
Look back at the key you completed on the previous page and use it to help answer the following questions.

1. Is it a dichotomous key? Why / why not? _____

2. Work through the key on the previous page to identify the invertebrate in the picture on the right.

Name it. _____

3. **Label the picture** with **four** features mentioned in the key, which help to identify this creature.



Backyard invertebrates challenge questions

1. Dragonflies and damselflies resemble the oldest flying insects known from ancient fossils that are over 300 million years old. If these invertebrates have been around for such a long time, do you think this means they are well-adapted to their environment? Explain.

2. Some adaptations are physical features and others are behaviours. Find the **Australia's strangest fly** display to find an example of a behavioural adaptation. What does the fly do? Why is it an adaptation to its environment?

Activity 5: Adapt or die



Go to the **Adapt or die: specialists on land and in freshwater** section.

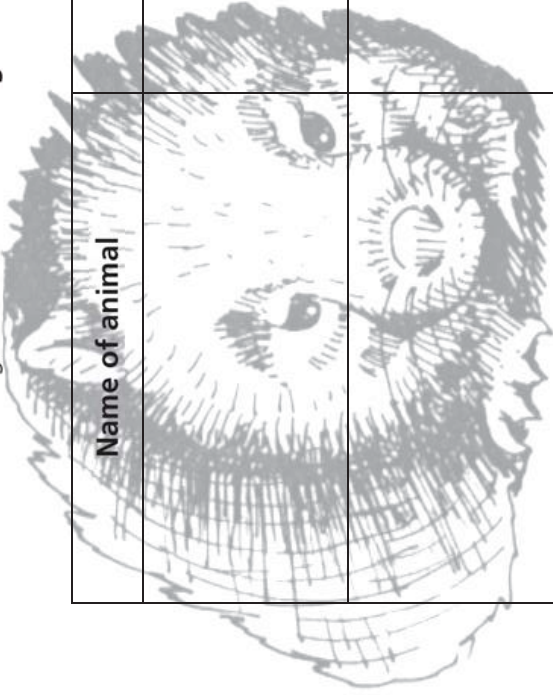


Look at the displays of freshwater survivors including the live animals in the freshwater tank. Choose **any freshwater animal** and answer the questions below.

1. Name the animal you have chosen. _____
2. Name one adaptation it has for living in a freshwater environment and explain how this adaptation helps it survive.



Look at the burrowing animals in the **Underground living** display. Choose two burrowing animals and complete the table below.



Name of animal	Adaptations	How the adaptations help it burrow or live inside a burrow



Find the **koala** display. Read the information and look at the specimen on display.

Why do you think koalas live high up in eucalyptus trees? _____

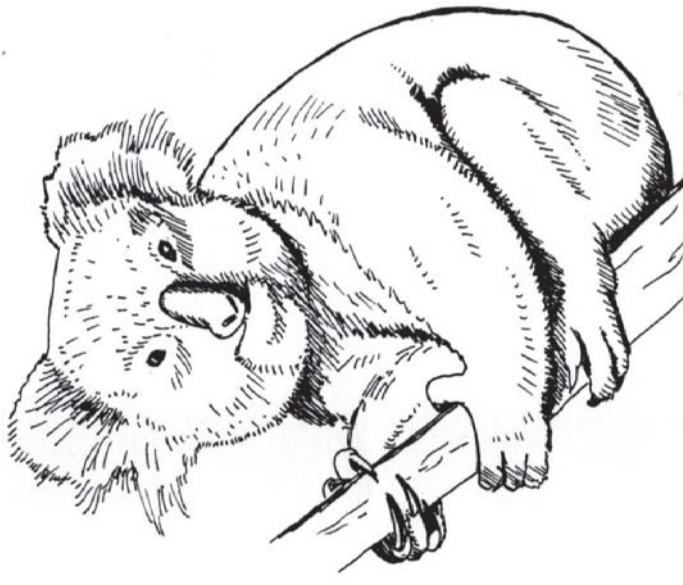
List two adaptations that you can see on the koala for living in trees?

a) _____

b) _____



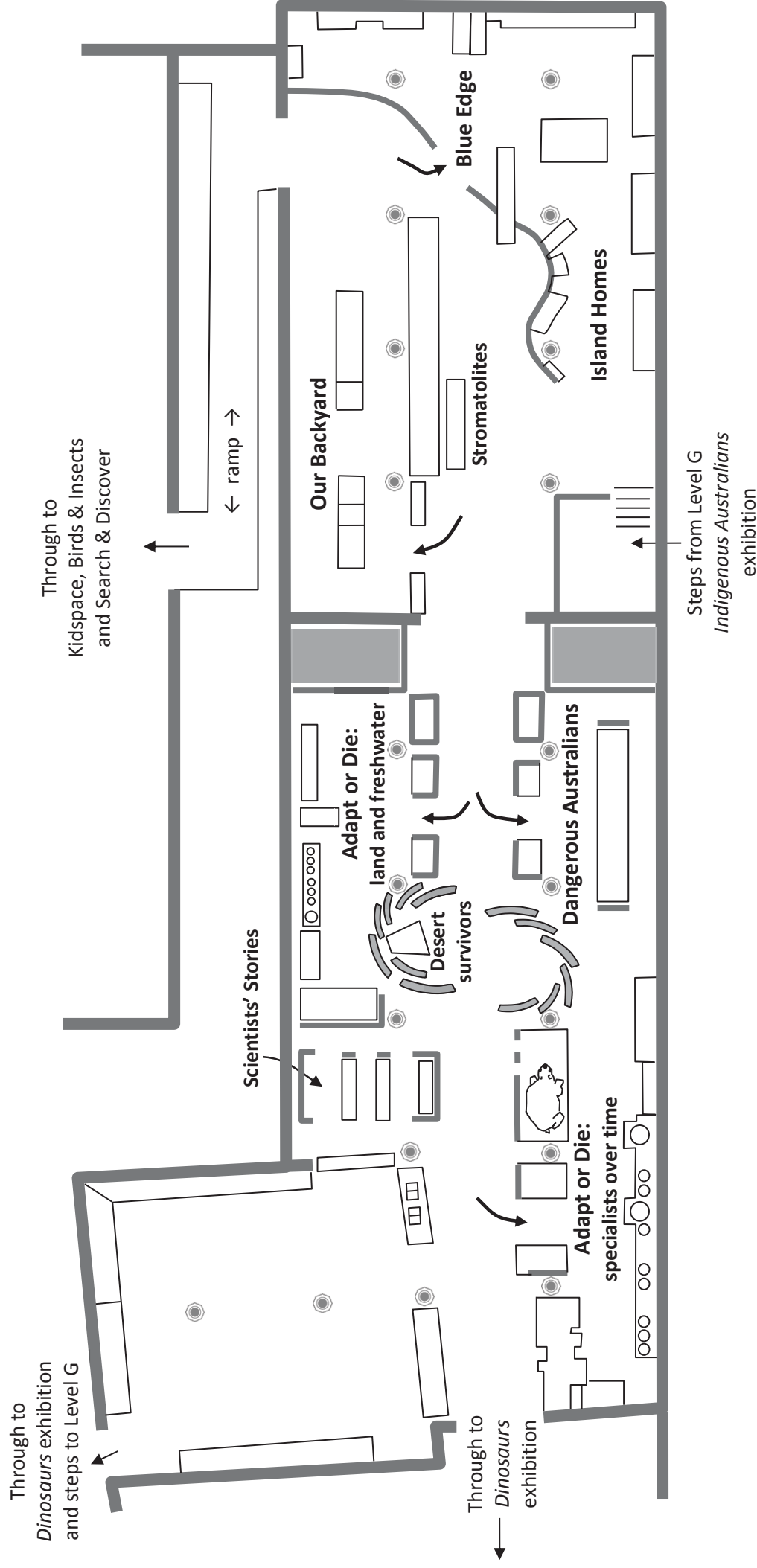
Find the **echidna** display. Read the information then label the echidna picture to show **three** adaptations **and** the reasons they are adaptations.



Adapt or die challenge question

1. Fur and feathers are adaptations for keeping animals warm, but they are also useful for keeping animals cool in hot environments. Can you work out why?

2. Name an animal with fur and one with feathers that lives in the desert.



Surviving Australia exhibition floorplan

4

Rooftop Cafe

Visit our new Rooftop Cafe
Take the lift or stairs to Level 4
and enjoy food with a view.

2

- A** Surviving Australia
- B** Pacific
- C** Dinosaurs
- D** Birds & Insects
- E** Kidspace
- F** Group meeting point
- G** Search & Discover
- H** Event space

1

- A** Planet of Minerals
- B** Chapman Mineral Collection

G

- A** Indigenous Australians
- B** Garrigarrang: Sea Country
- C** Wild Planet (under construction)
- D** Skeletons
- E** Wildlife Photographer of the Year (from 28 March 2015)
- F** Members Lounge
(Lower Ground Level – access via lift or stairs)

- | | | | |
|--|-------------|--|-----------|
| | Admissions | | Theatre |
| | Information | | Stairs |
| | Toilets | | Lifts |
| | Accessible | | Lockers |
| | Baby care | | Strollers |
| | | | Shop |

