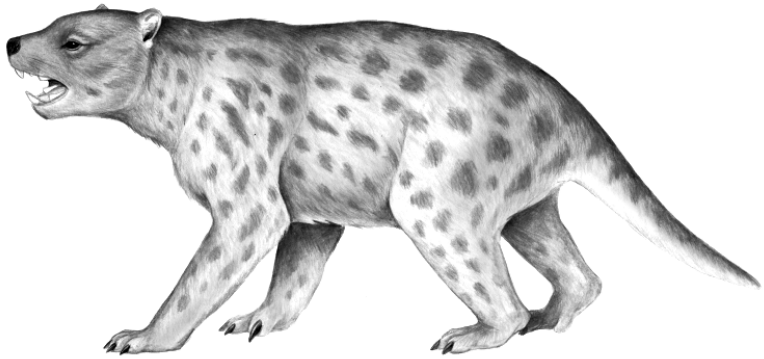
For use in:
Evolution of Australian Biota Study Day
or independent programs

Australian Museum Self-guided session

Evolution, survival and extinction

in the *Surviving Australia* exhibition

Student Activities



Illustrations: Powerful Thylacine and Marsupial lion, Anne Musser.

Produced by Learning Services, Australian Museum, May 2012

6 College Street, Sydney, NSW 2010
www.australianmuseum.net.au

Australian museum
nature culture **discover**

Evolution, survival and extinction

General instructions:

☞ Use the **floorplans** at the end of this pack to find the *Surviving Australia* exhibition on Level 2 of the Australian Museum. **Go to** the section, *Adapt or die: specialists over time*.

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

☞ To find the answers to the activity questions, locate the specific **headings** and/or **subheadings** listed **in bold** in the instructions that follow. Take care to read whether you are looking for information on: a large **wall panel**, a **flat bench** display, or a smaller specimen **label**.

☞ Don't forget to take time to **look** at the specimens – the reconstructions of extinct animals, the fossils (most are real, some are casts), and the modern animal specimens on display!

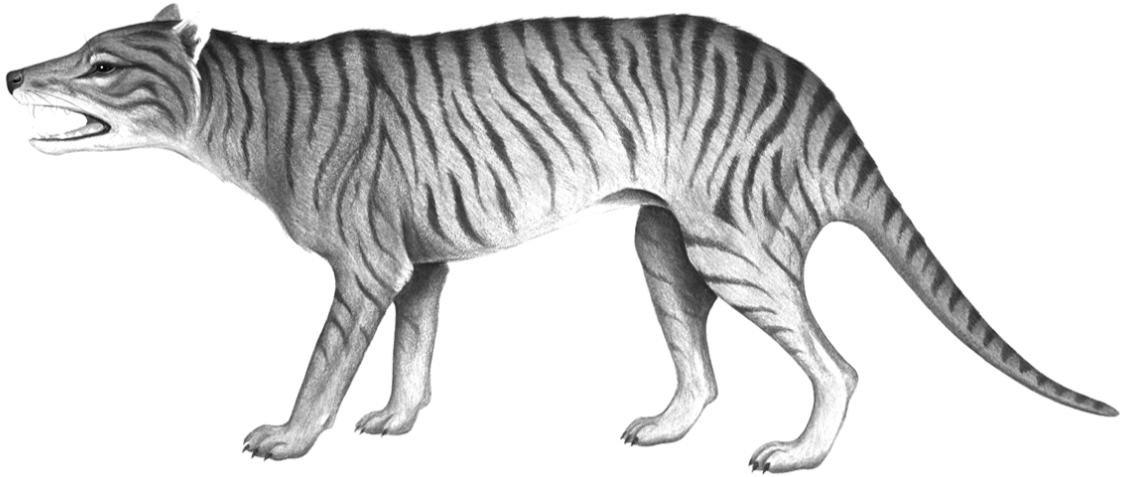


Illustration: Powerful Thylacine, Anne Musser.

Activity 1: Meet the megafauna

☞ Gather information from the **wall panel** under the heading, **Meet the megafauna**. Then cross-out the incorrect information below and fill-in the blank.

1. From about *5 million / 15 million* years ago, many animals around the world began evolving into *smaller / larger* forms, reaching their peak in the last *2 million / 5 million* years. These animals are known as the _____.

☞ Gather information from the **wall panel** under the heading, **Meet the megafauna**. Then cross-out the incorrect weight information below.

2.

How big is mega?

Most megafauna weigh at least *30 / 40 / 2000* kilograms. The largest were giants. Some, such as the Giant Echidna, were smaller but were still much larger than their living descendants.

☞ Gather information from the **flat bench** display, **Echidnas – beaks long and short** (found to the left). Then complete the the following:

3.

Giant Echidna

'Zaglossus' hacketti lived _____ years ago.

It's the _____ echidna (and monotreme) ever found.

It was about _____ metre long and weighed _____ kilograms.

☞ Gather information from the **flat bench** display, **Diprotodons – giant wombats?** Then complete the following:

4.

A world record holder?

Diprotodon optatum is the heaviest of Australia's megafauna weighing up to _____ **kilograms.** It is also the largest known _____ of all time!

Activity 2: The vanishing megafauna – many died!

☞ Go to the **wall panel**, **Vanished giants – what happened?**
Gather information from under the subheading, **The great extinction**.

1. What percentage of Australia's giant land animals had disappeared by the end of the Pleistocene (11,800 years ago)? _____

2. What name is given to this event? _____

☞ Gather information from the **flat bench** display under the heading, **Why did they die?** Then complete the information both below and over the page.

Was climate change to blame?

Climate became more variable and extreme

_____

_____

may have impacted both dry and moister environments.

Low population growth

A series of extended severe droughts could reduce megafauna to very small numbers and ultimately extinction because

_____

_____

Reduced food and water supplies

Large animals tend to need

_____

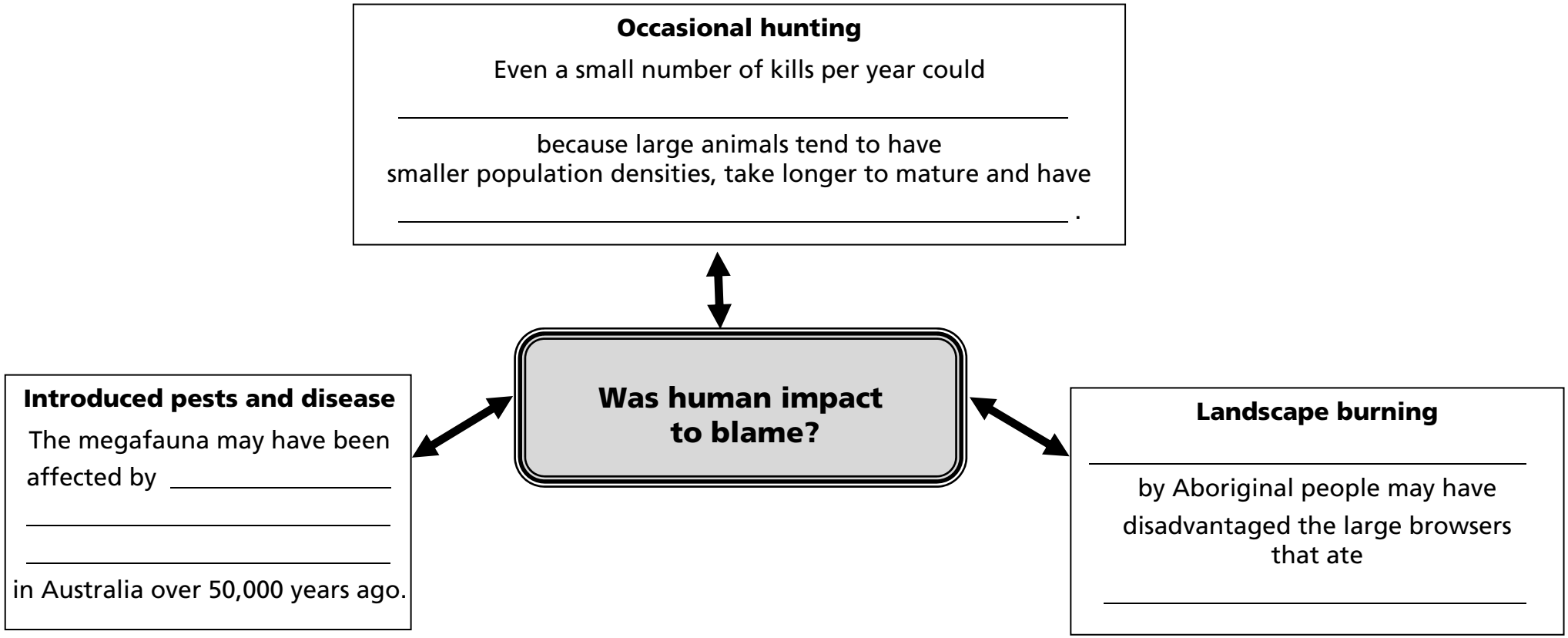
of food and water so are

_____

to a drying climate.

Isolation in fragmented small refuges

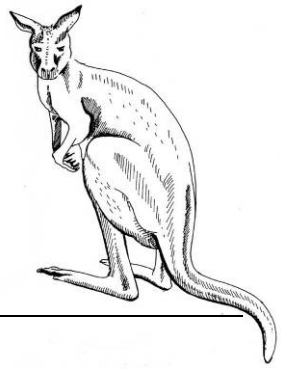
During the more severe drought periods megafauna became _____ _____ of suitable habitat then became extinct when local water or food reserves were used-up and _____ _____.



☞ **Later**, at home or school:
Consider the information gathered above in Activity 2 about megafauna extinctions. This is an area of considerable debate between scientists.

3. What do you think? Was it climate change? Was it human impact? Or could a combination of factors have been the cause of megafauna extinctions? Justify your point of view.

Activity 3: The vanishing megafauna – some survived



☞ Go to the **wall panel**, **Vanished giants – what happened?**
Gather information under the subheading, **The survivors – ex-giants.**

1. Name an animal that is one of Australia's only surviving megafauna. _____
2. How much smaller are they than their giant ancestors? _____
3. Give two reasons why smaller animals could have an advantage over larger animals. _____

_____

_____

_____

_____

☞ Gather information from the **flat bench** display under the heading, **Shrinking giants** and make careful observations to compare the two wombat skulls in the **large display dome**. Then complete the information below.

Common name:		Southern Hairy-nosed Wombat
Scientific name:		*Lasiorhinus latifrons*
Location:	fossil site location:	Nullarbor Plain, South Australia
Age:	Pleistocene	modern
Describe two similarities between the skulls		
Describe one difference between the skulls		

Activity 4: Investigating an extinct Australian animal

☞ Choose **one** extinct Australian animal group from the following list. Then locate the relevant displays and record information about your selected animal group on the next page.

thylacines
(for example:
Tasmanian Tiger and
the Powerful Thylacine)

☞ Gather information from the **flat bench** display, **Thylacines – end of an ancient line** and also the associated fossil displays and specimen **labels**.

☞ You may also like to view the various remains of modern Tasmanian Tigers displayed in the adjacent exhibition section, **Where are They Now?** (see your exhibition floorplan).

diprotodontids
(for example:
Diprotodon optatum)

☞ Gather information from the **flat bench** display, **Diprotodons – giant wombats?** and also the associated fossil displays and specimen **labels**.

marsupial lions
(for example:
Thylacoleo carnifex)

☞ Gather information from the **flat bench** display, **Australia's marsupial lions** as and also the associated fossil displays and specimen **labels**.

short-faced kangaroos
(for example:
Simosthenurus occidentalis and
Procoptodon goliah)

☞ Gather information about short-faced kangaroos from:

1. the **flat bench** display on the **Short-faced kangaroo** with the associated skeleton of the short-faced kangaroo *Simosthenurus occidentalis* (in the corner near the modern kangaroos),
2. the two adjacent fossil display domes and specimen **labels** and the information in the associated **flat bench** display under the two subheadings, **Short-faced kangaroos** and **Land of the giants**,
3. a third fossil display dome (further to the left) and the information in the associated **flat bench** display under the subheading **Short-faced kangaroo**.

Tick one box to indicate your selected extinct mammal group.

☐ thylacines ☐ diprotodontids ☐ marsupial lions ☐ short-faced kangaroos

1. Choose **two fossils** belonging to species in your selected group and provide the following details:

	Fossil 1	**Fossil 2**
What species? • common name (if available) • scientific name		
What part(s) of the body?		
Where were the fossils found?		

2. How have fossils (including those detailed in question 1 **and** other fossils) contributed to our understanding about the evolution of these species / groups in Australia? For example:

- What was their **past diversity** (how many different species in the group?). Has this changed over time?

_____

_____

- What was their **past distribution** (where were they found / how widespread were they?). Has this changed over time?

_____

_____

- What do the fossils tell us about the animals' **sizes**, **diets** and/or **lifestyles**?

_____

_____

_____

3. What are the closest **extant** (living) **relatives** of the species in this extinct group? _____

4. Name one species belonging to your chosen group. What happened to it? _____

_____

Activity 5: The puzzle of the Platypus

(a) New discoveries and changing ideas

☞ Gather information from the **flat bench** display, **The puzzle of the Platypus** to fill in the missing information from the timeline of platypus discoveries below.

late 1700s

A hoax

When European naturalists first came across the Platypus, they thought it was a hoax because it had hair like mammals, laid eggs like reptiles, and had bird-like feet and bills.

1803

A new type of mammal

Once it was discovered that Platypuses suckle their young with milk, it was realised that Platypuses had to be mammals. But because they produced eggs, they were classed as a new type of mammal – a _____ .

Species name: Modern Platypus, *Ornithorhynchus anatinus*

1971

Mystery teeth

Two fossil teeth found in the deserts of central Australia were found to be similar to the teeth of living baby Platypuses (adults now have grinding pads instead of teeth).

Fossil site location: _____, South Australia

Age: _____ million years old

Species name: *Obdurodon* _____

1984

New teeth – new species

More teeth were found – this time in north-western Queensland. These teeth were allocated to a new platypus species.

1985

A match!

An almost intact fossilised skull of an adult platypus was found. Its tooth sockets matched the teeth found in 1984.

Fossil site location: _____, Queensland

Age: _____ million years old

Species name: Riversleigh Platypus, *Obdurodon* _____

1984

Once upon a time in Gondwana

Another platypus-like animal was unearthed with the discovery of part of an opalised fossil jaw. It lived at a time when Australia was still connected to Antarctica and South America. This find made scientists question whether platypus fossils might also be found in these Gondwanan continents.

Fossil site location: _____, NSW

Age: _____ million years old

Species name: _____ *galmani*

1991 & 1992

Not just Australian

More teeth were found – this time in South America. They were from the largest known platypus. It seems platypuses are not unique to Australia after all!

Fossil site location: southern Argentina, South America

Age: _____ million years old

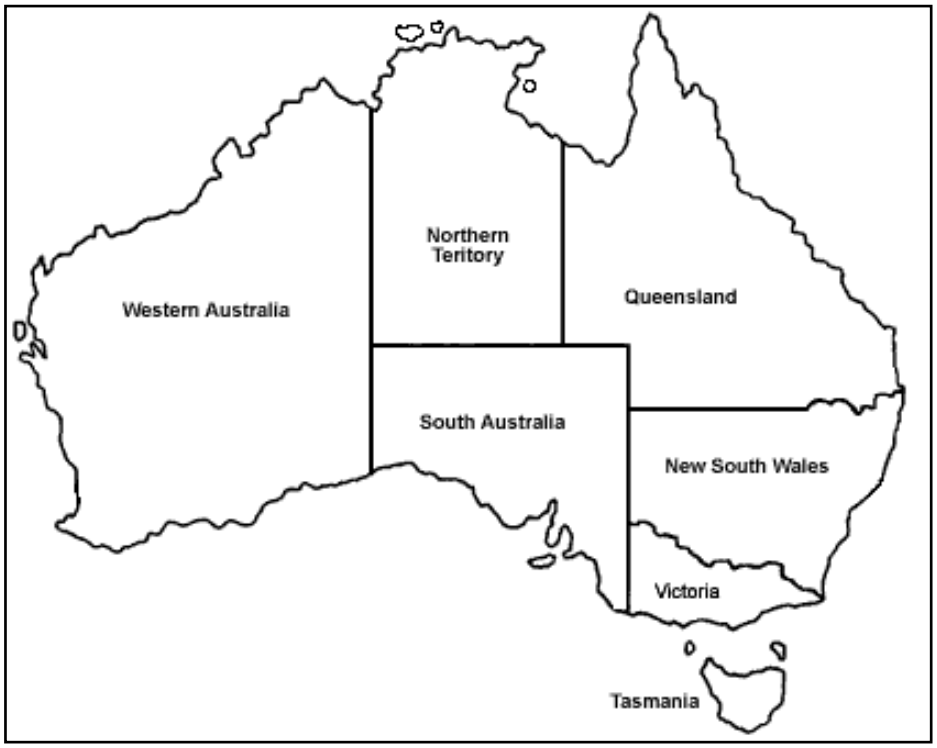
Species name: Patagonian Platypus, _____ *sudamericanum*

(b) Using fossils to look at distributions – in the past and into the future

☞ Gather information from the **wall panel**, **Monotremes – great survivors** to complete the following.

1. Label the map to show the positions of the following Australian fossil sites where platypus and early platypus-like monotremes have been found:

- Riversleigh, Queensland
- Darling Downs, Queensland
- Tirari Desert, South Australia
- Lightning Ridge, New South Wales.



2. Name one other place (not shown on the map above) where platypus fossils have been found. (Hint: check the puzzle pieces on the previous page.)

_____

☞ **Later**, at home or school:

3. (a) Research the distribution of the modern Platypus *Ornithorhynchus anatinus* and show its distribution on the map above.

(b) Compare the distributions of the modern Platypus and fossil platypuses. Does the distribution of platypuses appear to have increased, decreased or remained stable over time?

_____

(c) Now consider the future of the Platypus. Does the distribution data indicate that the future of Platypuses is secure or does it indicate potential problems? Explain.

_____

_____

_____

Australian Museum floorplan

updated May 2012

Level 2

Science Studio & *Nature Space*
– for booked education groups

C *Culture Space*
– for booked education groups

1 *Search & Discover*

2 *Birds & Insects* exhibition

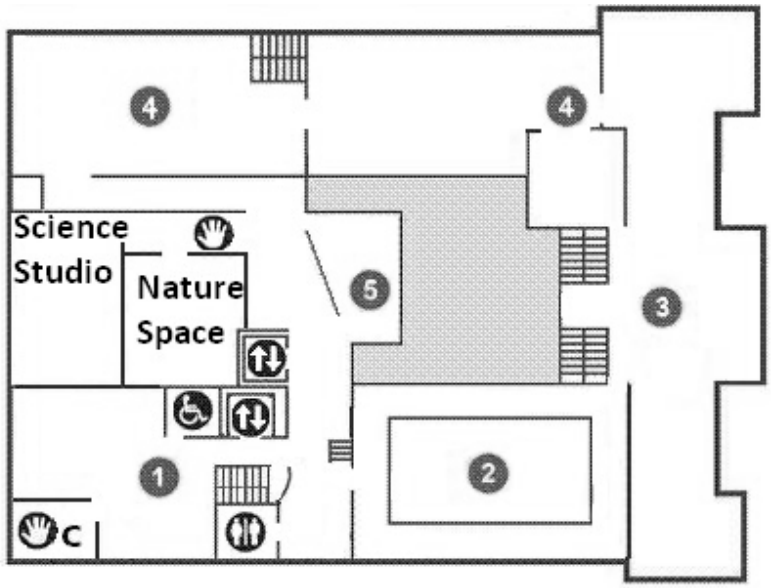
3 *Dinosaurs* exhibition

4 ***Surviving Australia* exhibition**

5 *Kidspace* (for under 5s)

Lift (education groups please use the stairs)

Accessible toilet / Toilets



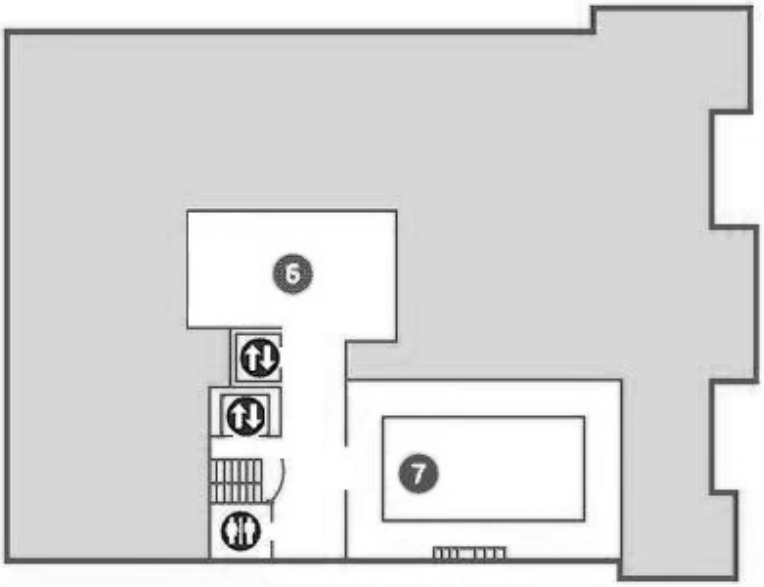
Level 1

6 *Albert Chapman Mineral Collection* exhibition

7 *Planet of Minerals* exhibition

Lift (education groups please use the stairs)

Toilets



Level G (Ground floor)

8 *Indigenous Australians* exhibition

9 *Skeletons* exhibition

Major temporary exhibitions

Main Entrance (College Street)

Atrium – information and cloaking

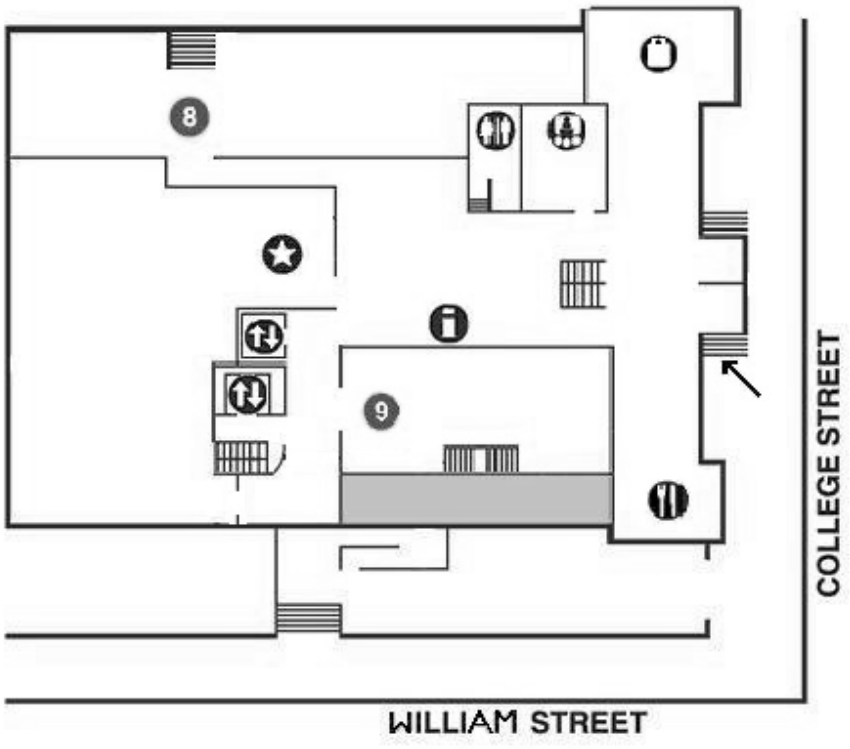
Toilets

Café

Museum Shop

Theatrette

Lift (education groups please use the stairs)



Surviving Australia exhibition floorplan

The self-guided session, ***Evolution, survival and extinction***, is based in the *Surviving Australia* exhibition located on Level 2 of the Museum.
The activity sheets focus on displays in the section *Adapt or die: specialists over time* (adjacent to the *Dinosaurs* exhibition).