A Day in the Life of a Palaeontologist
Suggested follow-up Activities

This document outlines some ideas for follow-up activities to support learning of the themes from the talk 'A day in the Life of a Palaeontologist' talk with museum technical officer Helen Ryan. These activities can be applied to many different year levels and implemented in a way that suits your class. We have also provided a detailed outline for two activities; 'make your own fossil' for younger students and 'exploring stratigraphy' for older students, linking to curriculum areas of earth and space science. These activities are intended to be engaging, hands-on ways to support our talk and some of the topics covered within it.

Some suggested activities to link to this talk:

1. **Exploring *Thylacoleo carnifex* and megafauna in 3D**

Helen showed and spoke about a *Thylacoleo carnifex* (marsupial lion) skull. *Thylacoleo carnifex* is an extinct marsupial species that lived alongside many of Australia's megafauna, such as *Diprotodon* and *Megalania,* that are now extinct.

Students can explore 3D skull scans of *Thylacaleo carnifex* and other megafauna on the Queensland Museum Sketchfab account https://sketchfab.com/queenslandmuseum . These scans are some of the innovative ways the palaeontologists can study extinct creatures with minimal samples available, and the 3D images on this site allow students to engage with scans of real fossils, and explore themes such as adaptations and features of animals, palaeontology and the change over time.

2. **Excavation of fossils**

A class activity of excavating fossils always gives excitement. Even if you do not have fossils, you can use shells or similar, and paint brushes to uncover them. A good extension to this excavation activity is to see if students can identify what they have found. Can they compare it to anything they know is alive today to help them identify their specimen? What can we tell about this fossil just from looking at its features? Where might we find out more information?

Activity Outline: Make your own fossil

Year Level	Primary School
Duration	20 minutes
Learning Outcomes	Students will learn about how fossils are formed, why fossils are important and what fossils can tell us about the past.

EQUIPMENT AND MATERIALS

Item
Air drying clay, plasticine, or playdough
Specimens for fossilisation like shells, leaves, dried flowers, twigs etc
Rolling Pin

Curriculum Links
Pose and respond to questions about familiar objects and events (ACSIS014)
Participate in guided investigations and make observations using the senses (ACSIS011)
Engage in discussions about observations and represent ideas (ACSIS233)
Share observations and ideas (ACSIS012)

WHATS A FOSSIL?

We learn about the past by studying fossilised remains, but what is a fossil? Fossils are the preserved remains of ancient living things. When living things die, if the right conditions are present, they can be quickly buried and undergo the process of fossilisation. This can result in body parts being preserved but also trace fossils of the activities of ancient living things. These could be things like food remains, poo and imprints such as footprints. An imprint of an ancient living thing could be indications of an animal's presence like a footprint, or they could be actual imprints of parts of the animal's body like shells or bones.

HOW DOES A FOSSIL FORM?

Fossil formation is rare since most organic matter breaks down quickly after death. For fossilisation to occur, something that dies will be quickly covered in sediment. This can allow some hard tissues to be preserved such as bones, teeth, shells, and wood. Over time, more and more layers of sediment bury the specimen, compressing it. Meanwhile water can seep into the specimen and leave minerals behind slowly turning the specimen to stone. Alternatively, as the sediment around it turns to rock, the specimen can break down leaving a hollow mould. As this mould fills with sediment over time it creates a cast of the original specimen. This video from the Natural History Museum, London is a great explainer for fossil formation, and has some great humour for students too: https://www.youtube.com/watch?v=87E8bQrX4Wg

HOW TO MAKE YOUR FOSSIL

1. Each student gets a ball of air-dry clay.
2. Roll it out into a flat sheet thick enough to hold an imprint of their specimen.
3. Gently press your specimen into the clay.
4. Carefully remove the specimen from the clay and allow to dry.

ENGAGEMENT

This provides some information on discussion points for use in class. Students look at theirs, and other student's fossil to help them when discussing.

Are fossils important? Is it important to study the past via the field of palaeontology? Why? Why not?

Discuss with students why it might be important to study ancient, extinct living things and environments. Gather responses and explore the yes and no arguments.

What can fossils teach us?

Working in groups, students can discuss what features of their specimen was preserved in the fossil. What wasn't preserved? What conclusions might a palaeontologist draw about the original specimen if they dug up your fossil?

Some examples of what we can find out from fossils:

- Leaves provide indicationsc as to what kinds of plants made up the landscape of the time.
- Footprints can indicate speed, behaviour, size, and weight of an animal. This comes from looking at footprint positions, depths distance between prints and applying body size ratios to found footprints.
- Poo, more commonly referred to as coprolite when its fossilised, gives indications of an animal's diet.
- Fossilised bodies give indications size, shape, adaptations, and other biological characteristics depending on the degree of fossilisation.

- Other trace fossils such as burrows, nests and eggs and provide information about the lifestyle and reproductive habits of various animals.

Activity Outline: Exploring Stratigraphy

Year Level	Upper-Primary to Early Highschool
Duration	1 hour
Learning Outcomes	Students will learn what stratigraphy is, and how layers of rock can tell us about prehistoric past and fossilisation.

EQUIPMENT AND MATERIALS

Item	**Representing**
Brown Bread	Light brown sandstone
Teddybear biscuits	Fossilised animal
Spinach	Fossilised plants
Pesto	Conglomerate
White Bread	White Sandstone
Tiny Teddies	Thylacine
Paper Plates	
***NOTE:** These are suggested foods but can be substituted	

Curriculum Links
Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena and reflects historical and cultural contributions (ACSHE081) Sudden geological changes and extreme weather events can affect Earth's surface (ACSSU096) The growth and survival of living things are affected by physical conditions of their environment (ACSSU094) Sedimentary, igneous and metamorphic rocks contain minerals and are formed by processes that occur within Earth over a variety of timescales (ACSSU153) Scientific knowledge has changed peoples' understanding of the world and is refined as new evidence becomes available (ACSHE119)

WHAT IS STRATIGRAPHY?

Stratigraphy is a field of geology concerned with understanding the layering of rocks and studying them to understand geological history. These layers in the rock are called strata. By studying the various kinds of rock layers and their order, we can better understand Earth's history. One of stratigraphy's core ideas is the principle of super positioning, the idea that rock layers closer to the surface must be younger than rock layers below them. This principle is important for ordering events of geological history. Palaeontology is also a big part of this field. Because different fossils might be found in different layers help us understand the age of different rocks. Furthermore, understanding stratigraphic layers helps us to understand past climates. Combining this with the presence and absence of different fossils, we can understand the interaction of past climates and the extinction of living things.

THE ACTIVITY

In this activity you'll lead students through a narrative of the death and subsequent fossilisation of a *Diprotodon sp.* Students will place layers of food to represent different strata of rock. Then students will answer some analysis questions related to what they've created. This activity is a simplified version of this process and is designed to be fun and engaging for students, to demonstrate it in a visual way.

INSTRUCTIONS

1. First, lay down a slice of brown bread. This is a brown, sandy surface in Australia in the ancient past. Sprinkle on a few leaves of spinach to represent native vegetation growing at the time. Along comes a *Diprotodon sp.* (teddybear biscuit). This ancient wombat the size of a small car is going about its day, when suddenly, it died. Lay your diprotodon in the centre of the sandwich.

2. After its death, there's heavy rain and a nearby river floods and buries the Diprotodon. Over time, more dust, dirt, and sand are deposited on top. (Add another layer of brown bread to represent this).

3. Over time there some sea level change and our fossil is buried deep under and ocean. Sediment and sand slowly drift down to the sea floor putting more pressure on the fossil. Add some more spinach leaves to represent marine plants and then another layer of pesto for sediment and sand.

4. Over the next several thousand years the sea levels lower again, and a *Thylacine sp.* (Tasmanian tiger) was living in the area. When this thylacine died, it was buried under a mudslide a brief time later. Place a tiny teddy to represent the *Thylacine sp.* and

add a slice of bread on top to represent the mud being deposited on top. Over time, this mud dried out and solidified turning to stone.

5. Gently press your newly made rock formation down (not hard enough to squeeze ingredients out the sides) Now cut it in half so the layering is visible.

6. Today in the modern era, you've arrived at this geological formation as a part of a team including geologists and palaeontologists to study this site. What can you find out from this formation? Students can discuss the following questions as part of the discussion.

ANALYSIS QUESTIONS (for students)

1. **Assuming you don't know the story we just went through; how can you determine which rocks are the oldest?**

2. **You have been provided with the following information:**
    - *Diprotodon sp.* lived between approximately 2.65mya and 50,000 thousand years ago when it went extinct.
    - The species of *Thylacine sp.* in this layer existed between 4 million and 4-5 thousand years ago.
    - Additionally, the fossilised plants found in the *Diprotodon sp.* (a herbivore) layer are completely different from the layer that the *Thylacine sp.* was found in.

Based on this information, can you estimate the ages of the different layers?

The point of this exercise to understand that even without any radio-carbon dating, knowledge from palaeontology can help in the study of geological history. Students should be able to make the educated guess that the thylacine fossil is less than 50,000 years old. This is because the plants found with the *Diprotodon* layer are different from those in the *Thylacine* layer suggest they were its food source and that they may have gone extinct when the climate changed, and their food source disappeared. This gets to the heart of how stratigraphy and palaeontology work together to help scientists build a picture of past ecosystems and how living things interacted with other living and non-factors in their ecosystem.

CONCLUSIONS

In the name of sustainability, once the lesson has been finished, students can eat their creations.