

Chapter overview

In this chapter students will learn to describe the scientific evidence for the evolution of present-day organisms from organisms in the past, how the fossil record is related to the age of Earth, and the time over which life has been evolving.

Content identified as Additional in the New South Wales syllabus is for students to describe examples of advances in science in areas that involve biology.

Pre-prep

Practical investigations in this chapter model and visualise fossils and their uses. Inquiry activities in the Teacher Companion expand on these. In most cases, you will not need any chemical preparation. Most of the information presented is logical, mathematical and theoretical. Use the visual and hands-on activities in this chapter to help visual learners. Preview the Pearson eBook videos and interactive activities.

Put some cream or milk in two test-tubes. Leave one in the lab and the other in the freezer for a week. You will use them in Unit 2.1 (Extra Support: Permafrost fossils, page 54).

This chapter is likely to take 3 to 4 weeks.

Pre-quiz

1 Recall what a fossil is.

A fossil is evidence of past life found in a rock.

2 Describe how a fossil forms.

An organism or part of an organism is covered with sediment and becomes part of the rock.

3 Explain how you could tell how old a fossil is.

Deeper fossils are older. Use carbon dating to find the age of the fossil. Use radioisotope dating to date the rock surrounding the fossil.

4 Recall the type of organism, or parts of an organism, that are most likely to form a fossil.

Hard parts such as bones or shells are most likely to form a fossil.

What's coming up

In this chapter students will investigate geological time through fossils and dating techniques to understand the scientific geological time scale. Chapter 3 looks at natural selection and evolution.

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Geological time

Have you ever wondered ...

- what life was like millions of years ago?
- where to find fossils?
- how we know when dinosaurs lived?
- how we know what a dinosaur would have looked like?
- how fossils form?

After completing this chapter students should be able to:

- describe scientific evidence that present-day organisms have evolved from organisms in the past
- describe how the fossil record is related to the age of Earth and the time over which life has been evolving

ADDITIONAL

- describe examples of advances in science in areas that involve biological science. CCT L WE

RESOURCES

Pearson eBook

Teacher support

A comprehensive mapping of *Pearson Science New South Wales 10* against the NSW syllabus for the Australian Curriculum and detailed teacher programs are available on Pearson eBook. These documents can be edited and adapted to suit the needs of your students and the requirements of your school.

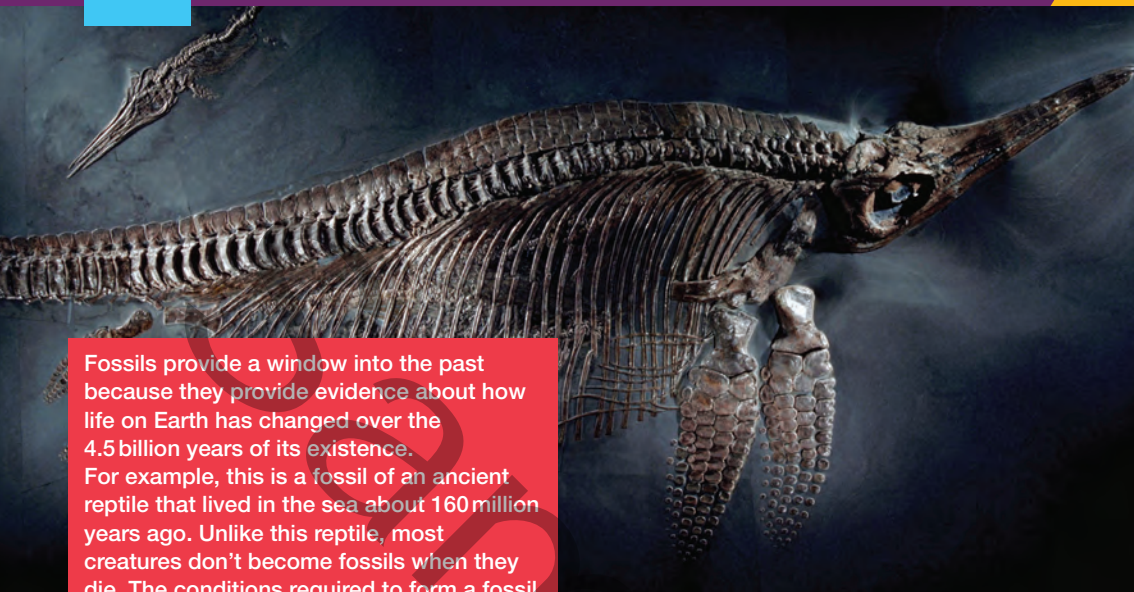
Chapter 2 safety notes and risk assessments

This single document contains safety notes and risk assessments for all Practical investigations in Chapter 2.

Weblinks

These websites support Chapter 2.

2.1 Fossils



Fossils provide a window into the past because they provide evidence about how life on Earth has changed over the 4.5 billion years of its existence. For example, this is a fossil of an ancient reptile that lived in the sea about 160 million years ago. Unlike this reptile, most creatures don't become fossils when they die. The conditions required to form a fossil are relatively rare and so most organisms break down and decay after death, leaving no trace that they were ever there.

What is a fossil?

Fossils are the preserved evidence in rocks or soils of organisms that once existed on Earth. The fossil may be the whole body of the organism, part of it or traces of its activities such as its burrows, tracks or dung (faeces).

Palaeontology is the study of past life, especially fossils. **Palaeontologists** are scientists who reconstruct past environments using fossils and geology.

The fossil record

The **fossil record** lists all the species of living organisms that have been found as fossils as well as their location and relative age. The record can be thought of as a timeline of Earth, tracking Earth's development since its formation 4.5 billion years ago. However, not all organisms are represented equally in the fossil record. To be preserved as a fossil, a dead organism must not be eaten by scavengers and must then decay very slowly. The soft parts of organisms decay much faster than the hard parts and so it is extremely rare for soft parts to be preserved. Hard objects such as skeletons, shells, teeth and wood are most commonly found as fossils. Hence fossils of dinosaurs, crabs and trees are more likely to be found than fossils of slugs, mosses and algae.

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2.1 Vocabulary preview

carbon film fossil
cast
Ediacaran
fossil record
fossils
indirect fossils
mould
original fossils
palaeontologist
palaeontology
petrified
replacement fossil

Learning strategies

Questioning

Guessing fossils

MI: Visual/Spatial, Logical/Mathematical

CCT **L**

- 1 What do you think the organism in the photo on this page would have looked like in real life? Draw an outline of its body.
- 2 What information might palaeontologists gain from the fossilised baby reptile?
- 3 Name a group of animals that this fossil reptile would belong to.

RESOURCES

Pearson eBook

Untamed Science video:
Stories in stone

Take a trip back in time with the crew to find out what fossils reveal.

P

INQUIRY

science 4 fun

Fossil kits

What can you tell from fossils?

Collect this ...

- fossil kit

Do this ...

Collect a fossil from the fossil kit. Handle it with care.

Record this ...

Describe your fossil by sketching it and recording its name and age.

Explain how fossils like this tell you a little about past life.



Fossil kits

Background

The aim of the activity is for students to interpret some fossils based only on what they can observe. They do not have to know anything about different methods of fossilisation, only the nature of a fossil.

Hints and suggestions

Fossil kits or individual fossils can be purchased. If you do not have one kit per group, use numbered stations around the room, each with one fossil. You can provide an information sheet at each station.

Possible results and looking forward

Students should be able to identify the types of organisms that were fossilised.

Students should be able to suggest that fossils could tell us things such as:

- what type of organisms lived in the past
- how similar the fossil species was to living species
- whether particular species have changed over time
- what organisms lived with the fossil species
- where the fossil species may have lived.

science 4 fun