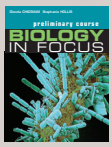
EVOLUTION OF AUSTRALIAN BIOTA

Chapter 2 The evolution of Australian flora and fauna

STUDENT ACTIVITY

Timeline changes in Australia



Linked to page 257

Aim: To put into context the fossils that are studied in this module and how they provide evidence for changing Australian biota over the past 250 million years.

Task: Analyse the two-part table that follows, giving a chronological account of changes in landmass, climate, flora and fauna in Australia and evidence for these changes which are thought to have occurred over the past 250 million years.

- Part 1: 250 mya–130 mya. Read this information to develop an understanding of the topic, putting into context the relationship between the fossils you study and how they provide evidence for the various changes, both geological and biological, that have taken place.
- Part 2: 110 mya–present. Read the information in the table and the text in Chapters 1 and 2 of Evolution of Australian Biota in the textbook. Visit the 'geological time' section of the Lost Kingdom's website (www.lostkingdoms.com/snapshots/geological_time.htm) and any other secondary sources needed. Complete the table by answering the questions within the table and inserting illustrations where required.

Note to students and teachers

This part of the task may be completed in one of several ways:

- on an ongoing basis, as independent research, as you proceed through Chapters 1 and 2
- by reading ahead to Chapter 2, to give yourself an overview of what you will be studying and the type of evidence to look out for, as well as its significance, when doing fossil investigations
- at the end of Chapter 2, as a review of the content and to put what you have learnt into context.

Table CD2.2 Timeline table linking geological, climatic and biological change in Australia from 250 mya to the present

Part 1: 250 mya–130 mya

Time	Moving continents	Dominant flora (vegetation)	Evidence	Dominant fauna (animals)
250 mya (Permean period) 	■ Pangaea: one huge continent, made up of all the separate continents that we know today **Describe the climate:**	■ Ice age forests: *Glossopteris* dominates at first, but becomes extinct at the end of the Permean period (about 230 mya)	■ *Glossopteris* fossils found in glacial sediments that formed at the beginning of the period (280 mya) ■ *Glossopteris* fossils and Permean coals occur in South America, Africa, Australia and India, suggesting that these continents were joined at the time	■ Insects plentiful at the time—evidence of jagged holes in *Glossopteris* leaves where insects have eaten them ■ Evidence: 'insect beds' at Belmont on Lake Macquarie, New South Wales

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Time	Moving continents	Dominant flora (vegetation)	Evidence	Dominant fauna (animals)
225 mya 	■ Pangaea begins to split into Laurasia (north) and Gondwana (south)	■ *Dicroidium*: fork-frond seed ferns are the common index fossils ■ Club mosses, *Cylomeia*: long, narrow leaves, either ribbon-shaped or hair like; grew on open plains	■ 220 mya Narrabeen shales—cliffs along Sydney's northern beaches (Harbord to Palm beach) ■ *Cylomeia* leaf and cone fossils	■ Insects plentiful
180 mya 	■ Parts of Gondwana begin breaking up (and parts of Laurasia break up)	■ Conifers and cycads (e.g. monkey puzzle trees, and kauri pines) ■ Seed ferns become extinct	■ Talbragar fish beds of New South Wales: conifers (e.g. Kauri pine trees (*Agathus*), monkey puzzles and podocarps)	■ Dinosaurs, pterosaurs (winged reptiles), early crocodiles and birds ■ Evidence: fossil feathers indicate birds were also around
130 mya 	Gondwana splits into 3 parts: ■ Africa and South America ■ Australia, Antarctica, New Zealand and New Guinea ■ India (already on a collision course with future South-east Asia)	na		
110 mya (80 mya—New Zealand separates)	**Describe the climate in Australia at the time:**		■ Tall conifer forests, with smaller gingkoes, cycads and club mosses forming beneath ■ First flowering plants appear	■ Dinosaurs (giant reptiles) dominate land ■ Flying reptiles share the skies with early forms of birds ■ Giant reptiles inhabit seas ■ Australia's first mammals (including relatives of the platypus) appeared
65 mya 	■ Australia begins separating from Antarctica	MASS EXTINCTION	**What theories are suggested by available evidence for this mass extinction?**	EXTINCTION OF DINOSAURS ■ Mammals dominate

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Time	Moving continents	Dominant flora (vegetation)	Evidence	Dominant fauna (animals)
55 mya	**How was Australia still connected to Antarctica?** **Describe the climate:**	**Identify the type of vegetation at the time:**		**List the animals:**
45 mya 	■ Australia becomes a separate continent: dry land, but great lakes remain in interior		■ Link between ancient and modern forms ■ Flowering plants bloom ■ Conifers and cycads decrease in importance	
20 mya	**In what direction did Australia begin drifting once it separated from Antarctica?** **How does this account for the climate becoming warmer at the time?** ■ Tectonic plate carrying Australia hits up against the South-East Asian plate	**Describe the type of vegetation:** lush rain forest **Insert a picture of a rainforest below:**		**Describe the animals:**
8 mya	■ New Guinea rises above sea level as northern edge of Australian plate crumples against Southeast Asian plate **Describe the climate change and give a reason:**	**Describe the type of vegetation and insert a picture of the type of vegetation:**	**Discuss the significance of the Nullarbor Plain as a source of fossils:**	**Describe the animals:**

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Time	Moving continents	Dominant flora (vegetation)	Evidence	Dominant fauna (animals)
4 mya	Describe Australia's position:	Describe Australia's vegetation:		Name some giant animals that evolved (these were called megafauna):
100000 ya				
60000–40000 ya				Arrival of humans?
10000 ya				
Present day		■ *Eucalyptus* (gum trees) and *Acacia* (wattles) dominate		