

# Mesozoic

## 235 to 65 million years ago

### Triassic

235 to 195 million years ago

Australia's first reptiles appeared. Glossopterid trees and bushes were replaced by more modern plant forms such as conifers and tree ferns. The extensive sandstone plateaux which today form the Blue Mountains west of Sydney are the uplifted remnants of a deep accumulation of river sands in a Triassic coastal basin.



By the start of the Triassic Australia had drifted north away from the Antarctic region into a warmer climatic zone. This warmer climate, coupled with a lower and more seasonal rainfall, discouraged plant growth in inland areas that had previously supported coal-forming swamps in the late Permian. Coal formation did recur in the late Triassic, indicating the return of wetter conditions.

Little of the present continental landmass was covered by water in Triassic times though shallow marine and estuarine conditions did prevail in the Bonaparte, Canning and Perth Basins of the west and north-west, where fine sand and silt accumulated. At the end of the early Triassic, around 225 m.y. ago, these areas were uplifted.

In central and eastern Australia river sands and silts accumulated in delta regions of the Cooper, Tasmania, Sydney, Bowen and Galilee Basins in the early Triassic. At the same time uplift, folding and granitic intrusion took place to the east of the Bowen and Galilee Basins. Vol-

canic activity also occurred here and further south in the Sydney Basin.

In the early Triassic many new animal species appeared, replacing those which became extinct at the end of the Permian. The Triassic saw the proliferation of amphibians and insects as well as the appearance of the first reptiles in Australia. While brachiopods declined other marine animals such as squid, cuttlefish and nautilus increased in number and diversity.

The major change in flora came with the disappearance of the glossopterid trees and bushes that had dominated the Permian landscape of Gondwana and their replacement by cycads, tree ferns and conifers.

Apart from coal deposits in Queensland, Tasmania and South Australia, the only other economically significant Triassic mineralisation resulted from volcanic activity which had already begun in the Permian in northern Queensland, giving rise to the Mount Morgan copper-gold deposit.

### Jurassic

195 to 135 million years ago

Gondwana began to break up in Jurassic times. Dinosaurs inhabited Australia whilst cycads, large tree ferns and conifers flourished in the warm, wet climate. Sediments laid down in large inland lakes now form the major sandstone aquifers of the Great Artesian Basin and reservoir rock for natural gas and oil resources in the Surat and Eromanga Basins.



In the early Jurassic the river systems in eastern Australia expanded rapidly. These eastward flowing rivers and their associated lakes shed a steady volume of sand, silt and mud into the Eromanga, Surat, Clarence-Moreton, Maryborough and Laura Basins. In places, coaly swamps reappeared. This process continued throughout the Jurassic and into the early Cretaceous, and much of the sand deposited over these millions of years now forms the major sandstone aquifers of the Great Artesian Basin.

Similar fluvial conditions prevailed in western and north-western Australia, where sand, silt and coal accumulated during the early and mid Jurassic in the Perth, Carnarvon and Canning Basins. Shallow marine incursions and sedimentation followed in these basins during the late Jurassic.

Around 160 m.y. ago Gondwana began to rift apart. The breakup first occurred on the western side of Australia, where major faulting took place just off the present-day coast as India drifted away. River and lake sediments accumulated in the rift valleys between these two continents. At the same time similar rift faulting probably affected southern and south-eastern

Australia as considerable volumes of basaltic lava, now mainly eroded away, covered parts of the Otway and Tasmania Basins. In the Tasmania Basin sills and columns of dolerite, once the cores and feeder dykes of this past volcanic activity, stand exposed today. Similar intrusive dolerite sills of the same age also occur in Victoria Land, suggesting that Antarctica and Australia were still joined.

The climate was generally warm to hot during the Jurassic, being drier early on and wetter in the later stages. Reptiles continued to evolve both on land and in the oceans, and became the dominant animal form throughout the period. Although scarce the remains of the first Australian Jurassic dinosaur, *Rhoetosaurus*, which was 15 m long and 5 m tall, have been found in western Queensland. Flora continued to diversify and flourish; forests of cycads and conifers were well established and a large tree fern (*Cladophlebis*) was so numerous and widespread that it has been termed the 'Jurassic weed'.

Jurassic rocks contain economic resources of coal, oil and gas in Queensland as well as acting as reservoir rocks for water in the Great Artesian Basin.

**Deeply dissected Hawkesbury Sandstone, Grose Valley near Katoomba (N.S.W.)**  
This horizontally bedded and now heavily eroded Triassic sandstone formation is characteristic of the Blue Mountains west of Sydney.



The Mesozoic, or time of 'middle life', saw the emergence of dinosaurs—the largest reptiles to ever roam the earth—and the first mammals and flowering plants. However, the dinosaurs and other giant reptiles became

extinct at the end of the era. Gondwana began to break up and Australia became a continental landmass in its own right. Significant resources of natural gas and oil are trapped in Mesozoic rocks in eastern Australia.

# Cretaceous

## 135 to 65 million years ago

Sedimentation from rivers and lakes continued into the early Cretaceous, depositing sand, silt and mud across large areas of the continent. Coal continued to form in swampy areas.

A gradual world-wide rise in sea levels around 110 m.y. ago caused a major marine incursion of most of the continent, with dry land contracting to several groups of islands. In eastern and north-eastern Australia uplift and volcanic activity formed mountain ranges.

About 95 m.y. ago Australia and Antarctica began to separate. As happened earlier when India broke away from the west coast an ever-widening rift valley opened up, this time in the Otway and Gippsland Basins of Victoria, and filled with sand and silt. With this further breakup of Gondwana the Australian continental landmass began to assume its present-day shape.

Another major event was the development of a new continental fracture along Australia's south-east coast. As a result a now mostly submerged ridge known as the Lord Howe Rise began to drift eastwards, taking with it western New Zealand and initiating the formation of the Tasman Sea.

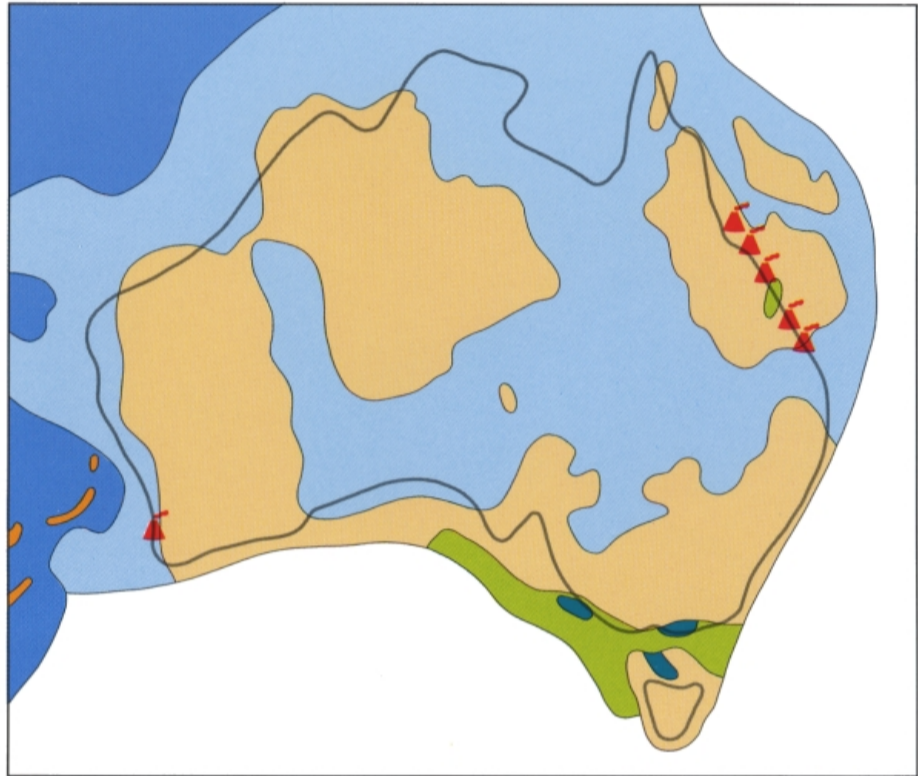
Towards the end of the early Cretaceous, around 100 m.y. ago, the

sea retreated from the north, east and central parts of the continent, reviving river and lake sedimentation. In the west marine sedimentation of sand, silt and lime continued in the Perth and Carnarvon Basins.

In Cretaceous times the climate was generally mild to warm, with rising temperatures towards the end. Scattered coal seams occur where conditions were locally humid. During the early Cretaceous the flora was much the same as that in the Jurassic, with abundant ferns and coniferous forests. However, late in the period flowering plants evolved and had become widespread by its close.

Reptiles continued to dominate the larger fauna though mammals had begun to evolve. An intriguing and as yet unsolved mystery was the mass extinction of many species of animal life, in particular the dinosaurs, at the end of the Cretaceous.

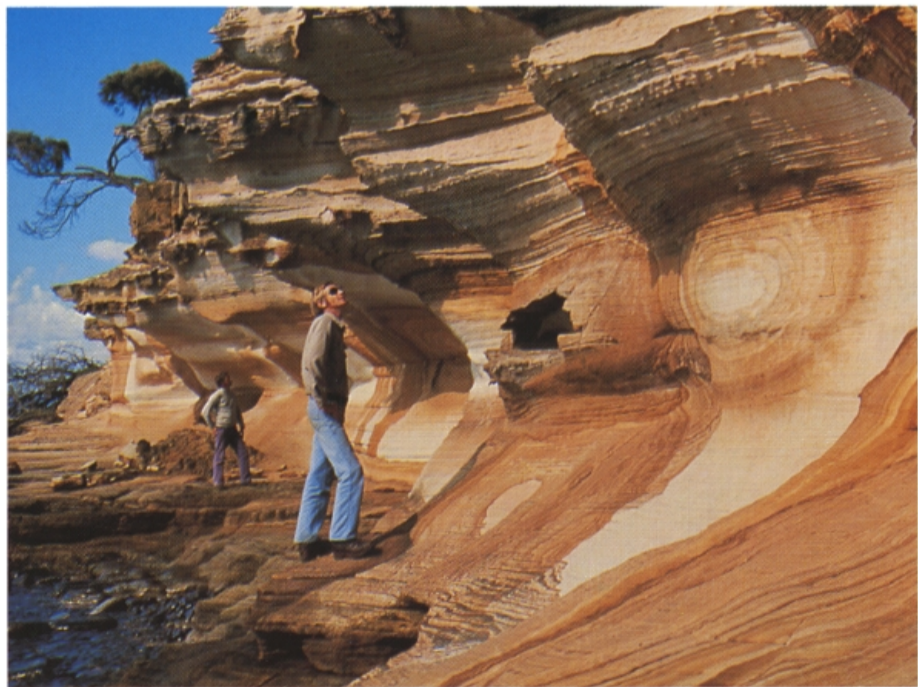
Coal deposits of Cretaceous age occur in Queensland, New South Wales and South Australia but are of little economic significance. Important manganese deposits laid down at this time are found on Groote Eylandt off the coast of the Northern Territory.



Australia and Antarctica began rifting apart. Flowering plants appeared and spread rapidly and Australia's first birds and mammals emerged. Mystery still surrounds the extinction of the dinosaurs at the end of the Cretaceous.



A reconstructed Australian landscape for Jurassic-Cretaceous times. A number of dinosaur species very similar to those found on other continents inhabited this environment. One unique to Australia was the very large Muttaborrasaurus, whose fossilised remains have been found at Muttaborra (Qld). The flora was dominated by conifers, cycads and tree ferns.



'Painted Cliffs', a sandstone rock-face on Maria Island, east coast of Tasmania. These cliffs have been formed through the erosion of horizontally bedded Triassic sandstone. Rings of precipitated iron oxide result from recent groundwater action.

Exposed dolerite intrusions, Cradle Mountain (Tas.) Sheets of jointed Jurassic dolerite eroded into columns cap the higher peaks in the mountainous areas of central and eastern Tasmania.