

THE GEOLOGY OF AUSTRALIA

Third edition

The Geology of Australia documents the rich and spectacular heritage of the Australian continent over the last 4400 million years.

Now in its third edition, *The Geology of Australia* provides an easy-to-read, comprehensive overview of Australia's geology, landscapes and Earth resources. Beginning with the Precambrian rocks that hold clues to the origins of life and the development of an oxygenated atmosphere, it goes on to cover the warm seas, volcanism and episodes of mountain building that formed the eastern third of the Australian continent.

This illuminating history details the breakup of the supercontinents Rodinia and Gondwana, the times of previous glaciations, the development of climates and landscapes in modern Australia, and the creation of the continental shelves and coastlines.

This comprehensively revised third edition features:

- two new chapters on geological time and Paleozoic orogenic rock systems and mountain building
- new and updated illustrations and full-colour images
- a description of the origin of the Australian continent and landscapes in simple language.

From Uluru to the Great Dividing Range, from earthquakes to dinosaurs, from sapphires to the stars, *The Geology of Australia* explores the timeless forces that have shaped this continent.

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OF AUSTRALIA
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AND DAVID JOHNSON



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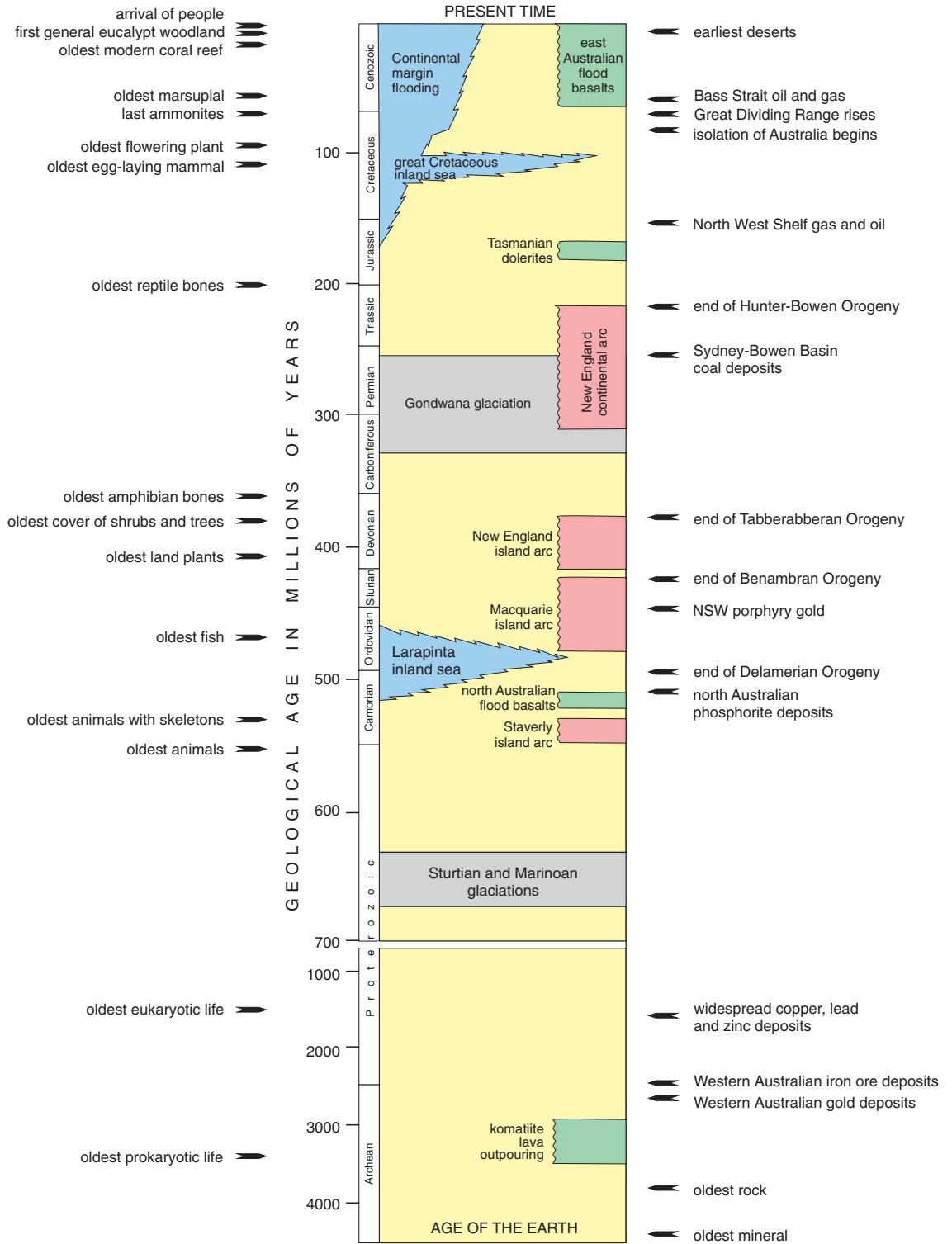
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Preface

The begetting of Australia as we know it was a very protracted process, the pathway of which is written in the rocks. This is true of every continent, and for each the pathway was unique, although many of the treads were shared. The last steps in the Australian journey were of special importance, because they gave rise to the unique environmental attributes which characterise this island continent.

This volume tells the story of how Australia came to be the way it is. It gives a time and process context to the rich and involved preceding history – a forever-fascinating tale. Its main parts are long known and well established, but the story is embellished every year by new research. The pace of change, both in the unfolding of new parts to the story and in the achievement of a tighter focus on broad-scale perspectives, is considerable. In just the seven years or so since the second edition of *The Geology of Australia* was crafted, much new information has come to light through research undertaken in universities, by government agencies and in the private sector.

The considerable physical assets of Australia are indelibly vested in its origins. These have exerted a powerful influence on the development of Australia as a nation. Two complementary streams of discovery have been running. One is pure research, knowledge for its own sake, which has unlocked the begetting pathway, the types of rock systems involved and the nature of the Earth's processes that applied in their origins. The other is the discovery, documentation and utilisation of Earth resources – minerals, rocks, oil and gas, along with soil and subsurface water – with economic ends as the drivers. These two knowledge-based streams have intertwined from the days of early European settlement to the present. Their interaction has been highly productive, in discovering both how Australia came to be and how best to use its physical assets in nation building. The outcome has been to place Australian geoscience as top tier on a global scale, one of very few home-based science disciplines to achieve that international standing.

Knowledge of Australia's origins is profound, and our intention is to lay out that story as a simple, easily understood narrative. Our volume is supported by a bare-bones introduction to geology: rocks, minerals, fossils and importantly a thumbnail sketch of how the Earth works in process terms. This essential backdrop puts the begetting of Australia in context. As an aside, we hope that the volume will also serve many readers as a useful geoscience compendium of terms and concepts.

Acknowledgements

The content of this book has been shaped by interaction over many decades with colleagues and students, and by absorbing their contributions to Australian geology through publication. The science of geology has a rich heritage in Australia, fostered in particular by the Geological Society of Australia. We have been very privileged by our involvement in Australian geoscience. We are particularly indebted to our departmental colleagues at James Cook University and to our host institution for its support through the provision of facilities, particularly comprehensive library access.

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The main localities mentioned in this book.

Units of measurement and abbreviations

Length

micrometre	μm
millimetre	mm
metre	m
kilometre	km

Slope

metre per kilometre	m/km
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Area

square kilometre	km^2
------------------	---------------

Volume

cubic metre	m^3
cubic kilometre	km^3

Mass

kilogram	kg
tonne	t

Power

watts	W
-------	---

Density

kilogram per cubic metre	kg/m^3
tonne per cubic metre	t/m^3

Pressure

kilobar	kbar
---------	------

Atmospheric pressure

hectopascal	hPa
-------------	-----

Temperature

degree Celsius	$^{\circ}\text{C}$
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Time

second	s
day	d
year	yr
thousand years (kilo-annus)	ka
million years (mega-annus, 10^6)	Ma
billion (thousand million) years (giga-annus, 10^9)	Ga

Speed

millimetre per year	mm/yr
metre per million years	m/Ma
kilometre per second	km/s
kilometre per hour	km/h
kilometre per million years	km/Ma