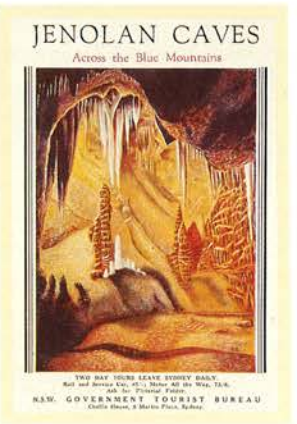


Jenolan Caves advertisement in the Sydney Mail annual, *2 Oct 1937, 16.*
BOOROWA PRODUCTIONS

CHAPTER 11

GEOLOGY

T. G. VALLANCE

FROM SURVIVAL to prosperity, Australia's people have depended on the earth and what it provides. As the explorer Thomas Mitchell said: 'It is only where trap, or granite, or limestone occur, that the soil is worth possessing, and to this extent every settler is under the necessity of becoming a geologist; he must also be a geographer, that he may find water and not lose himself in the bush' (Mitchell, 1838; facs, 1965, 2, 321).

In Mitchell's time the soil chiefly supported rural enterprise. A more diversified dependence would soon emerge with the growth of mining and other extractive industries. Yet no matter what the need, Mitchell's advice made sense to those occupying a land still being discovered. Observant individuals with practical awareness of rocks and landforms possessed a useful talent, one of advantage whether in selecting a farm or prospecting for minerals or building stones. Such were among our earliest geologists. At their head stands Governor Arthur Phillip whose first despatch from Sydney Cove carried remarks about the rocks there and the uses to which they were being put.

Practical geologists they may have been, but the study of the earth has a longer history in the practical line than has the systematic scientific discipline to which some would confine the name geology. Any student of Australian geology, at least any with a sense of history, will admit the disparate sources of his or her knowledge. Explorers, surveyors, government officials with various, even little, scientific expertise, university researchers, museum curators, company staff and many others, not least among them private citizens who find the earth a rewarding field for investigation—all have contributed.

Some two hundred years of investigation have seen a continent mapped geologically, in reconnaissance fashion at least. If the detail accumulated now releases most Australians from the individual necessity to become geologists, not so the nation. As modern technological society makes increasing demands of the earth and as deposits found by surface prospecting are consumed, the search for useful materials turns to places hidden from view. That kind of search requires considerable scientific sophistication and mastery of diverse techniques. The once conventional distinction between practical or applied geology and pure or abstract geology now has little meaning. The specialist branches of geology form one admittedly technical science. But it is a science that remains of fundamental importance to Australians, both as a guide to their country's resources and, more generally, as a key to understanding the physical character and history of the region they inhabit.

The titles that follow have been chosen to introduce readers to present knowledge of Australian geology in all its variety and to give some view of how that knowledge grew. From rocks more than four thousand million years old in Western Australia to areas like the Great Barrier Reef still being formed, the variety is great in both time and space. If Australia at present lacks the threat of major earthquake or active volcano, and has no fine glacier, all these and more in the past have left their impression. In observing the earth now, the geologist seeks to recognise patterns of action in terms of earth history and development. As will be seen, the Australian geologist commonly has been constrained to search within limits set by people, not by nature. So much of our published record is confined by colonial or, later, state boundaries.

Politics and geology may seem unrelated but since 1788 governments in Australia, with varying enthusiasm and effectiveness, have recognised a need to know the natural resources of their territories. Governments alone have had the financial capacity to sponsor systematic geological investigation on a comprehensive scale. Long after Federation, geological survey remained largely a preserve of the states (Johns, 1976). The commonwealth government all but confined its geological patronage to the Northern Territory and Papua until 1946 when it established the Bureau of Mineral Resources, Geology and Geophysics (BMR), a body that has become our leading regional survey and now increasingly promotes field and laboratory research. Such research, and that of relevant divisions of the CSIRO, supplements work conducted in the more traditional university centres.

Yet though these institutions are the principal sources of new information it is a voluntary professional body, the Geological Society of Australia (founded 1951), that in recent years has fostered general reviews of geological detail on a regional basis. Those on New South Wales (Packham, 1969), Queensland (Hill and Denmead, 1960), Tasmania (Spry and Banks, 1962) and Victoria (Douglas and Ferguson, 1976) have their places in the bibliography as important sources of modern geological information. In South Australia and Western Australia earlier leads of the Geological Society have been followed by revised 'new' editions from state authorities (Parkin, 1969; Western Australia. Geological Survey, 1975). For the reader seeking less technical approaches, Laseron (1969) may be a gentler guide, in the work cited and its companion *The face of Australia* (3rd edn, A & R, 1972) dealing with landforms. Talent (1970) offers a simple introduction to earth materials.

State government bodies, not surprisingly, have sponsored reviews of mineral resources. That relating to New South Wales, edited by Markham and Basden (1974) to mark the centenary of the state geological survey, is a recent work in a tradition that goes back to Burr (1846) and the first geological publication to be issued in this country. There are so many from which to choose. Carne and Jones (1919) on limestones is given a place here, in part to recall a geological problem faced by our forebears at Sydney Cove and to note its esteem among the increasingly numerous devotees of the scientific recreation called speleology. Baker's (1915) illustrated survey of building stones will remind readers what impressive products of the earth they pass on the street. At the national level, the important subject of geology and ground water resources is treated by the Australian Water Resources Council (1975). But again it is a voluntary organisation, the Australian Institute of Mining and Metallurgy (established 1893), that has taken responsibility for recent reviews on the economic geology of Australia (Knight *et al*, 1975–76). The essays on the mineral resources of Western Australia, edited by Prider (1979), form part of a publishing venture to celebrate that state's sesquicentenary.

The list also includes major published bibliographical works relating to Australian geology. Most of them, apart from Teesdale-Smith (1959) on South Australia, are by now historical documents that underline the need for renewed effort. Much the same, sadly, applies to specialist bibliographies where only Quilty (1975) on West Australian palaeontology has any claim to comprehensive modernity, although the revised list of Tasmanian minerals (Tasmania. Geological Survey, 1970) affords some access to recent literature on its subject. Fossils and their study, palaeontology, have great significance to the geologist seeking to date and correlate stratified deposits. The Queensland studies listed under Hill, Playford and Woods (1964–73) are models

yet to be matched elsewhere in Australia. Even the amateur collector of fossils will find these works useful, if challenging, guides. Mineral collectors also know Australia as a source of splendid specimens, nowhere better than at Broken Hill, the treasures of which are described and illustrated in Worner, Mitchell and Segnit (1982). Those who seek minerals in Western Australia will profit by knowing the volumes by Simpson (1948–52), a work that follows in more modern style the pattern of chemical mineralogy set long ago by Liversidge (1888) in New South Wales.

In a collection that celebrates history due notice must be given to those works especially significant to historians of geology. Dealing with Australia, that kind of historian is as much concerned with importations as the social historian. Like the people who settled Australia from 1788, scientific geology began in Europe. Furthermore, study of the earth emerged as a systematic historical science only during the first half of the nineteenth century. Its developing concepts and methods came to an Australia still being explored and settled. The historical record of Australian geology thus reflects an intellectual maturing elsewhere; as well, it shows how translated European experience was no consistently reliable guide to Australia's geological past (Vallance, 1975).

In 1788 the term 'geology' was known but unused; 'theory of the earth' still sufficed for the different speculative systems that sought to explain the earth's character. But Europeans already possessed many observational data about rocks and rock masses. They knew, for instance, that strata of various sorts of rocks lay in particular order and believed the arrangement to be worldwide. Our first settlers found nothing to upset this view; in a country stocked with novel plants and animals the rocks seemed reassuringly familiar. Governor Phillip saw what he thought resembled Portland stone; within a few years coal would be found along the coast, below the stone at Sydney. Thus it was in England; coal lay at stratigraphically lower levels than Portland stone. It was to apply this sort of lithological method of correlation that Buch examined the rocks gathered by the Baudin expedition of 1800–04. His 'Einige Bemerkungen über die geognostische Constitution von Van Diemens Land' (first published in 1814 as a journal contribution and reprinted in his *Gesammelte Schriften*, Berlin, Reimer, 1870) was the first published work on Australian geology.

However, by this time European geologists were becoming aware of the demonstrations, first in England but later in France, that fossils afforded a far more reliable basis for correlation of strata than did rock character. From these demonstrations much modern geology takes its rise. By about 1850 European geologists had all but completed the general pattern of time and rock systems that continues to be used across the world. Even in Europe, of course, adoption of the more sophisticated palaeontological method was gradual; old and new approaches coexisted for decades. In Australia, where for much of that time there were few with even rudimentary scientific training, the old lasted longer. An early official nod to science had led nowhere.

Between 1803 and 1812 the civil establishment in New South Wales included one titled His Majesty's Mineralogist, but the officer's duties were ill-defined and his achievement on the whole insubstantial (*Proceedings of the Linnean Society of New South Wales* 105, 1981, 107–46). The geological observation and collection carried out in the early years happened largely as a result of the enterprise of a few interested amateurs, explorers both official and private, and from the visits by naval expeditions that carried scientific staff (*Bulletin of the British Museum [Natural History]*. Historical series, 10, 1, 1982, 1–43, and *Histoire et nature* 19–20, 1981–82, 133–40). The Sydney merchant Berry's paper on geology along the coast (1825) reported an exceptional piece of private fieldwork. Its importance, however, was apparent only to those who knew the ground.

The 1820s saw the first descriptions of distinctive Australian fossils (Brongniart, 1828; C.D.E. Konig, *Icones fossilium sectiles*, London, 1825). It is unclear who collected these fossils but soon explorers like Sturt and Mitchell (1838; facs, 1965) were to show a talent in that regard. Their material too, such as the fossil marsupial remains from Wellington Caves later so attractive to Owen (1877–78), had to be sent to Europe for study. Not until 1855 and the arrival of McCoy (1874–82) as a foundation professor at the University of Melbourne was there a generally experienced palaeontologist resident in Australia (*Alcheringa* 2, 1978, 243–50). Even capable

geologists like Strzelecki (1845; facs, 1967) and Clarke (1878), who both reached Sydney in 1839, sent their fossils away, not as miscellaneous curiosities but in the hope of gaining detail to supplement their own work in the field.

More or less systematic field investigations were now beginning. Strzelecki's map (*Records of the Australian Academy of Science* 2, 4, 1974, 68–70) of southeastern Australia is a founding document in our regional geological cartography. Jukes' (1850) attempt at a sketch map of the whole country soon followed (see also Darragh, 1977). Jukes and another visiting geologist, Dana (1849), had examined Australian rocks in the field with the clergyman–geologist Clarke, long honoured as our pioneering resident student of stratigraphical order.

To Clarke in particular belongs the credit for unravelling the sequence of strata in the main (Sydney) coal basin of New South Wales. Establishment of the ages represented by those strata, however, proved difficult and controversial. In the hope of clarifying age problems Clarke had sent for study in Cambridge collections of fossils from what his field evidence indicated was one succession. The result bewildered him, for McCoy, the assistant detailed to the study, concluded not only that the plant and animal fossils were of quite different ages but that Clarke had been less than careful in the field.

With the advantage of hindsight we can see that the controversy, enlarged after McCoy moved to Melbourne, really arose because each expected preferred European models to hold in Australia ('The fuss about coal' in D.J. and S.G.M. Carr eds, *Plants and man in Australia*, Sydney, 1981, 136–76). Neither ever quite escaped his attachment to Europe. It is thus fascinating to note the independent approach so early adopted by the American Dana. But Clarke and McCoy long dominated the Australian scene, a dominance that left geologists in India to find the clues as to why southern lands differed so markedly from Europe: while coal plants waxed in northern warmth the south was experiencing glaciation.

If the ages of coalbearing successions became a major theme in nineteenth-century Australian geological science it was metalliferous ore, and in particular gold, that transformed the organisation of geological effort here. The discovery and working of such deposits, first in South Australia (B. O'Neil, *In search of mineral wealth: the South Australian Geological Survey and Department of Mines to 1944*, Adelaide, 1982, 7–35), and soon in New South Wales and Western Australia (*Journal of the Royal Society of Western Australia* 63, 1981, 119–28), raised questions of government regulation and taxing, and hence of the need for governments to possess knowledge of resources. South Australia's lead here is not surprising; a mineralogist had been sent out with the first settlers. It is less well known that by 1846 there was a goldmining company based in Adelaide.

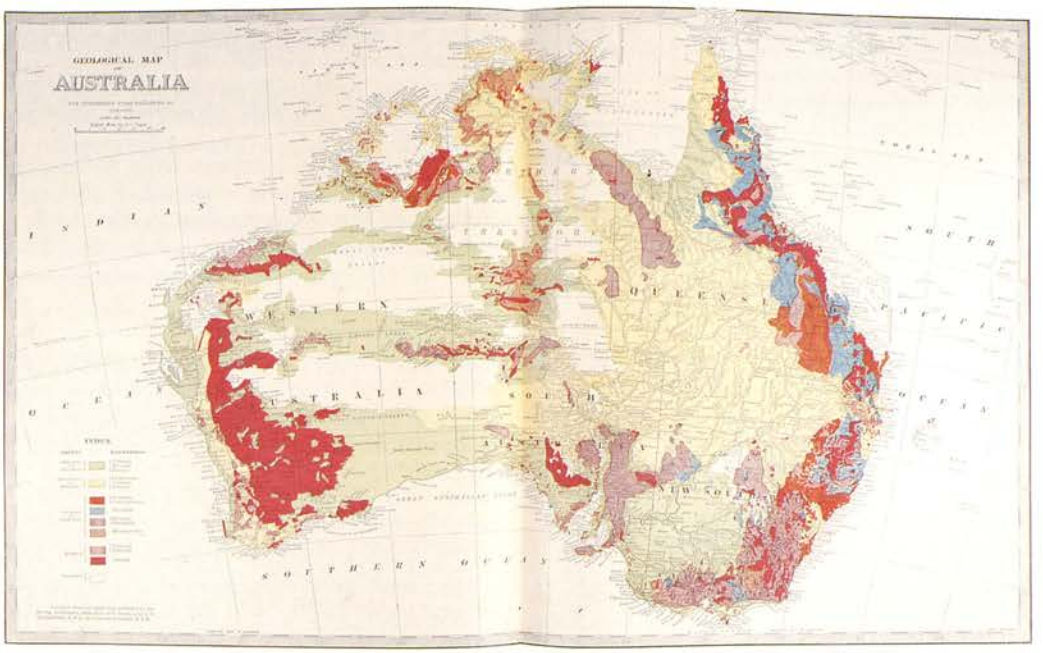
But it was gold in the eastern colonies that from 1851 changed Australian society. New South Wales already had a government geologist in the field when news broke of gold at Ophir. Gold in Victoria soon led the new colony to outshine its neighbour, not least with a more comprehensive geological survey under Selwyn (represented here by Selwyn and Ulrich, 1866) that began for Australia the task of systematic geological mapping (see Darragh, in Douglas and Ferguson, 1976). Since then, apart from short periods when hard-pressed administrators have tried to economise by dispensing with science, there has been a continuing tradition of government patronage of geology in Australia (Johns, 1976).

By the end of the nineteenth century, the governments of New South Wales, Queensland (Jack and Etheridge, 1892), Tasmania (Johnston, 1888) and Victoria had published monographic geological descriptions of their territories. The universities in Sydney, Melbourne and Adelaide were promoting teaching and research in geology. By 1913 universities in Hobart, Brisbane and Perth had joined them. Natural history museums with representative collections of local fossils, minerals and rocks were functioning as research centres in each capital city. The impressive growth of geological knowledge that has marked the years since Federation had already begun; it was to reach a culmination in David's (1932) concept of a new geological map and unifying treatise brought to posthumous fruition in 1950.

Edgeworth David helped bring independence to Australian geology, helped it come of age and gain a public image. In 1886, four years after he settled in Sydney and only eight since

Clarke's death, David and a colleague from India recognised for the first time signs of the ancient glaciation that distinguished Australia from Europe nearly three hundred million years ago. Australian geology was not that of a transplanted Europe; it had its own style to be discovered and explained. Glacial features of all ages fascinated David; their pursuit led him across Australia, across the world. They drew him in 1907 with Shackleton to Antarctica, from which he returned two years later a popular hero. His sometime student Douglas Mawson, with him on that adventure, was likewise to win fame for even greater feats of polar exploration. Beyond all their colleagues, these two professors of geology, David at Sydney and Mawson in Adelaide, made geology popular, culturally respectable among people with no professional involvement in science.

With his experience and synthetic skills as a geologist as well as the esteem that allowed him access to information, official and unofficial, published and unpublished, David was the man best able to take stock of Australian geology. He had long projected a major general work and began in earnest when granted leave for two years before retiring as professor in 1924 (*Historical records of Australian science* 5, 2, 1981, 30–57). Only the geological map in four sheets appeared in his lifetime; the hurriedly prepared explanatory notes (David, 1932) had to be a substitute for the treatise in his mind and in boxes of notes. It is to the sensitive intelligence of W.R. Browne that we owe David (1950). The work remains unmatched, perhaps unmatchable. Others might arise who could equal in mastery the comprehensive sweep of David and Browne but the task of detailed synthesis in a work of less than encyclopaedic dimensions becomes increasingly difficult as our geological knowledge grows. That growth itself is a legacy from David and his editor, and the many from whose data they created a classic of Australian science.



Geological map of Australia published by the Picturesque Atlas Publishing Co of Sydney and Melbourne in A. Garran (ed), Picturesque atlas of Australasia *3, c1888.*

ANDERSON, C. *Bibliography of Australian mineralogy.* Sydney, Government Printer, 1916. 164 p (NSW Geological Survey. Mineral resources, 22).

A guide to printed records of mineral species that had been found in Australia, the list covers European literature to 1914.

AUSTRALIAN WATER RESOURCES COUNCIL. Technical Committee on Underground Water. *Groundwater resources of Australia.* AGPS, 1975. 142 p, illus, maps.

Emphasises the geological environments. Includes a historical section.

BAKER, R.T. *Building and ornamental stones of Australia.* Sydney, Government Printer, 1915. 169 p, illus, map. (NSW Dept of Education. Technical Education Branch. Technical education series, 20).

This guide to the igneous, metamorphic and sedimentary rocks used for constructional and ornamental purposes extends the author's earlier work, *Building and ornamental stones of New South Wales* (2nd edn). Sydney, Government Printer, 1909.

BERRY, A. 'On the geology of part of the coast of New South Wales', in B. Field ed, *Geographical memoirs on New South Wales.* London, John Murray, 1825, 231–54.

In the first geological paper presented in Australia to the Philosophical Society of Australasia on 6 March 1822, Berry discusses the arrangement of strata along the coast near Sydney.

BRONGNIART, A.T. *Prodrome d'une histoire des végétaux fossiles.* Paris, F.G. Levrault, 1828. 223 p.

Introducing the names *Glossopteris browniana* and *Phyllotheca australis*, the French palaeobotanist here begins the study of distinctive Australian fossil plants.

BURR, T. *Remarks on the geology and mineralogy of South Australia.* Adelaide, Andrew Murray, 1846. 32 p.

The first geological monograph published in Australia and the beginning of metalliferous mining.

CARNE, J.E. AND JONES, L.J. *Limestone deposits of New South Wales.* Sydney, Government Printer, 1919. 411 p, illus, maps. (NSW Geological Survey. Mineral resources, 25.)

An illustrated review of deposits of a natural material sought and prized since earliest colonial times. The book also deals with utilisation of limestone and the history of its discovery.

CLARKE, W.B. *Remarks on the sedimentary formations of New South Wales* (4th edn). Sydney, Government Printer, 1878. 165 p.

In this work completed just before his death, the clergyman-geologist—to some 'the father of Australian geology'—sets down his last views of a subject he had made his own. First published as a short essay in 1867.

DANA, J.D. *The United States exploring expedition. During the years 1838, 1839, 1840, 1841, 1842. Under the command of Charles Wilkes, U.S.N. Vol. X. Geology.* Philadelphia, Sherman, 1849. 756 p, illus, maps.

A noted American geologist reports on the geology (pp 449–537) and fossils (pp 681–720) of central–eastern NSW.

DARRAGH, T.A. 'The first geological maps of the continent of Australia', *J of the Geological Society of Australia* 24, 5, 1977, 279–305.

Maps are essential documents to geologists. This important paper discusses the various geological maps of Australia.

DAVID, T.W.E. *Explanatory notes to accompany a new geological map of the Commonwealth of Australia, based on the maps already published by the geological surveys of the various states etc.* Sydney, Australasian Medical Publishing Co for the Commonwealth Council for Scientific and Industrial Research, 1932. 177 p, illus, map.

Edgeworth David's map—itself a major document—had been published (in four sheets) by the then CSIR in March 1931. A comprehensive treatise was to have accompanied the map but because of failing health the author prepared instead these explanatory notes—proving the scientific mastery for which he won fame.

DAVID, T.W.E. *The geology of the Commonwealth of Australia. Ed. and much supplemented by W.R. Browne.* London, Edward Arnold, 1950. 3 vols, illus, maps.

The most influential book on Australian geology: the work of review and synthesis David hoped to write. The inspiration was his, but the book was written after his death (in 1934) by W.R. Browne and issued in an edition limited by the availability of the 1931 maps (see above) for volume III.

DOUGLAS, J.G.G. AND FERGUSON, J.A. eds, *Geology of Victoria.* Melbourne, Geological Society of Australia, 1976. 528 p, illus, maps. (Geological Society of Australia. Special publication, 5.)

The first modern presentation of the geology of Vic; includes among its many illustrations the latest (1976) state geological map at 1:1 000 000 scale.

ETHERIDGE, R. Jr *A catalogue of Australian fossils (including Tasmania and the island of Timor) stratigraphically and zoologically arranged.* CUP, 1878. 232 p.

Even by 1878 the variety of known Australian fossil taxa was impressive. Subsequent vast increase in our palaeontological knowledge seems to have discouraged emulation of Etheridge's scholarly enterprise.

ETHERIDGE, R. JR AND JACK, R.L. *Catalogue of works, papers, reports, and maps, on the geology, palaeontology, mineralogy, mining and metallurgy, etc. of the Australian continent and Tasmania.* London, Stanford, 1881. 196 p.

A valuable key to early publications, reissued by the NSW Dept of Mines in 1882. No work comparable in scope has been published since.

GREGORY, J.W. ed, *A contribution to the bibliography of the economic geology of Victoria, to the end of 1903, with map.* Melbourne, Acting Government Printer, 1907. 131 p, map. (Victoria. Geological Survey. Records, 2, 3.)

Lists published and unpublished reports from certain newspapers.

HILL, D. AND DENMEAD, A.K. eds, *The geology of Queensland.* MUP, 1960. 2 vols, illus, maps.

A systematic modern treatment by various authors. Originally published as vol 7 of the *J of the Geological Society of Australia.*

HILL, D. *et al, Illustrations of fossil faunas and floras of Qld.* Brisbane, Qld Palaeontographical Society, 1964–73. 10 pts, illus.

Describes the main varieties of fossils preserved in Cambrian and younger sediments and includes a select bibliography.

HILL, D. AND WILLADSEN, C. *Bibliography of Australian geological serials: and of other Australian periodicals that include geological papers.* UQP, 1980. 76 p. (University of Qld papers, Dept of Geology, 9, 3).

Fundamental and detailed compilation.

JACK, R.L. AND ETHERIDGE, R. JR *The geology and palaeontology of Queensland and New Guinea, with sixty-eight plates and a geological map of Queensland.* Brisbane, Government Printer, 1892. 3 vols, illus, maps.

The first comprehensive work on the subject.

JOHNS, R.K. ed, *History and role of government geological surveys in Australia.* Adelaide, Government Printer, 1976. 111 p, illus.

State and commonwealth geological surveys have been chiefly

responsible for regional geological and geophysical mapping and the evaluation of mineral resources. Contains brief histories of these bodies and lists professional staff.

JOHNSTON, R.M. *Systematic account of the geology of Tasmania.* Hobart, Government Printer, 1888. 408 p, illus, maps.

The first general treatise on the geology of Tas.

JUKES, J.B. *A sketch of the physical structure of Australia, so far as it is at present known.* London, Boone, 1850. 95 p, maps.

Jukes visited with the *Fly* expedition in the 1840s; his geological experiences include the Great Barrier Reef. His geological sketch map of Australia was the first ever published.

KNIGHT, C.L. ed, *Economic geology of Australia and Papua New Guinea.* Parkville, Vic, Australasian Institute of Mining and Metallurgy, 1975–76. 4 vols. (AIMM Monograph series, 5–8.)

A review of the present state of geological knowledge relating to economic mineral materials in the region.

LASERON, C.F. *Ancient Australia: the story of its past geography and life.* Rev by R.O. Brunnschweiler. A & R, 1969. 253 p, illus, maps.

A geological history of Australia and its palaeogeographical development written for the non-expert. First published in 1954.

LIVERSIDGE, A. *The minerals of New South Wales* (3rd edn). London, Trubner, 1888. 326 p, illus, maps.

Liversidge was a major contributor to the progress of mineralogy. This is the third (and greatly expanded) edition of a paper first issued in the *Transactions of the Royal Society of NSW*, 9, 1876, 153–215.

McCOY, F. *Prodromus of the palaeontology of Victoria: or, figures and descriptions of Victorian organic remains. Decades 1–7.* Melbourne, Government Printer, 1874–82. 7 pts in 1 vol, illus.

The seven decades (each with ten descriptions and plates) of this *Prodromus*, issued by the Geological Survey of Vic, are vintage McCoy. A major contribution to Australian systematic palaeontology.

MAHONEY, J.A. AND RIDE, W.D.L. *Index to the genera and species of fossil mammalia described from Australia and New Guinea between 1838 and 1968 (including citations of type species and primary type specimens).* Perth, Government Printer, 1975. 249 p, illus.

Compiled as a source for taxonomists; provides access to the extensive literature on an important group of fossil vertebrates.

MARKHAM, N.L. AND BASDEN, H. eds, *The mineral deposits of New South Wales.* Sydney, Dept of Mines, Geological Survey of NSW, 1974. 682 p, illus.

Collection of essays published to celebrate the founding of the NSW Dept of Mines in September 1874.

MITCHELL, T.L. *Three expeditions into the interior of eastern Australia, with descriptions of the recently explored region of Australia Felix, and of the present colony of New South Wales.* London, T & W Boone, 1838, 2 vols, illus.

Mitchell—explorer, amateur geologist and a founder of inland regional survey—described various fossils, rocks and other geological phenomena and prepared the first geological map of any part of Australia (plate 42). Facsimile edition, LBSA, 1965.

OWEN, R. *Researchers on the fossil remains of the extinct mammals of Australia: with a notice of the extinct marsupials of England.* London, Erxleben, 1877–78, 2 vols, illus.

Papers, first published by the Royal Society of London, by the English comparative anatomist, a pioneer of Australian vertebrate palaeontology and an active promoter of cave research.

PACKHAM, G.H. ed, 'The geology of New South Wales', *J of the Geological Society of Australia* 16, 1, 1969, 1–654.

This systematic and detailed modern account includes a small-scale geological map of NSW. A revised map on a scale of 1:100 000 was issued by the state Geological Survey in 1972.

PARKIN, L.W. ed, *Handbook of South Australian geology.* Adelaide, Geological Survey of SA, 1969. 268 p, illus, maps.

A well-illustrated guide. More recent work has been incorporated in the 1:100 000 geological map in 1980.

PRIDER, R.T. ed, *Mining in Western Australia.* UWAP, 1979. 304 p, illus, maps.

Contributors deal with history and geology related to mining in WA. A new (1979) geological map is included.

QUILTY, P.G. *An annotated bibliography of the palaeontology of Western Australia, 1814–1974.* Perth, Government Printer, 1975. 263 p, illus, maps. (WA Geological Survey. Report 3.)

West Australian fossils, includes many that antedate 1859—the year in which, arguably, the first fossil from this region to be recognised as new to science received its name.

SELWYN, A.R.C. AND ULRICH, G.H.F. *Notes on the physical geography, geology and mineralogy of Victoria.* Melbourne, Blundell and Ford, 1866. 92 p, illus, maps.

The Geological Survey of Vic, then directed by Selwyn, set a model for systematic study of Australian field geology. This report summarises part of that notable achievement.

SIMPSON, E.S. *Minerals of Western Australia.* Perth, Government Printer, 1948–52. 3 vols, illus.

A detailed account of mineral species found—and where found—in WA, by the government mineralogist.

SPRY, A.H. AND BANKS, M.R. eds, 'The geology of Tasmania', *J of the Geological Society of Australia* 9, 2, 1962, 107–362.

The work is accompanied by geological and structural maps.

STRZELECKI, P.E. de *Physical description of New South Wales and Van Diemens Land, accompanied by a geological map, sections and diagrams, and figures of the organic remains.* London, Longman, Brown, Green and Longmans, 1845. 462 p, illus, maps.

The first geological map of any large part of Australia. Facsimile edition, LBSA, 1965.

TASMANIA. Geological Survey. *Catalogue of the minerals of Tasmania.* Hobart, Dept of Mines, Tas, 1910, illus.

A comprehensive revision and enlargement of this work by W.F. Petterd was issued by the Tasmanian Dept of Mines in 1970.

TEESDALE-SMITH, E.N. *Bibliography of South Australian geology: includes all literature published up to and including June, 1958.* Adelaide, SA Dept of Mines and Geological Survey, 1959. 240 p, map.

Of the Australian states, only SA has published a bibliography of works in all branches of its geology.

VALLANCE, T.G. 'Origins of Australian geology', *Proceedings of the Linnean Society of NSW* 100, 1, 1975, 13–43.

An outline of how geological knowledge of Australia developed, and how in the early days that knowledge was shaped by European experience.

WESTERN AUSTRALIA. Geological Survey. *The geology of Western Australia.* Perth, WA Geological Survey, 1975. 540 p, illus, maps. (WA Geological Survey Memoir, 2).

Fundamental work, but the geological map of the state has been superseded (see Prider, 1979).

WORNER, H.K. *et al, Minerals of Broken Hill.* Melbourne, Australian Mining & Smelting Ltd, 1982. 259 p, illus.

Mining at Broken Hill where silver–lead–zinc deposits have yielded fine mineral specimens—some here illustrated in colour.