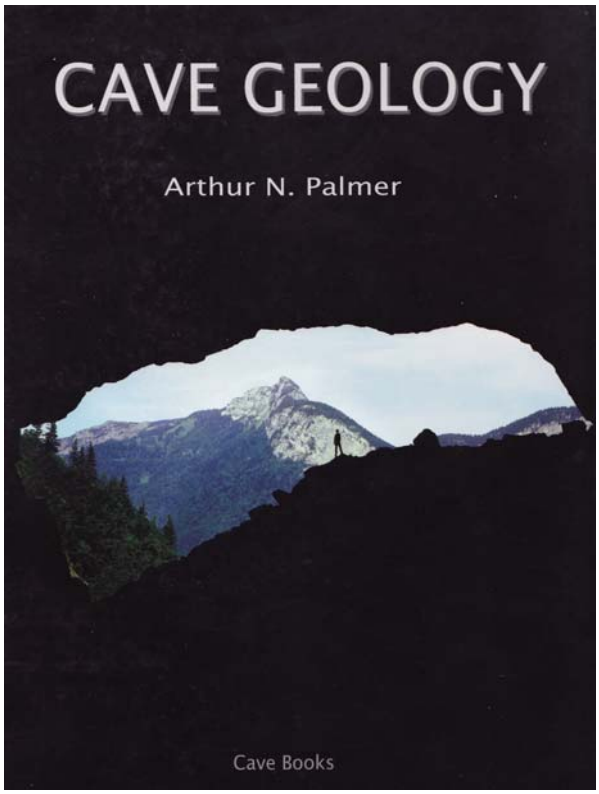
BOOK REVIEWS

Cave Geology*,** 2007, Arthur N Palmer, Cave Books, Dayton, Ohio. **, *ISBN 978-0-939748-66-2 Hardback, 454 pages. $US38.00. **Reviewed by Andy Spate and by Ken Grimes**.



Andy Spate's Review:

Another book that you should buy! Palmer's book is a very interesting and useful tome. Let's get the publisher's blurb out of the way first up:

> *Cave Geology is the definitive book on the subject by an internationally recognized authority. It can be easily understood by non-scientists but also covers a wide range of topics in enough detail to be used by advanced researchers. Illustrated with more than 500 black and white photographs and 250 diagrams and maps, this book is dedicated to anyone with an interest in caves and their origin.*
>
> *Topics include:*
>
> - *Cave science and exploration*
> - *Karst landscapes*
> - *Cavernous rocks*
> - *Karst groundwater flow and chemistry*
> - *Characteristics of solution caves*
> - *Cave origin*
> - *Relation of caves to geologic setting*
> - *Cave minerals* [and speleothems]
> - *Caves in volcanic rocks*
> - *Cave meteorology and internal weathering*
> - *Dating of caves*
> - *Field techniques*
> - *Relation of cave studies to other sciences.*
>
> *Concepts, techniques, and field examples are stressed. Most examples are from American caves, although the scope is international.*

Palmer's approach is very different to most texts on cave and karst subjects, The book is very readable and comprehensive although whether the scope can be truly said to be 'international' might well be open to discussion. In his Chapter 2, *Cave Country*, he devotes about 6.5 pages to North America; about two pages to Central America and the Carribean; a little less than three pages to Europe; four pages to Asia; 1.5 to Western Pacific islands; one page to Africa and three-quarters of a page to Australia and New Zealand.

Whilst we shouldn't be parochial and miserable about Oz and NZ's share of his book it is disappointing to see that most of his discussion on Australia's cave is devoted to the Nullarbor. We have much else! Our impressive and world-rating syngenetic caves and karst are summed up as follows:

> *The western coast of Australia contains caves in very young dune limestones.*

That's all, folks!

New Zealand gets similar mention. But, as I said we mustn't be too parochial – especially when one looks at the Australian-based karst texts (Jennings, Gillieson, Hamilton-Smith and Finlayson) are similarly unashamedly parochial. Palmer's book does cite a number of Australian authors.

Palmer has a reputation for lucid writing and this is more than adequately demonstrated in this remarkably comprehensive book. This book is more than a standard textbook – it is also a field and laboratory manual and includes a glossary. For example, the field manual aspects include instructions for cave surveying, streamflow measurement and chemical field studies amongst other issues. One of the more interesting of these is a couple of pages on the interpretation of cave origins which might be of value to those of us situated in New Zealand and in the Eastern Highlands (to which New Zealand really belongs, geologically).

The glossary, unusually, contains guides to pronunciation for some of the more obscure terms we encounter from time to time. It is fairly comprehensive as is the index. There may be more references listed than actually cited? There are a few – very few – typos.

One of the most unusual parts of the book is its last page (page 454) headed *Conversion of units* which contains the comment:

> *The United States is the only major country that has not adopted the metric system as its national standard.*

Hopefully Arthur's fine book will be another kick-along to bring the USA into the modern metric world. Add it to your personal or office library!

Interestingly, this book was to be one of two volumes – the second to be on cave biology. As Palmer says in his *Preface*:

> *This book will eventually have a companion: Cave Biology, by Kathleen Lavoie. We originally planned to be co-authors of a single book, Introduction to Speleology, but it grew too big and is now two volumes. Readers are encouraged to consult Kathy's book too, because the link between biology and geology is significant.*

This may well be another book that we should have a look at

Ken Grimes' Review:

As indicated by the title, this book concentrates more on caves than does Ford & Williams (see below), but it also describes surface karst landforms and karst (and pseudokarst) processes in general.

In the opening page Art Palmer says 'Speleology is often considered as much a sport as a science. This book focuses on science, but most speleologists enjoy both'. Art obviously enjoys both and the book has much for cavers as well as scientists – eg the use of geological interpretation to guide exploration for new passages.

He also emphasises that 'a great deal of important speleological field work is done by non-scientists'. He caters for them with many practical tips and procedures – within the text or provided as separate sections, complete with examples. These cover topics such as cave photography, estimating stream flows, chemical tests, and interpreting scallops. There is a whole chapter (Ch 14) devoted to tips on the general scientific method and specific techniques and devices for cave surveying, and geological and geophysical studies that can be used by amateurs and scientists. His many excellent photos provide good examples of lighting techniques and composition, as well as illustrating the cave geology.

Thus, the book is aimed at both intelligent laymen (i.e. cavers) and at scientists. This is good for most cavers and also for most cave managers, but of necessity it results in some frustration for the scientist with a lack of detail and over-generalisation in places. The author has had some difficulty keeping a consistent level of treatment, which ranges from very simplified to quite complex – it is impossible to simplify the karst water chemistry and processes which are the background to understanding cave genesis and patterns, but his use of numerous detailed examples helps clarify the science and mathematics. Fortunately, the complex parts can be easily skipped by the disinterested, and for those who want more detail, there is a reasonable supply of references to other books and reports.

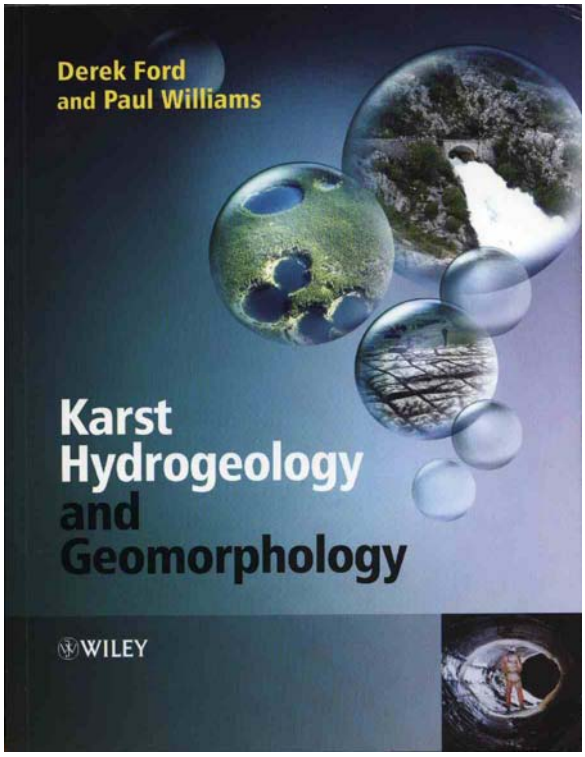
The book opens with introductory chapters on Speleology (terms, an overview of cave types (including pseudokarst) and practical aspects of their exploration, mapping, photography etc) and Cave Country (surface karst features are summarised here, then the distribution of caves in the world and North America); and a necessary background on the Cavernous Rocks.

The text then becomes fairly heavy as it describes in detail the nature and movement of water in karst, and the chemistry and physics of limestone solution. These are necessary background to the following chapters on firstly the characteristics of solution caves (passage types, patterns, sculpturings and sediments); and then the important, and most interesting, chapters on cave formation and the control of cave patterns by hydrology and geology. This is Art's speciality, so these discussions are very up-to-date and detailed, with many excellent examples and photos. Next comes chapters on special topics: Cave minerals and speleothems; Caves in volcanic rocks; Cave meteorology and internal weathering (including condensation corrosion and biogenic weathering).

A chapter on Caves and Time deals with the dating of caves and their deposits, paleoclimates and paleokarst, and the evolution of karst areas over time. Chapter 14, Geological Studies of Caves, is a practical chapter for both amateur and professional scientists. A final chapter covers cave and karst management and resources. There is a 7 page glossary.Apart from a summary of cave life on pp 164-5, discussion of biology is limited to its influence on speleogenesis and speleothem development – a planned companion volume by K. Lavoie will cover Cave Biology. Brief Australian examples occur in many places (see index, and add 'Yanchep, p. 207') but there are no major discussions.

Karst Hydrogeology and Geomorphology. *Ford, D. & Williams, P., 2007: Wiley, UK, 562 pp., Paperback. ISBN 978-0-470-84997-2***.** Cost: $US140.00 HB, or $US55.00 PB (+ post) from Speleobooks <www.speleobooks.com> **Reviewed by Ken Grimes.**

This is a 'heavy' book – aimed at academics and people with a solid scientific or engineering background. It is a long awaited, complete rewrite, of their 1989 textbook. They have covered in depth all details of karst and karst caves and there is also some discussion of pseudokarst and non-limestone karst scattered through the text; but biological discussion is limited to its influence on speleogenesis & chemical deposits. The emphasis is on science, but there is also a lot of technical and practical detail on applied topics such as chemical tests, aquifer tests, bore-hole analysis, hydrographs and water tracing. The two final chapters deal with karst management.



The chapters cover: Introduction (terminology & classifications); The karst rocks (limestone, evaporites, silicates, and their structural features); Dissolution (chemistry, geochemistry, biochemistry – all very heavy!); Distribution and rate of karst denudation (and solution); Karst hydrogeology (both pure hydrology and the development of karst drainage systems – parts of this overlap with the later speleogenesis chapter); Analysis of Karst drainage systems (a lot of practical information here); Speleogenesis (all aspects of cave development and shape, including breakdown and non-limestone caves); Cave interior deposits (clastic sediments, speleothems and ice; and the dating of deposits); Karst landform development in humid regions (this is mainly about surface karst features in the "normal" humid situation); The influence of climate etc (this continues from the previous chapter but looks at karst in the special climates – arid & cold; changing climates and changing sea levels etc, including several Australian examples); Karst water resource management (a practical chapter, with good examples and not too technical); and, finally, Human impacts & environmental rehabilitation (more management, but mainly of aspects other than water; ACKMA gets a mention on p.500).

All this is very detailed, and generally well done. However, I got off to a bad start in the first page where I disagreed with their basic definition of karst which refers to "... well developed secondary (fracture) porosity", but not to conduits! Everywhere else in the book they refer (correctly) to the three porosity types (matrix, fracture & conduit) so this must have been a temporary lapse, but it is unfortunate that it happened in the definition which is likely to be quoted by all and sundry for the next 10 years!

I then discovered that there are major problems with the index. Indexes are a pain to compile and seldom perfect, but this one definitely needs redoing. Many terms are not where you would expect them in the main list, but embedded as sub-terms under general terms such as 'caves' and 'karst' (eg for 'pseudokarst' see "karst, pseudo"). Additional confusion is found under 'caves' where the full column of sub-entries has accidentally been spilt into two alphabetic lists – the first runs from 'bathyphreatic' to 'water table cave' and the second from 'branchwork' to 'syngenetic'.

Other bugs are that the sub-entries found under 'Bypass passage' should be under 'Calcite crystals' and the sublist under that term should be moved to 'Calcite speleothems'! Even worse, many of the cited page numbers are wrong.

The index appears to have been compiled before the page layout was finalised and several sections have moved. If you do not find your term at the stated page try flipping back one or two pages and it will probably show up.

Australian examples get frequent mention and some form the basis of major discussions (e.g. the West Kimberley and the Nullarbor – see under 'Australia' in the index). The Nullarbor discussion has missed two recent papers that introduce major new ideas (James et al, 2005 and Webb & James, 2006).

CONCLUSION by Ken Grimes – comparing Palmer and Ford & Williams

> '*Karst specialists need to make their voices heard more clearly. But they should also be aware that environmental decisions are based more on politics, economics, and law than on science, and that environmental goals are best achieved by enlisting advocates from these fields rather than by opposing them'*. Palmer, p. 399.
>
> '*Sustainable management of rural* [karst] *systems depends more on the management of human behaviour than on the management of the physical environment. ... the more severe the population pressure, the more survival rather than sustainability becomes the focus of daily life'*. Ford & Williams, p. 499.

So which should you buy?

I would suggest Palmer's book for cavers and cave managers who want an overview of how caves form and work, without the need to struggle with excessive details and complexities – it is also cheaper! Member clubs of the ASF should all be buying copies for their libraries. However, for karst managers (as against just cave management) the two management chapters (64 pages) in Ford & Williams are more detailed than Palmer's 18 page treatment, and are not too technical.

Specialist cave and karst scientists and engineers will prefer the greater detail and breadth in Ford & Williams, but will get good value from both books. For a study of speleogenesis and cave patterns I suggest using both books to cancel the bias shown by the authors to different models:

F&W emphasise the 'four state' model (now expanded to six!) based on joint-density, whereas Palmer emphasises the high discharge/length ratio model – read both to attain the true Middle Road of Buddhist doctrine!

Palmer has a complete chapter on lava caves, which are ignored by F&W; but surface karst features get much better coverage in F&W. Neither book says much about cave biology – apart from its role in speleogenesis and management.

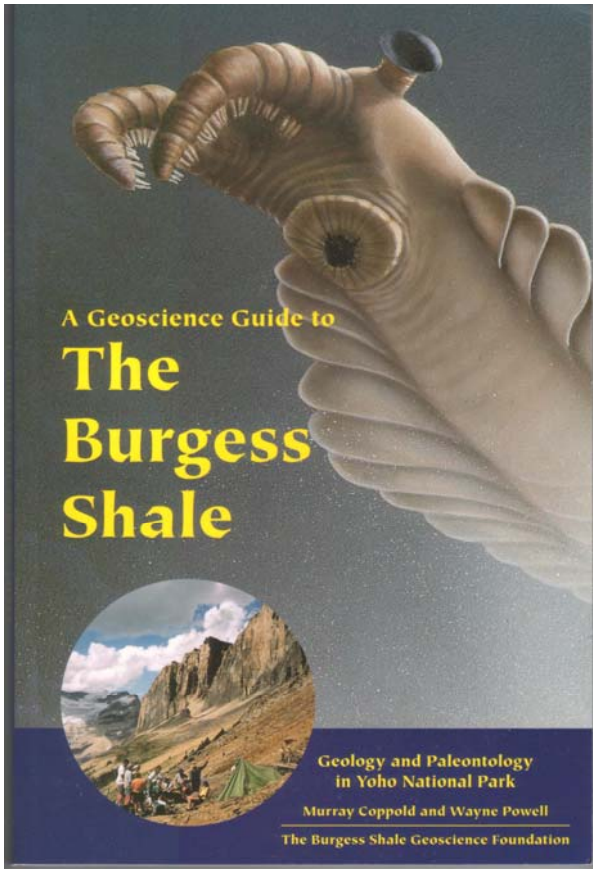
References:

James, JM., Contos, AK., & Barnes, CM., 2005: Nullarbor Caves, Australia. in Culver, DC. & White, WB., [eds] *Encyclopedia of Caves*. Elsevier, Amsterdam, pp. 418-426.

Webb, JA. & James, JM., 2006: Karst evolution on the Nullarbor Plain, Australia, in Harman, RS. & Wicks, C [eds] Perspectives on karst geomorphology, hydrology and geochemistry. *Geological Society of America, Special Paper* **404:** 65-78

A Geoscience Guide to The Burgess Shale – Geology & Palaeontology of the Yoho National Park (Canada). M. Coppold & W. Powell. The Burgess Shale Geoscience Foundation, 2006. ISBN: 0-9780132-0-4. $Can15.95 (+ post). For orders: <www.burgess-shale.bc.ca>. **Reviewed by Steve Bourne.**

A Guide to Sterkfontein: the Cradle of Humankind – Prof Lee Berger & Brett Hilton-Barber. Struik Publishers, Cape Town, 2002. ISBN: 978-1-77007-065-3. 210 Rand (circa $Aus 35.00) + post. See: <www.struik.co.za> **Reviewed by Steve Bourne.**



Upon his return from his overseas jaunt Kent very kindly provided me with copies of the two books mentioned above. Of course this came with a catch – both were to be reviewed for the journal.

The books relate to World Heritage Fossil Sites, Sterkfontein in South Africa and the Burgess Shale in Canada. They are two of just eleven World Heritage sites listed primarily for their fossil values, with Naracoorte Caves being one of the eleven.

Before examining the books it is worth recounting the meeting of World Heritage Fossil Site managers that took place in Australia in 2000. There a small publication on Miguasha Park, A World Heritage Fossil Site in Canada was shared with delegates. It was agreed then that a series of small publications of a similar look should be produced. Unfortunately different agendas from different agencies has not allowed this to happen, however these two books are similar to the original Miguasha Park book in many ways.

Both books are designed for the general interest reader, with some in depth science throughout. The Burgess Shale guide places all the hard science in the front half of the book, to set the context for the information on the fossils themselves, which would be why most visitors to the site would purchase it. For someone who is seeking to understand the fossil record at the Burgess Shale, this would be a good thing.

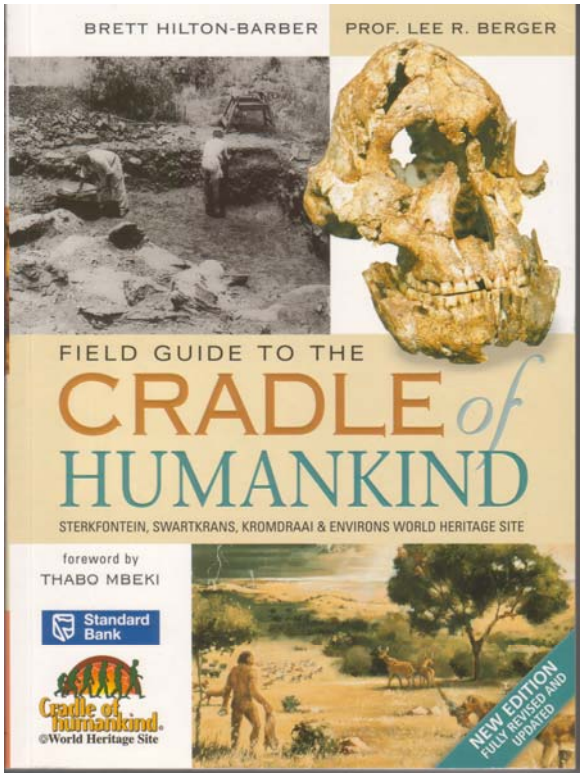
Unfortunately it becomes a little too text book like and could easily lose many readers before they get to the second half which focuses on the fossils themselves and descriptions of the trilobites and other fauna.

The information is interesting and easily accessible, but may be more appealing for many readers with the text book information either at the back of the guide in dispersed throughout. It has a wonderful blend of historical information with the more recent research including excellent historical images.

The bibliography is extensive and very useful, divided into technical literature by field and general references. It is a useful guide to the Burgess Shale with enough information for most students and other readers.

The Sterkfontein Guide covers the Cradle of Humankind, the name given to the Sterkfontein, Swartkrans, Kromdrai and Environs World Heritage Site. I found this a fascinating read examining the origins of humans as revealed through the fossil record. The treatment is up to date and explores issues of 'lumpers versus splitters' in taxonomic work and current debates.

Pleasingly, *Homo floresiensis* the so-called Hobbit found on the island of Flores in Indonesia is included. Some excellent graphics and photographic images of hominin fossils are included with brief descriptions of each species.



The guide falls away a little when it deals with the balance of fauna discovered at the sites. No images of fossils, just sketches of extinct mammals of fairly average quality. Images of fossils would have been more instructive and appealing for me.

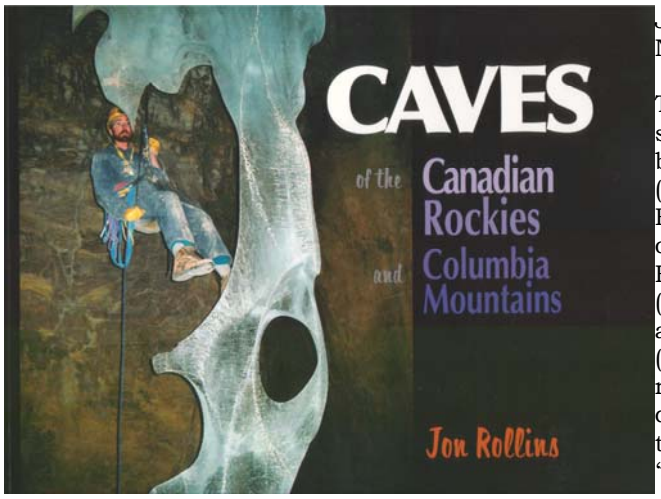
The bibliography is short with some of the references very old. I spent some time with Dr Francis Thackeray of the Transvaal Museum earlier this year who has published widely on the World Heritage Site yet none of his work is listed.

A student or serious reader of hominin evolution would be frustrated by this omission. Like the Burgess Shales guide, it is a good read that satisfies the reader and provides an excellent momento of their visit. I want to visit both sites!!

Postscript

The Naracoorte Caves equivalent to these guides has been sitting, in various iterations, on my computer for several years. If nothing else, these guides have reminded me to keep at it (and some researchers!) and get the Naracoorte book finished!!

Caves of the Canadian Rockies And Columbia Mountains. Jon Rollins. Rocky Mountain Books, Calgary, 2004. 336 pages. ISBN: 0-921102-94-1. $Can 34.95 (+ postage). Orders: <http://rmbooks.com> **Reviewed by Kent Henderson**.



I picked up this book on my recent trip to Canada, and it is quite interesting – inasmuch as I tend to find almost any book of caves interesting! That said it is basically a caver's guide to the caves of the Canadian Rockies – something like the equivalent of the Australian Karst Index.

Most of the book is cave descriptions and maps, which are very detailed. In each case Assess, Location, and Exploration & Description is provided, along with many maps and photographs. Indeed, armed with this book one could quite readily find the entrance to any of the two hundred plus caves it describes. I do not think ASF would approve, let alone Australian or New Zealand cave management authorities…

The initial chapters of the book cover the following – A Brief History of Cave Discovery; Where the Cave Are; Getting Around; The Caving Season (hardly 'all year round', as here…); Equipment; Jurisdictions and Permits, Cave Descriptions; Natural History, and Cave Management.

The latter occupies one page of the book, is strictly caver-orientated, and is far from breathtaking in scope. It deals with Group Size ('Larger groups tend to create greater impacts'); Route Marking ('Do not leave spray paint arrows on walls…'); Camping Underground ('Don't do it'); Human Waste ('Carry it out with you'); Garbage (ditto); Respect Cave Formations ('Avoid touching and walking on cave formations'); Cave Fauna ('Bat roosts should not be disturbed in the winter months of October to April'); and Bones ('Avoid disturbing them'). All these things are self-evident truths, but of course the book is not written for 'us'.

The section on the History of Cave Exploration is interesting, which commenced in the 1900s and became organised and active commencing in the 1950s and 1960s – pretty much like in Australia. It is noted that substantial sections of the Canadians Rockies (much of which is karst) are largely unexplored.

Finally, the book has an extensive list of references and appendices which include 'Sources and Resources' and the obligatory 'Glossary of Caving Terms'. If you are interested, Canadian Caving Organisations are extensively listed at <www.cancaver.ca>, at which you can also access the twice yearly publication, *The Canadian Caver*.

Overall, the book is well produced (with a colour cover) and a reasonably interesting read. Certainly, if you wish to cave in Canada, it would be your 'Bible', and form a useful addition to your library.