

## REVIEWS

HILL, C. A. & FORTI, P. *Cave minerals of the world*. With a historical introduction by T. R. Shaw. Huntsville, Alabama, U.S.A. National Speleological Society. 1986. x + 238 p. ISBN 0 9615093 0 9. Price \$29.95 (hardback), \$24.95 (paperback).

(reviewed by D. T. Donovan)

This book is 'about secondary minerals formed in caves' (p. ix), and such minerals are defined as 'formed in a cave because of a unique set of conditions therein; i.e., the cave environment has influenced the mineral's deposition.' 'Minerals located in vugs, veins . . . do not qualify as "cave" deposits . . .'. The last phrase surely means that hydrothermal deposits are excluded. These definitions are important as we shall see later.

The commonest cave minerals are, of course, the carbonates of calcium and these are dealt with in the first mineralogical chapter of the book. The authors briefly describe the mechanisms of carbonate solution and deposition. They then give a list of carbonate minerals said to occur in caves, their composition, crystal system and properties. (But this list does not include all carbonate minerals described in the book: see below). The different types of carbonate speleothems are then described, 25 of these being distinguished including a number of rare forms. Related topics including the calcite/aragonite problem, colour, and rates of growth are in a separate chapter at the end of the book.

The sulphates are perhaps the next commonest cave minerals, several (e.g. gypsum, epsomite) being much more soluble than calcite. The stability of sulphate minerals is discussed, and then the various forms of speleothem which have been recorded. Sulphates form stalactites and stalagmites like the carbonates, as well as gypsum flowers and other crystal-dominated forms. This chapter, however, illustrates an inconsistency in the arrangement of the book. Most of the sulphates listed can clearly occur as cave minerals, as defined. The list also includes celestite (strontium sulphate) on the grounds that it 'occurs in caves as wall crusts' without detailed evidence being given. However, the closely similar mineral barite (barium sulphate) is to be found in another chapter in a section on 'ore-associated minerals' apparently on the grounds that it has been transported to the cave by groundwater from a nearby orebody (p. 134).

The chapters on nitrates and phosphates remind us that there are groups of minerals which form as a result of the presence of organic matter, mainly bat guano, in caves. A number of new phosphate minerals of this kind have recently been described. They are not very likely to be spotted by the ordinary caver since their identification depends on sophisticated laboratory techniques.

So far the book describes minerals and speleothems which fall within the authors' definition of 'cave minerals', quoted above. However, other minerals are included which do not qualify. To mention British examples, blue john and 'stalactitic' barytes (Ford, 1955, and Ford & Sarjeant, 1964 respectively; the book cites the latter paper but not the former) are not cave minerals by any interpretation. Both occur in veins formed by normal mineralization processes, explicitly excluded by the authors in their introduction. If they are found in caves it is because the caves have intersected veins or vugs. The section headed 'Ore-associated minerals' already mentioned includes a number whose occurrence as true cave minerals must be very doubtful. Many minerals have a stalactitic or stalagmitic habit because they were deposited

on the walls of cavities, but they are of hydrothermal origin (hot mineralizing solutions). The well-known 'stalactitic' rhodochrosite, also included in the book, is a familiar example in mineral collections. There may be a grey area, for the authors write (p. 83) that 'The presence of hematite is usually an indicator of past hydrothermal conditions in a cave. Such an origin explains . . . hematite in Tyuya-Muyun Cave . . .', but once such an origin is admitted, there seems to be no dividing line between such caves and hydrothermal veins, which may often have been deposited in pre-existing cavities.

The authors seem, therefore, to have changed the rules as they went along. They might have done better either to have restricted themselves to cave minerals as closely defined, with a list of doubtful cases, or to have adopted a broader definition which would have allowed them legitimately to include the wide range of minerals covered by the book.

This somewhat detailed criticism need not deter speleologists from getting the book. It is well indexed, so that individual minerals are easily found despite the idiosyncrasies of arrangement, and excellently produced and illustrated, with a section of colour pictures. The mineral names are generally correct. It should be very useful for anyone wishing to study the occurrence and origin of carbonate and sulphate speleothems and follow up the specialized literature. There are occasional hiccups: for example, the captions to figures 70 and 71 are transposed. The very long list of references will form a starting point for anyone wishing to pursue the subject. Again there are a few inaccuracies, and our own friends the M.N.R.C. appear as the 'Mendip Nat. Resources Comm.' (p. 207).

The seventeen-page historical 'introduction' by T. R. Shaw is, in fact, not a history of the study of cave minerals, but an account of the history of ideas on the formation of speleothems. These were regarded by several early scholars as bearing on the nature and formation of matter itself, and hence have greater importance in the history of science than might be supposed.

### References

- FORD, T. D. 1955. Blue john fluorspar. *Proc. Yorkshire Geol. Soc.* **30** (1), 35-60.
- FORD, T. D. SARJEANT, W. A. S. 1964. The "stalactitic" barytes of Derbyshire. *Proc. Yorkshire Geol. Soc.* **34** (4), 371-386.

MATTHEWS, P. G. (editor): *Australian karst index 1985*. Melbourne, Australian Speleological Federation Inc. [1986]. 492 pp., paperback, A4. Obtainable from Australian Speleological Federation Inc., P.O. Box 388, Broadway, NSW 2007, Australia, or from Peter G. Matthews, 66 Frogmore Crescent, Park Orchards, Victoria 3114, Australia. Price 35 Australian dollars: plus package and posting 8 dollars surface mail, 17 dollars surface airlift, 30 dollars airmail; Mastercard, Visa accepted; for cheques add 2 dollars.

(reviewed by J. Wilcock)

This weighty volume is the product of 15 years work by the Australian Speleological Federation, and in particular by Peter Matthews, present Chairman of the UIS Commission on Informatics, and Convenor of the ASF Documentation Commission. It is important not only as a record of Australian caves, but as a basis for discussion of the value of computer techniques in speleological documentation. The 1985 *Karst Index* is an update