

## BOOK REVIEWS

Worner, H. K., Mitchell, R. W., and Segnit, E. R., eds. *Minerals of Broken Hill*. Melbourne (Australian Mining and Smelting Ltd.), 1982, 260 pp., 13 figs., 211 pls. (170 in colour). Price £29.30.

The use of colour in journals and books has become commonplace, but the *Minerals of Broken Hill* has broken new ground in this field. Printed on high-quality paper, here is a book which would grace any bookshelf, be its owner a professional mineralogist or anyone who has an eye for the aesthetic—a book which would be an asset in a drawing-room or in a teaching laboratory.

Celebrating the centenary of the discovery of the Broken Hill lode and dedicated to the memory of Sir Maurice Mawby, Broken Hill's best-known mining engineer and amateur mineralogist, the book follows logically through an account of the history of discovery of the Broken Hill lode, the history of mining; a review of the genetic concepts of the minerals; the geology; minerals of the primary ore; minerals of the secondary ore; minerals of the Consols Mine in particular; a profusely illustrated list of the minerals found; discredited and doubtful species; and a summary of the mineral data. There is a comprehensive and up-to-date bibliography of 450 references, biography of the editors and contributors, glossary, and an index.

The history of the discovery of the Broken Hill orebody, its subsequent development, and the role it played in the economy of Australia is concisely set out in Chapter 1 by G. Blainey.

The men behind the research and development of the Broken Hill lode are brought to life in Chapter 2 by R. O. Chalmers in a set of short but highly entertaining biographies.

Should a mineralogist have the good fortune to visit the Broken Hill area, the section by R. O. Chalmers and H. K. Worner describing the collectors and collections of Broken Hill material is particularly valuable, especially in the location of high-quality material in private hands.

Broken Hill minerals are noted for their large size and beauty of crystallization, due to the combination of unusual rock chemistry and the geological history of the area. This complex story, described by H. F. King, in Chapter 3, explains the physico-chemical genetic events which produced the unique mineral assemblage in such a way that it may be readily digested by the non-geologist. The figures are particularly valuable.

Chapter 4 by N. L. Markham and B. P. Stevens describing the geology of the orebody and host

rocks (rich in high-quality diagrams which complement the text) leads the reader through the geological complexity to arrive at the general consensus of opinion that the orebody is the product of the metamorphism of a stratiform body produced by sedimentary exhalative processes.

The three chapters by I. R. Plimer are examples of high-quality text-book description. The first (5), 'Minerals of the Primary Ore', describes the highly complex nature of the hypogene mineralogy in a readily understandable manner. The second (6), 'Minerals of the Secondary Zone', describes the supergene mineralogy in an equally understandable manner in spite of the formidable mineral chemistry involved. The third (7), 'Minerals of the Consols Mine and Mine Sequence', is particularly valuable as it describes and explains the exceptionally high silver contents found there.

The principal feature of this impressive book is Chapter 8, 'The Minerals', by W. D. Birch, A. Chapman, and S. R. Pecover, and must be rated as a classical account of the mineralogical description of an orebody; 300 mineral names appear in this chapter of which 180 species are confirmed or considered to occur at Broken Hill. The description of each species is accompanied by accurate data, in some cases by phase diagrams and accurate crystal drawings related to habit abundances.

The photography of this chapter cannot be faulted. The colour plates do ample justice to the fine material photographed, and some must be rated as classics. The accuracy of colour and the highly competent way depth-of-field problems have been overcome points to a high degree of professional ability by the photographers. For this feature alone the book would grace any drawing-room.

As soon as one has come to grips with the system of abbreviation used in Chapter 9 by W. D. Birch, who provided a summary of the mineral data, Table 9.1 is a valuable data file for the research worker. A simple system enables the reader to correlate physical and field data with relevant and abundant references.

The bibliography of 450 references has been carefully collated and forms a firm foundation for the book. This section alone would be worth publishing as a separate item.

A pleasing feature of the book is the pictorial section dealing with the biographies of the editors and contributors.

It would seem impertinent to find fault with this book. The proof-reading has been excellent and

there are no obvious typographical faults. Perhaps plate 95 on p. 144 was printed upside down.

I would take the authors to task about their disregard for the findings of the International Commission for Mineralogical Nomenclature, where terms and names, presumably in general use in the Broken Hill area, have been used in the text rather than those recommended by the Commission, such as: 'Barite'—Baryte (p. 87), 'Pyrrhotite'—Pyrrhotine (p. 160), etc. The same criticism may be directed at terms used in the glossary which may be of local usage, such as 'Azoic'.

It was sad to see the discarding of such names as campylite in Table 9.2, though the reasons for doing so are explained in the text of Chapter 8, and of chalcotrichite in Table 9.3, though the latter name is used in the text (p. 112). Nantokite is misspelled throughout and bindheimite is wrongly described as a hydrous lead sulphate on p. 87.

These few criticisms may be pedantic and they take nothing away from this magnificent piece of work. After reading it one is left with the impression that the authors have described the cream of what is known about Broken Hill and have made it abundantly clear that there is still much to do.

This is a fine piece of work which must surely set a standard for subsequent work. The editors and contributors are to be congratulated. I have no reservations about recommending this fine book to geologists and mineralogists at all levels. It is a bargain at £29.30.

R. J. KING

Kempe, D. R. C., and Harvey, A. P., eds. *The Petrology of Archaeological Artefacts*. Oxford (Oxford University Press), 1983. xvi + 374 pp., 49 figs., 66 pls. Price £30.

The stated aim of this book is to 'provide a comprehensive review of the current state of knowledge of the petrology of archaeological artefacts'. Of its eleven chapters, eight are based on artefact or rock type and include building and sculptural stones, vitrified forts, axes and tools (grouped according to whether they made of obsidian, jade, or 'stone'), grinding stones, ceramics, and native metals and minerals. These articles benefit from the expertise of the authors, many of whom are, or have been, very active in the fields which they review. The coverage of the literature is extremely thorough, and most of the topics are set authoritatively in a theoretical framework and in the context of the history of research. Given the nationality and interests of most of the authors, the coverage is less biased towards UK and Old World archaeology than might have been expected and

a commendable and generally successful attempt has been made to provide a world-wide review which rarely degenerates into a list of places and papers.

The emphasis here is on the identification of the rock type used to produce an artefact and the location of its source or provenance. To this end, one or more of a range of techniques, including thin-section petrography, elemental analysis, and stable isotope analysis is used to 'fingerprint' the object and relate it to a source quarry or outcrop which has been characterized using the same technique. The power of trace-element analysis in provenance studies is well illustrated in the case of obsidians, reviewed by J. R. Cann, and it is finding increasing application in the examination of petrographically uniform materials such as jade and flint. However, the wide variation in the trace-element composition of marbles on a local scale has led to the application of oxygen and carbon isotopes to provenance classical statuary, while optical methods alone have proved successful for the majority of rock types.

In the production of a volume such as this, where the potential readership is drawn from more than one field, there is an inevitable problem as to the amount of background information to provide for the non-specialist and its presentation. The editors have decided to grasp the nettle and present two chapters, one on analytical methods and the other on 'raw materials' (essentially rock nomenclature and classification). Disappointingly, I found neither chapter completely successful. The techniques chapter will be compared unfavourably with the several textbooks on the subject aimed specifically at the archaeologist, while the usefulness of the twenty pages of thin-section photomicrographs is severely limited by the absence of labels and of accompanying explanation.

However, this should not be allowed to detract from the success of the book in its stated intent. A vast amount of material is assembled between its covers, and it will become an essential entrée to the field for any earth scientist who is confronted with a problematic artefact by an expectant archaeologist. It should make interesting reading for anyone with a well-informed interest in rocks and minerals. Here is outlined both the ingenuity of pre-industrial man in his selection and utilization of this fundamental raw material, as well as the ingenuity of his descendants in the investigation of this behaviour. I would expect to see it on the bookshelves of many mineralogists were it not for the price, which while not extreme for a book of this length by today's standards, may act as a deterrent.

IAN C. FREESTONE