

chapter. An extensive bibliography (about 300 references) and index complete the text.

Tony Naldrett is the leading world authority on magmatic sulfide deposits. This book reflects that fact in being a well-balanced appraisal of our current understanding of these ores. In drawing upon a wealth of experience in all aspects of the study of magmatic sulfides, the author is also able to offer unique insights and thus create a work that goes well beyond being a mere review. It is also a very well written, illustrated and produced book that sets the standard for works dealing with major classes of ore deposit. It is highly recommended as an essential purchase for Earth Science libraries, and scientists with a professional interest in the magmatic sulfides.

D. J. VAUGHAN

De Brodtkorb, M.K. (editor). *Nonmetalliferous Stratabound Ore Fields*. New York (Van Nostrand Reinhold), 1989. xvi + 332 pp. Price £44.50.

One of the 'Evolution of Ore Fields Series', this book provides a structured series of fourteen chapters contributed by an international group of authors on the subject specifically of stratabound deposits of celestine, baryte, magnesite and fluorite. It combines descriptive accounts of the different ore fields with synthesis of the geological environments and processes of mineralization involved. Within the confines of a single volume, the breadth of subject matter has led to compromises resulting in a book that is neither a truly rounded textbook nor a rigorous set of technical descriptions. Nevertheless, the choice of subject is novel and has the virtue of bringing together diverse aspects of geology which blur the distinctions between hydrothermal, sedimentary and diagenetic processes of mineralization. Similarly, it can be said to bridge the conceptual gap between the metalliferous mineral deposits and those of the so-called 'industrial minerals'. A book which cuts across divisions in the earth sciences is to be welcomed.

The foreword, by the series editor the late Dr Wilfred Walker, seeks to set an underlying theme of relating mineral deposition to crustal evolution. The two short opening chapters which follow deal respectively with the use of Sr isotopes as natural tracers and with aspects of Ba geochemistry. That on isotopes is regrettably brief, and could usefully have incorporated sections on the application of S and O isotopes to genetic interpretations. The second says surprisingly little about the crucial question of baryte solubility, while devoting much

of its brief span to strontium concentrations and isotope ratios in baryte.

After the opening section, the book settles into descriptions of ore fields grouped by mineral commodity and then geography. An excellent chapter looks at celestine ore fields in several parts of the world, including the Bristol area of the UK, and discusses their relationship to evaporite deposition and diagenesis of carbonates. Then come eight chapters dealing chiefly with baryte deposits in different countries and of contrasting genetic types. Taken as a group, these are of considerable interest for the manner in which contrasting evaporitic, karstic, diagenetic, exhalative and epigenetic ore types are considered. The first two describe sedimentary and hydrothermal baryte (and celestine) from Precambrian to Jurassic age in Argentina and Brazil. They are well set out and of obvious interest to an English-speaking readership. Next comes a description of the widespread North American baryte ore fields, though excluding those in Arkansas. Here the great range in genetic type and tectonic environment of baryte deposition is again apparent. The following chapter deals specifically with Arkansas, and gives a detailed description of syngenetic baryte deposits in relation to sedimentary processes. Two chapters on European ore fields follow a similar pattern to those on North America in that one takes a broad geographical view, while the second is specifically about Sardinian ore fields. Both emphasize contrasting exhalative, unconformity-hosted and karstic ores. That on Sardinia also describes recent alluvial and placers deposits, and like that on Arkansas is able to give considerable detail on what is in effect a single broadly defined ore field. The next chapter looks at baryte in the Japanese Kuroko-type ore fields, thus turning to the high-temperature, volcanogenic, polymetallic style of baryte ores. The last chapter of this group returns to Argentina and Spain to discuss sedimentary-diagenetic baryte nodules and concretions, and aspects of their trace element geochemistry.

The final three chapters comprise one on magnesite ore fields, one on fluorite, and a brief summary which also adds details on areas neglected in the preceding body of the text. That on magnesite returns to the theme of contrasting origins, here between ores in ultramafic, evaporitic and lacustrine settings. The chapter on fluorite also emphasizes sedimentary and palaeogeographic factors in deposits varying from Cainozoic in Italy to Precambrian in the Transvaal.

Clearly, the book covers a great deal of ground. Besides filling a gap in the geological literature, it successfully brings out the great variety of pro-

cesses which can create these mineral deposits. If I have a gripe, it is that it suffers from a slight lack of clarity. The chapters do not possess separate summaries, and I repeatedly became confused both by the amount of descriptive detail and the manner in which genetic sections are mixed in. For instance, I found the section on Cainozoic syndimentary lacustrine fluorite extremely interesting, but came away without a clear insight into the chemistry of its formation.

Despite its shortcomings, this book will be of value to those interested in gaining a broad understanding of mineral deposits, and should find a home on the library shelves. It contains a body of useful information which would otherwise remain scattered. However, an uneven, often weighty style and the tendency to mix description with genetic interpretation will hinder its adoption as a general text. The book is illustrated by numerous maps, cross-sections and photographs. There are few obvious typographic errors, although the lists of references contain mis-spellings of some author's names (including my own).

N. J. FORTEY

Earney, F. C. F. *Marine Mineral Resources*. London and New York (Routledge, Chapman and Hall Ltd.), 1990. xxiv + 387 pp., 94 figs. Price £65.00.

In many ways Fillmore Earney's new book is a sequel to his *Petroleum and Hard Minerals from the Sea* published in 1980. By comparing them one is able to see charted the developments in knowledge and technology of the last decade. Much more of the recent work is dedicated to the implications of the emergence of the Law of the Sea (UNCLOS III) Convention of 1982. In addition to detailed descriptions of the known resources and current technologies for their recovery, the author dwells on the new regime, particularly the emergence of the Exclusive Economic Zone concept which gives coastal and island states powers to regulate the economic activity within a zone reaching 200 nautical miles seawards from set base lines and thus take resources from the waters, from the sea bed and from beneath the sea bed. He further discusses the role of the International Sea-bed Authority which will regulate sea-bed mining beyond the limits of EEZs. Very properly he reveals the impact of the recovery of mineral resources from the sea on the economies of those states, often developing countries, but also including Canada, which are currently the leading producers of metallic minerals.

The coverage is global, detailed and backed by

up-to-date statistics of reserves and production rates. Particular attention is paid to cases where the ownership of marine mineral resources have been and still are matters of dispute.

At £65 the work is expensive but such is the scholarship and with more than 600 references it should be required reading for all geologists, technologists and indeed administrators concerned with the sea.

A. J. SMITH

Hodgson, A. A. (editor). *Alternatives to Asbestos—the Pros and Cons*. John Wiley & Sons (on behalf of the Society of Chemical Industry), 1989. xiv + 195 pp. Price £43.50.

The need for a book on alternatives to asbestos arises from the growing awareness of the serious health hazards involved with inhalation of its fine particles and more specifically from the recommendations of the report of the U.K. Health and Safety Commission's Advisory Committee on Asbestos (1979). Key recommendations from the report involve substitution by other materials as far as practical, weighing advantages and disadvantages of asbestos and potential substitutes including their potential health risks, performance of the finished product, and the costs associated with changing from asbestos to a substitute.

The present survey is in three contributed chapters: 1. The alternative raw material (60 pp) by the editor A. A. Hodgson. 2. The feasibility of substitutes (88 pp) by A. Pye, and 3. The health aspects (28 pp) by P. E. Elmes.

Chapter 1 encompasses glass fibres, mineral wools, synthetic and natural organic fibres, some specific minerals (mica, vermiculite and other clays, talc, pyrophyllite and wollastonite), expanded rhyolite glass (perlite), diatomite, and carbon, refractory and metallic fibres. Consideration is given to chemical and physical properties, manufacturing methods, uses, costs and availabilities. Asbestos itself is not treated in detail but the reader is directed towards other publications.

Chapter 2 deals with substitution in the six major product groups: fibre-reinforced cements, building materials and insulation, friction products, heat-resisting textiles, reinforced plastics and packings and jointings. No single material is a universally suitable substitute. Almost by definition, anything that completely reproduces the desirable properties would also present the undesirable hazards. However, among the most viable alternatives are: cellulose fibre reinforced cement, vermiculite insulation sprays and coatings, insulation with man-made 'mineral' fibre