

BOOK REVIEWS

Jones, A.P., Wall, F. and Williams, C.T. Eds. *Rare Earth Minerals. Chemistry, Origin and Ore Deposits*. London (Chapman & Hall), 1996. xvi + 372 pp (with 12 pictures in colour). Price £29.99 (paperback). ISBN 0-412-61030-2.

This book is number seven in the Mineralogical Society Series. It brings together selected papers and some additional contributions based on a successful conference held at the Natural History Museum (London) in April 1993. It contains 13 chapters and an appendix, each with separate reference lists, plus index.

The initial chapter (P. Henderson) provides a brief review of the *REE*. Chapter 2 (R. Miyawaki and I. Nakai) discusses the crystal chemical aspects of *RE* minerals and summarizes their structure types. This is followed by a review and classification (R.H. Mitchell) of perovskite minerals, which are important *RE* hosts in alkaline rocks. The next chapter (P.J. Wyllie, A.P. Jones and J. Deng) explains the concentration of *REE* in the Mountain Pass carbonatite on the basis of experimental work, much of which is yet to be published in detail. Chapter 5 (R. Gieré) explores the formation of *RE* minerals in hydrothermal systems, using carbonate-hosted veins from northern Italy as a case study. A review of *RE* minerals from the classic syenite pegmatites at Langesundsfjord, Norway, is presented next (A.O. Larsen). Chapter 7 (R.P. Taylor and P.J. Pollard) treats the *REE* mineralization at Thor Lake, Canada, and Chapter 8 (F. Wall and A.N. Mariano) presents data on *RE* minerals in the Kangankunde carbonatite, Malawi. The next two chapters are somewhat related, discussing *RE* mineral distribution in laterites formed on alkaline complexes in Brazil (G. Morteani and C. Preinfalk) and authigenic *RE* minerals associated with karst and bauxite development (Z.J. Maksimović and Gy. Pantó). Chapter 11 (C. Wu, Z. Yuan and G. Bai) gives an overview of the *RE* deposits of China, which probably has the most important economic *RE* deposits in the world. This is followed by a chapter (A.P. Belolipetskii and A.V. Voloshin) on the classic Kola peninsula. These two contributions contain much new information in English for the first time. The final chapter (C.T. Williams) is a very useful review of analytical

methods for *REE*, with special emphasis on EPMA. A glossary of *RE* minerals, arranged alphabetically according to their anions, concludes the book.

Obviously, this book presents a wide range of information and topics. The editors state in their preface that they have tried to include a tutorial component by adding a mixture of contributions, some of a review nature, to illustrate the variety of current work on *RE* minerals. To this end they have certainly succeeded well. The special feature of this book, in contrast to e.g. the sort of competitor volume *Geochemistry and Mineralogy of Rare Earth Elements* (Reviews in Mineralogy, Vol. 21, 1989, by MSA), is the emphasis that is placed on the *RE* ore deposits, their mineralogy and origin.

The book is well written and produced and contains a large number of figures and tables. Typographical errors are few (but what about La_2O and LaCHCO_3 on Fig. 4.1?). I have only a few adverse remarks, above all that I would have preferred an extended treatment of the Kola *REE* mineralizations. The chapter on perovskites contains recommendations of mineralogical nomenclature that have not been endorsed by the IMA Commission on New Minerals and Mineral Names. The construction of mineral names like 'Yb-xenotime-(Y)' is a nuisance. I miss the mineral kamphaugite-(Y) in the glossary (not because I described it in 1993, but it is actually mentioned in the Kola paper). Again, the recent revision of the formula of tengerite has not been taken into account.

I can strongly recommend this book to anyone interested in *RE* minerals in general and their deposits in particular; in fact, it can be regarded as essential reading. It is good value for money.

G. RAADE

Robinson, G.W. *Minerals: an Illustrated Exploration of the Dynamic World of Minerals and their Properties*. London (Weidenfeld and Nicholson), 1994. 208 pp, 140 colour photographs. Price £19.99. ISBN 297-83329-4.

This beautifully illustrated book presents many of the most photogenic minerals in the Canadian Museum of Nature, via more than 140 full-colour photographs and a carefully interwoven text. In the introduction,

the reader is introduced to a geologist's way of thinking, the plate tectonic theory, the nature of minerals and the geological cycle. The tone of the text is authoritative yet simple and 'down to earth': thus if a temperature of 1500°C is needed to synthesize a mineral in the laboratory, then looking for that mineral in rocks that form at lower temperature would make little sense. And again 'minerals are like people, they like to be comfortable in their surroundings; just as we respond to changes in our environment, so do minerals'.

The later sections deal in turn with minerals from molten rocks, minerals and water, chemical alteration, and recrystallization, each section being illustrated by excellent colour photographs, by J.A. Scovil, of choice specimens from the Museum collection. The narrative text continues in the refreshingly lucid style. It is explained briefly why olivine can accept iron partly substituting for magnesium but how other elements such as potassium or beryllium do not fit easily into the olivine structure and therefore remain in the magma to form different minerals later on at lower temperatures. This theme is followed up in the chapter on granitic pegmatites, illustrated with photographs of tourmaline, topaz, euclase, albite and columbite, and a chapter on apatitic pegmatites (did you realise that these were named for Apat, a locality in southern Greenland?). The section on chemical alteration introduces the concept of equilibrium and chemical reactions, including hydration-dehydration, oxidation-reduction, the formation of secondary minerals, and replacement deposits: we are reminded that no mineral is immune to chemical alteration given the right physical and chemical conditions. The changes due to heat and pressure are dealt with comprehensively, and it is good to find chapters on both skarns and rodingites. The final section introduces the concept that more than one geological process may be required to produce such relatively rare occurrences as the emerald deposits of Colombia or the massive volcanogenic sulphide deposits in black smokers.

Throughout the book, in addition to the colour photographs of well-crystallized mineral specimens and the equally illuminating text, there is a sprinkling of a dozen or so coloured figures illustrating the geological processes involved. The size of all the specimens photographed is stated; most are somewhat magnified, but the overall result is to make this a very desirable book, and one which will appeal to professional and amateur mineralogists alike, particularly at the very reasonable price. If one may be allowed a tiny quibble, it is stated several times that the specimens are from the Canadian Museum of Nature – but nowhere is there mention of which town or city contains this treasure-house. R. A. HOWIE

Cairncross, B. and Dixon, R. *Minerals of South Africa*, Johannesburg (Geological Society of South Africa), 1995. xix + 296 pp, numerous coloured maps and photographs. Standard Edition (ISBN 0-620-19324-7) U.S.\$ 115.00; Luxury leather-bound collectors Edition (ISBN 0-620-19325-5) U.S.\$ 300.00 (available from the G.S.S.A., P.O Box 44283, Linden 2104, South Africa).

This volume, which deals exclusively with minerals found in South Africa, combines mineral photographs in colour with descriptions of the minerals, together with their geological settings; historical information and abundant locality maps are also given, as well as a coloured geological map showing the simplified geology of the whole country.

The main section of the book takes a chronostratigraphic approach, from the Archaean (Monarch cinnabar mine, the asbestos deposits of the Barberton greenstone belt, the gold deposits of the Witwatersrand Basin, the Messina copper and Pafuri nickel deposits), on to the Proterozoic, and the Phanerozoic, concluding with the carbonates and phosphates of cave deposits. Most of the individual mines and deposits are shown on clear locality maps, which are just one of the strengths of this work; for many of the mining areas, alphabetical lists of minerals occurring there are presented.

The text is absorbing and both geologically and mineralogically authoritative. A typical section on the Archaean deposits, gives details of the Bon Accord Ni deposit, with a geological sketch-map and a list of rare nickel minerals including bonaccordite, cochromite, liebenbergite, nichromite, nimite, trevorite and willemsite for all of which this is the type locality. The discovery of the Witwatersrand gold deposits is summarized; this basin has already produced over 40 000 tons of gold and in 1972 was producing more than 66% of the world's gold, though this proportion has now declined. In the section on the Proterozoic, detailed descriptions are given of the Kalahari manganese field to the W of Kuruman in the Northern Cape Province, with numerous mines yielding not only kutnahorite, hausmannite, bixbyite, rhodochrosite, manganite, etc., but also the more exotic inesite, sturmanite and vonbezingsite; of around 150 species recorded here, 10 have to date been found only in the Kalahari Mn field. Then we come to the Bushveld complex, which with three large suites of igneous rocks occupying an area of 65 000 km² is the largest layered complex in the world. This has provided type specimens for 14 PGM as well as being rich in chromite; it also has some zeolites. As throughout, there are maps and sections, as well as an old photograph of one of the first excavations of the Merensky Reef, including H.