

its reputation. It is perhaps best known for the magnificently preserved spinifex textures in the komatiites of the Reliance Formation and these are again well illustrated in this volume. The Belt has well developed stratigraphic relationships with the famous outcrop of a greenstone belt succession lying unconformably on top of a 3.5 Ga gneissic basement. Unfortunately, the book went to press before the radical (and unjustifiable, in my view) interpretation of Kuski and Kidd (1992) who believe that previous workers have missed a major thrust which brought oceanic crust onto older basement.

Special Volume 2 is a handsome book of over 200 pages and consists of nine chapters with a subject index and a consolidated bibliography at the end of the volume. Each chapter is lavishly illustrated with numerous tables, diagrams and figures and my main criticism in this regard is that many of the photographs are difficult to interpret and there appears to be a good deal of repetition (particularly pillow basalts).

Chapter one (Bickle, Nisbet, Martin and Orpen) is a short overview of the Zimbabwe craton and this is followed by chapter 2 (Martin, Nisbet, Bickle and Orpen) on the stratigraphy of the Belingwe Belt (with a beautiful map of the area, Fig 2.1) Chapter 3 (Bickle, Orpen, Nisbet and Martin) is a structural chapter, and deals with the important aspect of the structural evolution of the 3.5 Ga gneissic basement and the main elements of the greenstone belt itself.

Chapter 4 (Orpen, Martin, Bickle and Nisbet) deals with the rather poorly known south and south-western part of the greenstone belt. Here the lowermost parts of the greenstone belt are exposed (Hokonui, Bend and Koodoovale Formations) and a wide variety of rock types and environments is covered. These three formations are missing on the eastern side of the belt and are represented by the major unconformity. Chapter 5 (Nisbet, Bickle, Martin and Orpen) covers the sedimentology of the Brooklands Formation and the reader struggles to find exactly where this is to be found (see Fig. 2.1). The references to Lower Ngezi and Reliance and Mangeri, all of which are much higher stratigraphically, lend to the confusion.

Chapter 6 deals with the Ngezi Group (Nisbet, Martin, Bickle and Orpen) and covers the well known basal unconformity and the overlying komatiitic sequences. The chapter gives a comprehensive description (field relations, petrography, sedimentology) of the Group and is one of the longest chapters in the book. The authors of chapter 7, (Chauvel, Dupré and Arndt) discuss Pb, Sm and Nd data on the well preserved Reliance Formation ultramafic lavas. From these data

emerge some Pb isochrons and information about the range of ϵ_{Nd} for the lavas. The authors conclude that the lavas were contaminated by old sialic crust, an indication that the Reliance Formation was not typical oceanic crust. Those readers with a sense of humour are encouraged to read the acknowledgements for the chapter which essentially expresses the length of time in producing a compilation of this type.

Chapter 8 (Bickle, Arndt, Nisbet, Orpen, Martin, Keays and Renner) is a description of the geochemistry of the igneous rocks found within the belt, particularly those from the drill hole which sampled very fresh komatiites. The round-up Chapter 9 (Nisbet, Bickle, Orpen and Martin), is a concise summary of the geology and the tectonic models proposed to explain the evolution of the belt. This book is clearly a labour of love for Bickle and Nisbet. They have been associated with the Belingwe Belt for almost 20 years and are to be congratulated for their perseverance and thoroughness. There are at least another 10 greenstone belts left to be described in Zimbabwe. *On y va!*

R. W. NESBITT

Parthé, E., Ed. *Modern Perspectives in Inorganic Crystal Chemistry*. (N.A.T.O. ASI. vol. C 382). Dordrecht and London (Kluwer Academic Publishers Group), 1992. viii + 282pp. Price DM 180.00 (£62.00). ISBN 0-792-319954-0.

This collection of contributions comes from participants of a NATO advanced study institute held in June 1992. The perspectives of the title represent the views of a selection of chemists, physicists, materials scientists and mineralogists who met with the intention of providing a picture of the current state of inorganic crystal chemistry. The breadth of contributions ensures that there is much here that will be of interest to many mineral chemists. Well produced, the volume provides abundant illustrations of some of the principles, problems and particulars that engage workers in the field of crystal chemistry today.

While this book cannot claim to be a comprehensive text, it does throw up some interesting points and illustrations, often providing seasoning to the subject rather than the bare bones. For example, I'm not sure if the description of calcite as an extremely deformed perovskite structure, in the section on perovskites, sheds light on perovskites or calcite or both, but it's typical of the type of perspective that is on offer here. More generally, the book discusses symmetry relations between crystal structures, cluster chemistry, coordination chemistry and

charge transfer, intermetallic compounds as well as more concepts such as bond valence. Thus, certain general crystal chemical themes emerge. One criticism that might be levelled is that perhaps too much space is devoted to nomenclature and classification, but this is offset by the presence of abundant examples, homely as well as esoteric, drawn upon as illustrations which will be useful to the student and instructor alike.

Perhaps the most helpful feature of this book, which makes it an especially attractive resource for anyone involved in teaching the subject, is the inclusion of problems (and model answers) at the end of each chapter. These serve to emphasize some of the points made in each chapter and will be useful for anyone working through the book themselves. Inevitably, in view of the multi-author nature of the volume, the level of these problem sets is somewhat variable, but this also means that there is something for almost everyone! I imagine, therefore, that most libraries would wish to obtain a copy of this collection of crystal chemical conundrums, but the price (in common with all Kluwer NATO volumes, it seems) will place it out of reach of most private individuals.

S. A. T. REDFERN

Gasparrini, C. *Gold and Other Precious Metals: From Ore to Market*. Berlin, Heidelberg and New York. (Springer-Verlag) 1993, xxii + 336 pp. Price DM 228 (hardcover). ISBN 3-540-54976-5.

This volume sets out to bridge the gap between the fields of metallurgy and mineralogy to give a comprehensive description of the geology, mineralogy and mineral processing of gold and other precious metals. The book also covers U and a number of other metals and several non-metals which are important industrial minerals.

The aim is praiseworthy in providing in one volume a review of the chemistry, geochemistry, economics, geological occurrence, mineralogy and mineral processing of not just gold, silver and the platinum group elements but also uranium, beryllium, boron, carbon (as graphite and diamond), magnesium, aluminium, potassium, titanium, chromium, manganese, iron, cobalt, nickel, copper, lead, zinc, arsenic, niobium, tantalum, molybdenum, tin, antimony, barium, rare earths, tungsten, mercury and bismuth! It also includes a part on mineral exploration. Even more surprising is that the work is the effort of a single author.

However, although the expectation is high, the book does not deliver. The presentation, for a book of its price, is of poor quality with numerous typographical mistakes in the text and in tables and diagrams. All the tables are of a standard below what is acceptable for publication and many of the diagrams appear, to this reader, to have no real value except to fill in the space between the text (for example, badly reproduced spectra on p. 49). Other diagrams are difficult to read such as Figures 2 and 3 on pp. 28–29, which were produced on low quality dot matrix printers, and in the modern age of laser printers simply not acceptable in a publication of this sort. A partially redeeming feature are the good quality photomicrographs although these are annoying in that information on locality is lacking from most of them.

As to the content, it is clear (particularly from the poor reference list) that the author has had a lot of experience in gold, silver and uranium. These sections are a mixture of unnecessary basic facts (considering the book is aimed at graduate level) and useful information on these elements. The section on platinum group elements is one of the worst reviews of these minerals this reviewer has read and is not a patch on the Cabri book produced by the Canadian Institute of Mining. The base metal section (including numerous non-metals) is brief and uninformative with little for those involved in the exploration and processing of the many elements studied. The text contains a few typographical errors but there are more in the tables. In the preface the author admits to not using IMA convention for mineral names and formulae and is good to her word. What is more confusing, however, is the varying terminology between the different sections, e.g. using three different general formulae for covellite (or covelline in several places). Much of the text consists of quotes from private communications and few of the references given could be gained through a library. Needless to say, the references are extremely poor and by no means a reflection of the fields covered by the book. In summary, I guess there are some who will buy the book to wade through the chapters on gold, silver and uranium to pull out its useful information but at the price on offer and because of overall quality I would imagine only a few research libraries will take this edition. The book has the feel of a first draft and I would strongly recommend waiting for a much needed edited and revised edition before purchasing.

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