

occurs with mica at the contact of a carbonatite and a cancrinite-bearing syenite. Inevitably definitions quoted from the original listing have become in some cases inappropriate due to later classification: thus pyroxmangite should not now be considered to be a pyroxene but a pyroxenoid with a Siebenerketten configuration.

The style makes this book eminently readable and one soon finds one needs to keep it handy for quick reference. It is a pity, though understandable on financial grounds, that not all mineral names are to be found, only those propagated since 1897. Thus one really needs to keep Hey's *Chemical index of minerals* and its appendices, or at least Fleischer's *Glossary of mineral species*, also to hand. One spots occasional infidelities or omissions such as spessartite (rather than spessartine), under spandite: Harry von Eckermann (eckermannite) died in 1969, and joesmithite was named in honour of J. V. Smith.

Altogether a useful and enjoyable book, giving much information wrested from hidden or obscure sources, but one which by its very nature will become dated as the discovery of further new minerals is reported. It invites comparison with the recent work by Mitchell (MM 44, 114), though the latter is more directly concerned with the several ways in which mineral names are assigned and lacks the mineralogical data and original references of the present volume.

R. A. HOWIE

Derry, D. H. *A concise world atlas of geology and mineral deposits*. London (Mining Journal Books, 15 Wilson St., London, EC2M 2TR) (1980). 110 pp., 8 figs., 10 coloured maps. Price £20.00 (post-free surface mail).

This really is jet-age geology. Relax with your seat-belt loosened and peer down from 30,000 feet on to a colourful panorama of Permian sediments, Cretaceous ophiolites, Palaeozoic volcanics; here a coal basin or a porphyry copper, there a major thrust or site of a terrible earthquake. Down to 500 feet over rocks 500 million years of age, and even after landing you can turn the page and say to your friendly Mongolian taxi-driver 'take me to number two Ul, Leniadom'; for at the back of this excellent book are the names and addresses of 153 geological surveys, institutes, mine departments, etc., all over the world. And who more likely than the author will you encounter by chance in the transit lounge; the much-travelled Duncan Derry 'a very successful explorer for, and developer of, minerals, he has worked in all continents . . . maintaining a keen and critical interest . . . in both the practice and theory of the geological sciences' to quote from the Foreword by Kingsley Dunham.

The book begins with an introduction to geology, based on plate tectonics and simple enough to ensure the book can reach a wide readership of both geologists and interested laymen; and there is a copious glossary at the back of the book. Landscape, structure, vulcanicity, seismicity, and the evolution of life are displayed with the help of some neat little world maps and diagrams, as a setting for a brief introduction to the world's mineral wealth.

The main part of the book consists of ten coloured geological maps each accompanied by a description of the geological history and mineral resources of a major mass of land. Notes are added to the maps to highlight unique and interesting geological features or events and major structures are shown on both land and sea. The mineral information is shown by words and symbols indicating mineral fields and provinces, but here and there a note is added about some individual deposit or mine for some reason of historical, geological, or economic interest. The scales and projections of the maps have been skilfully chosen to show as much on a page as possible and with minimum distortion of shape. Putting the whole of the Americas on one double page spread is a triumph of cartographic art, but the detail gets a little crowded around Toronto and Salt Lake City. The whole world (save a few ocean areas) is shown, including two intriguing polar views of the Arctic and Antarctic.

World mineral resources are summarized in a special section showing charts of the top dozen or so countries by annual production in 1979 with estimates of reserves. Twenty-seven mineral commodities are included; metals, non-metallic minerals, and energy minerals.

Atlases have been a persistent feature of geological publication and they are always welcome. This one is nicely designed, the text well written, and the cartography and colour printing of a very high standard. Compared with the mammoth Geological World Atlas published by UNESCO, Derry's is more portable and at £20 more purchasable. Being 260 mm by 335 mm it fits in the side pocket of my airline bag, and despite its weight of just over a kilo (the binding is a little heavy) I am certain by copy has many miles to go.

COLIN J. DIXON

Schmidt, W., and Malzahn, H. *Industriemineral diamant*. Leipzig (VEB Deutscher Verlag für Grundstoffindustrie) (1980). 502 pp., 111 figs., 14 pls. Price 47.00 M.

Mankind has been fascinated with diamond for at least two millennia. Today the interest is greater

than ever as diamonds play an ever-increasing role in industry, in basic science, and in world economics. This concise book by Schmidt and Malzahn spans most of the aspects of diamonds. There are chapters on the science of diamond, the geology of its growth, world production, mining techniques, diamond synthesis, grading diamond, its use in industrial abrasives, and a description of gem-diamonds. Inevitably any book covering such a wide-ranging field will have omissions. There is no mention of the early synthesis of diamond in Sweden. Sections of the scientific literature have been overlooked so that, for instance, in the discussion of electrical conductivity there is no reference to the definitive work of Collins and Lightowers. However, the main drawback of the book is that it is already slightly dated. Although published in 1980 the text describes the state of the diamond world as it was a few years earlier. The authors have not incorporated the most recent advances, for example of determining the growth conditions of natural diamonds. Nor, apparently, have they been able to take advantage of the recent substantial reviews of diamond such as *'The properties of diamond'* edited by J. E. Field (Academic Press, 1979). But despite these drawbacks, Drs Schmidt and Malzahn have presented a well-balanced introduction to the properties and uses of this unique mineral.

G. DAVIES

Luger, P. *Modern X-ray analysis on single crystals*. Berlin (Walter de Gruyter) (1980). 312 pp., 151 figs. Price DM 96.00.

There have been many books published on crystallography and X-ray structural analysis and hence, in reviewing this new book, one must ask whether it is really necessary, and also decide how it compares with others in the context of clarity, and the needs of the modern crystallographer. Currently the art of structure analysis is wrapped up in extremely sophisticated computer programs and is practised by many research scientists who have not necessarily undergone a rigorous training in formal crystallography. In such circumstances there is a real danger that the casual user of the 'black box' technique of structure analysis may be quite unaware of some of the fundamental pitfalls in analysis. This new textbook is designed specifically with such research workers in mind. In this context I believe that it is extremely valuable. It is well written and provides exactly the right sort of overview of the whole technique. The text throughout is extremely well illustrated and, at each stage in the programme of analysis reference is made to the results obtained for three quite complex organic test structures.

The book assumes very little and begins with a clear account of the necessary mathematical background. This includes an elementary treatment of matrices, determinants, and vector algebra. The first chapter ends with Fourier transform theory and the relevant convolution operations. The second chapter is devoted to the description of essential preliminary experiments in selecting and examining suitable single crystals for structure analysis. Photographic techniques and all the important types of single-crystal camera are described in detail. In effect this chapter warns the would-be analyst about the dangers of proceeding directly to single-crystal diffractometer techniques where an imperfect crystal can be detected only with difficulty and the loss of time.

In chapter three the author deals with all aspects of crystal symmetry. The simple point-group symmetry operations are carefully illustrated and at the same time their matrix representations are written out in full. In dealing with the translational symmetry of the lattice and non-primitive lattices the author stumbled somewhat in using an inequivalent motif at $[\frac{1}{2}\frac{1}{2}0]$ in a centred square lattice, fig. 3.13, p. 130. Tabulation of the Bravais lattices is followed by the definition and illustration of the space-group symmetry elements. Full space-group formalism follows and is illustrated with reference to space-group determination for the three chosen organic test structures. This chapter ends with an account of the atomic scattering function, the electron-density function, and the structure factor.

Chapter four deals with the use of a modern single-crystal diffractometer and an account of the usual programs and routines available for refining lattice constants and data collection. The criteria used in the selection of slit widths and incident radiation are defined. Chapter five continues with the editing of the intensity data and details the theory and practice of statistical analysis of the data for centrosymmetric and non-centrosymmetric structures. Statistical data for the three test structures are figured and used in this context. Having discussed the theory of the Patterson function and Harker sections, the author turns to direct methods of phase determination next. The theory is given and direct methods are used to derive preliminary structural data on the three test structures.

The last chapter is devoted to the final stages in structure analysis using least-squares methods, and methods of graphical display are both discussed and illustrated.

Having read this book with considerable enjoyment it was clear that both in the mode of presentation and in its clarity it succeeds in its main objective. I feel that it could be given to an