BOOK REVIEWS

Orlov (Yu. L.). *The Mineralogy of the Diamond.* Chichester and New York (Wiley-Interscience), 1977. xii + 235 pp., 84 figs. Price £17·00.

This is an updated and expanded English edition of the author's text originally published in Russian in 1973. The different habits of diamonds in meteorites, impactites, and kimberlites are explained in terms of typomorphological classification and physical properties of the diamonds. The structural defects and morphology of diamond are considered in detail, including the modification of plane-faced growth forms by dissolution and the corrosive modification of growth and dissolution forms. The optical and other physical properties of the various subtypes are described and particular attention is paid to their absorption spectra and luminescence. The study of inclusions in diamond crystals is becoming increasingly important for the information it provides on the genesis of diamonds; details are given of inclusions of diamond, garnet, olivine, enstatite, diopside, chrome spinel, rutile, magnetite, coesite, graphite, and various sulphides. After discussing the synthesis of diamond and the phase diagram for carbon, a largely rewritten chapter discusses the genesis of diamonds in terrestrial igneous rocks.

Diamonds in kimberlites are considered to have several different origins: they are genetically related to mantle rocks of markedly different compositions. Any particular xenolith contains only one variety of diamond (based on its morphology, internal structure, and properties), i.e. for every type of deep-seated diamond-bearing rock it is considered that there is a characteristic type of diamond crystal. Orlov thus considers it possible to consider the polygenetic nature and typomorphism of diamond even within the limits of a particular type of deposit. The effects exerted on crystal morphology and on certain physical properties by such epigenetic processes as plastic deformation, dissolution, and natural radioactivity (which produced green surface colouring) are all to be taken into consideration, but their study then should make it possible not only to determine where the diamonds crystallized but also to ascertain the composition of the parent rocks.

The author has performed a useful service in collecting together and reviewing the highly fragmentary material published by workers in many different fields of science and technology using various modern techniques to study diamonds. His views on the genesis of diamonds and the close relationship between their morphology and other properties and the type of rocks containing them will be of great interest not only to mineralogists but to geochemists and petrologists concerned with kimberlites, eclogites, and related problems.

R. A. HOWIE

Bardet (M. G.). *Géologie du diamant. Vol. III. Gisements de diamants d'Asie, d'Amérique, d'Europe et d'Australasia.* Mém. Bur. de Recherches Géol. Minières (Paris), no. 83, 1977. 169 pp., 40 figs., 1 pl. Price 180.00 F ($36.00).

The first part of this Memoir [M.M. **40**–425] dealt with generalities about the diamond and the second part [M.A. 78–120] was concerned with African deposits. This third and final part is devoted to deposits in the rest of the world, mainly the USSR and North and South America, but including details of diamond-bearing rocks in India, Borneo and Malaysia, Australia, and China. The chapter on the USSR deposits deals with the kimberlites and alluvial diamonds of Siberia and also with the diamonds of the Urals, Timan, and the Russian platform, though the figures illustrating this chapter are somewhat diagrammatic. The largest section deals with the diamonds of South America, covering the Guyana Shield and the Brazilian platform (20 million carats to date) and the diamonds found in the Cretaceous detrital sedimentary rocks of Brazil. The detrital diamonds of the Panna district of India and of the Majhgawan kimberlite pipe are briefly described (having produced the Kohinoor, Regent, Orloff, and Hope diamonds). In a brief concluding chapter the relationship between diamondiferous kimberlites and the establishment of stable cratons is touched upon; the correspondence of the breakup of Gondwanaland and the appearance of such kimberlites is striking. The hypothesis of Nixon *et al.* [M.A. 74·1852: in *Lesotho Kimberlites*, pp. 312–18], involving partial fusion of the mantle during plate movements offers some explanation of Cretaceous kimberlites: can such a hypothesis be extended to the Precambrian?

R. A. HOWIE

Perel'man (A. I.). *Geochemistry of elements in the supergene zone* (Transl. from Russian by R. Teteruk-Schneider; Edited by A. A. Levinson). Jerusalem (Israel Program for Scientific Transl.) and Chichester (John Wiley & Sons Ltd.), 1977, x + 266 pp., 60 figs. Price £19·50.

The title invites comparison with Garells and Christ's (1965) *Solutions, Minerals and Equilibria*

and corresponding sections of the *Handbook of Geochemistry*, which also deal with low T/P aqueous systems. Presentation of the relatively sophisticated inorganic chemistry of processes and provision of a systematic reference text is not attempted here, however. Instead the book is based upon a geochemical classification scheme (following in the Russian tradition of Mendeleev, Vernadski and Fersman) devised for the behaviour of elements in the supergene environment. It comprises a relatively short introductory section (39 pages) in which basic principles and concepts are presented followed by several chapters dealing with the geochemistry of seven groups of elements which include, for example, one group of active aerial migrants (O, H, C, N, I) and one of weakly mobile cations (K, Ba, Rb, Li, Be, Cs, Tl). A total of twenty-eight elements are included but unfortunately iron and manganese, which are particularly important in supergene processes, are omitted (although some aspects of the geochemistry of iron are discussed in considering oxidation-reduction).

The first chapter on physicochemical parameters of the elements is the weakest part of the book as it is too condensed to aid students or provide new information for practising geochemists. The English is not so clear as in later sections and four paragraphs are wasted in quoting Lebedev's 1969 views on systems of ionic radii in which the politics are more apparent than the science (a few short sentences by the author describing different theories which affect ionic radii would have been preferable).

The three chapters which follow present the basis for the classification given at the end of Section One and although they include much information familiar to western geochemists, many of the concepts discussed provide a fresh viewpoint. For example, typomorphic elements are described as elements with high clarkes which migrate easily and thereby determine the geochemical environment. This procedure could prove useful in normalizing geochemical data before statistical analysis, since the different levels at which elements occur can affect the results obtained.

Many coefficients are presented to describe, for example, the tendency of elements to concentrate in living matter (biophilic) or to be useful in industry (technophilic) and formulae are given which describe the tendency of elements to migrate in aqueous systems and to concentrate at geochemical barriers. The importance attached to the clarke of elements in the lithosphere both as a philosophical basis of geochemistry (Fersman is quoted as indicating that it provides a new constant of the universe) and in quantifying information is striking. For example the concentrations of elements in rocks or minerals are normalized by dividing by the clarke in the lithosphere.

The most important sections of the book are those dealing with the geochemistry of elemental groups where the author's extensive knowledge is fully displayed. The principles of the geochemical cycles are described in relation to the coefficients and other parameters discussed earlier in the text (when their application is more readily apparent). Information is presented clearly and simply with quantitative information and many interesting examples. Inter-relationships between elements and geochemistry, biology (and sometimes sociology) are particularly interesting, for example radium is discussed with regard to its geochemical migration, technological impact, biological absorption and environmental significance (carcinogenic properties, contents in water). There are also some interesting speculations—for example that selection of radiation-tolerant biological species is greatest following periods of orogenesis, and acid magmatism when arid climatic conditions prevail—conditions which favour accumulation of high levels of radium. These sections are very readable and thought-provoking although the basis of some of the ideas is lacking.

Overall the book is well presented and attractively bound although more suitable diagrams would be preferred (a few are barely legible). The English is generally clear and the use of italics to emphasize points is helpful. When the first section has been absorbed the remainder is easy to follow. Many sections of the book would be useful in introductory courses of geochemistry, however it is also recommended to researchers and professional geochemists in environmental or economic fields. One of the striking aspects is the duplication of research in the West and in Russia and this publication is particularly valuable in providing a better understanding of Russian geochemistry.

J. A. PLANT

Picot (P.) and Johan (Z.). *Atlas des Minéraux métalliques*. Paris (Mem. Bur. Rech. Géol. Minières, **90**), 1977. 403 + ii pp., 328 photographs (of which 219 are in colour). Price 320 F; $64.00.

This book has 403 pages (21 × 21 cm) all of heavy paper, 340 of them containing microscopic descriptions of 350 ore-mineral species. For practically all of the anisotropic species there is a colour photograph, and in practically all of these it is taken between two polars so that it shows the colours of the anisotropic-rotation effect in white light. For covelline, in addition to such a photograph, there are also three colour photographs in ordinary light.