calculation of interatomic distances (bond lengths) and bond angles for each of the crystal systems. There is also a tabulation of crystal forms grouped according to crystal system.

Each chapter concludes with a set of carefully prepared exercises, and the book has also a list of selected references and a subject index. The text contains few errors: even the slip in defining the Ångstrom unit as 10^8 cm (p. 22) is unlikely to mislead for there follows its equivalent as 0.1 nm.

This text will be of value to those taking up crystallography: studied with care, it will give a sound basic understanding of the crystalline state. The author and the translator are to be congratulated in producing a clear and rigorous account that carefully explains the subject. The book is easy to read and well illustrated with over 200 clear, well labelled figures. It deserves to be widely used and, at £17.50 for the plexicover edition, it is good value.

A. C. BISHOP

Hall, C. *Gem Stones* London, New York and Stuttgart (Dorling Kindersley), 1994. 160 pp. Price £10.99. ISBN 0-7513-1026-3.

This volume in the 'Eyewitness Handbook' series offers a visual guide to more than 130 varieties of gemstones. It is abundantly illustrated with colour photographs of both cut and rough stones, typically with six or seven photographs per page, together with thumbnail sketches of the appropriate cuts used for each species. A line at the top of each entry gives the crystal system, the chemical composition (in words) and hardness, while, at the foot, the specific gravity, range of refractive indices, birefringence and lustre are listed, leaving the rest of the space clear for a description of the gemstone and its occurrence, together with the illustrations.

Ahead of the descriptive sections, there is a comprehensive introduction including sections on what comprises a gemstone, how they are formed, where they are found, and detailed sections on their physical properties (hardness, cleavage, specific gravity, lustre, morphology, refringence and birefringence, pleochroism, iridescence, chatoyancy and natural inclusions). Brief details are also given on faceting, polishing and engraving, and there are sections on the history and folklore of gems, on their synthesis, imitation and enhancement.

All these sections are again fully illustrated (and we gain a clue as to the authoritative nature of the information provided when an eminent gemmologist is seen using a refractometer and viewing stones with a hand-spectroscope); indeed Dr Roger Harding is named as Editorial Consultant and the author herself is a member of the curatorial team at the Natural History Museum. Thus this is not only a handbook with copious and well-chosen colour photographs of high-quality gemstones, but it also gives accurate and up-to-date information on the gem species displayed. Almost the only quibble I have is with the massive green or pink Transvaal jade being described as grossular rather than hydrogrossular, which it is, — and with the neither euphonious nor grammatically correct description of pearls, jet, coral, ivory and amber as 'organics'.

But this is a wondertul text, beautifully illustrated with excellent colour photographs, and is surely a bargain at the price. It should be in the hands of all interested in this generally colourful aspect of applied mineralogy.

R. A. HOWIE

Bevins, R. E. *A Mineralogy of Wales*. Cardiff (National Museum of Wales: Geological Series No.16), 1994. 146 pp., 10 maps, 97 photos. Price £25.00 (£27.50 by post). ISBN 0 7200 0403 9.

Wales has provided ten new mineral species and, of the first reports of minerals in the British Isles, sixty-seven have been from Wales. No further justification is needed for this latest in a series of well-illustrated books on the mineralogy of popular mineralized areas.

After an introductory chapter outlining the geology of Wales and the background to Welsh mineral occurrences, with maps of mineralized regions, the main section of the book consists of an alphabetical listing of the minerals — from acanthite to zoisite — illustrated by a series of photographs, most of them in colour and of an exceptionally high quality, including a few of thin-sections or taken in reflected light. There are spectacular photographs and accompanying details for some of the species for which Wales is famous: anglesite from Anglesey, lustrous crystals of brookite from both Clwyd and Gwynedd, acicular millerite from ironstone nodules in the South Wales Coalfield, and both twinned celsian and paracelsian from the Benallt mine, on the Llyn Peninsula. Newer species are also represented, with photomicrographs of brochantite, connellite, devilline, langite, schulenbergite, susannite and wroewolfeite.

The black-and-white annotated sketch maps showing the locations of former mines are very helpful, but otherwise it is not always easy to know which particular area of the Principality is being described. Clearly one must be armed with an appropriate ordnance survey map to tie down a specific locality, but for those readers less familiar than the author with the relatively new administrative boundaries in Wales, the inclusion of a sketch-map showing the whereabouts of Gwynedd, Powys and Dyfed would have been helpful — though often in

the text such regional addresses as the Central Wales Mining District are used.

But this is an inspiring book and the inclusion of very full references to some four hundred publications, together with a comprehensive index, should make it an essential item on mineralogists' bookshelves.

R. A. HOWIE

Davies, G., ed. *Properties and Growth of Diamond.* London (The Institution of Electrical Engineers), 1994. xvi + 438 pp. Price £135.00. ISBN 0 85296 875 2.

This book, in the Institution's Datareviews Series, aims to list and discuss all the important properties which characterize diamond. There are contributions from 30 authors, assembled in 12 main chapters, ranging from the bulk properties of natural-isotope diamond, through the surface properties of diamond, the properties of nitrogen in diamond, the properties of nickel, silicon, hydrogen and oxygen in diamond, radiation damage, ion implantation and diffusion, decay times of luminescence and laser action in diamond, carbon isotope effects, donors, acceptors and electrical conductivity in diamond, the technology of diamond surfaces, metastable growth of diamond, and the high-temperature, high-pressure synthesis of diamond.

Most of the individual sections are extremely brief (one or two pages), but the mere fact that there are sections headed 'Optical constants of diamond' or 'The type terminology for diamond' makes reference easy. The literature on the properties of diamond is dispersed between physics, mineralogy, crystallography, materials science and electrical engineering, and the Editor is to be congratulated on drawing together the world expertise on diamond and presenting the results in one internationally authored, highly structured, fully indexed volume. At first glance the reader may be surprised by the relative paucity of diagrams, but the aim is to review a diversity of research results and to present brief summaries of current thinking on the topics covered — and we are given diagrams in the somewhat more expansive chapter on the metastable growth of diamond. The process of making polycrystalline diamond films by chemical vapour deposition (CVD) is a rapidly emerging technology which offers diamond at a relatively low cost, in large areas and in a variety of surface morphologies. In this chapter, reports and views are offered on a variety of burgeoning CVD techniques, ranging from hot-filament assisted growth to plasma synthesis, combustion flame methods and the laser-assisted growth of diamond. The flame characteristics for the combustion growth of diamond are discussed, and this is followed by a section on the physics and chemistry of combustion flames. The final chapter is concerned with the high-pressure synthesis of diamond and in particular with diamond grown with metal catalysts.

There are extensive references at the end of each section, and these will be essential to gain familiarity with the data scattered throughout the literature of many disciplines and most continents. Both the typeface used and the format and cost of the volume are large, but this is clearly a work that must be available to all interested in the properties and use of diamonds. Its careful study will surely justify the expense of obtaining a copy.

R. A. HOWIE

Regional Geochemistry of the Lake District and adjacent areas. Geochemistry Group of the British Geological Survey, Keyworth, Nottingham (British Geological Survey), 1993. viii + 98 pp, 46 coloured maps + 1:250 000 geological map. Price £50.00. ISBN 0 85272 2257.

This is the ninth publication in the series providing a systematic survey of the regional geochemistry of Great Britain. As the results are being presented starting with Shetland and working southwards, this is the first area to be dealt with in England covering not only the Lake District with its copper lead-zinc, baryte and tungsten mineralization but also west Cumbria and Furness areas with hematite and the western part of the North Pennines lead-zinc-fluorite-baryte orefield. The principal aim of the project, started in 1975 and continuing to the present day, was to identify new occurrences of metalliferous minerals but it also provides quantitative data on natural element levels in the environment against which to assess contamination and to supplement geological information in the investigation of the geological evolution of Great Britain.

The procedures for sampling, sample treatment, analysis and error control are described in detail. The stream sediment sampling for this region took place in the summers of 1978-80 from some 6200 sites covering the area at an average sampling density of one sample per 1.6 km^2. The conductivity, pH and fluoride content of 2585 stream-water samples were measured and the bicarbonate content at a smaller number of sites. The stream sediments were analysed for 28 elements by direct reading emission spectrometry, arsenic and antimony were determined by atomic absorption spectrometry and uranium in stream sediments and water samples by delayed neutron activation analysis.