limits of petrogenetic theory and making it more quantitative requires an ever more thorough grounding in and intimacy with physics and chemistry, and that, in essence, is the aim of this new text. To quote from the Preface, 'the application of physical and chemical principles, by using equations and various constraints, is mandatory for the understanding of the generation of magmas'; and 'to convert an idea into equations is frequently a difficult task, and represents a real challenge for the present generation of the students of igneous petrology'. In short, Maaløe offers a more mathematically based analysis of petrogenesis than is customary in textbooks.

Monary, binary, ternary, and pseudobinary systems are the subjects of the first four chapters, followed by ones on P–T diagrams, Schreinemakers' phase theory, gas-bearing systems, and oxygen fugacity. Chapters on partial melting, and on fractional crystallization follow and are succeeded by the final three on magma kinetics, magma dynamics and isotope geology. In all chapters there is at least one item likely to challenge even the most experienced petrologist, and plenty of new slants on already well-worked topics. I found the chapters on partial melting, fractional crystallization, magma kinetics, and magma dynamics especially welcome, although the sections on redistribution of solute during crystal growth are too brief. Conspicuous by its absence is a treatment of the application of chemical thermodynamics to the problems of igneous petrogenesis, maybe it was felt too large a subject to tackle.

Considering that English is not the author's native tongue, the text is easy to read, and for the most part well written, generally lacking the turgid, repetitive style that can arise in these circumstances. There are some irritating proof-reading failures that accompany any first edition, such as incorrect references to figures, wrong symbols in equations, and a few places where the meaning is unclear. The index is inadequate—in fact a bare minimum. In the main, however, the presentation is of high standard.

While no other text covers precisely the same subject matter, there is considerable overlap with the books by Carmichael, Turner, and Verhoogen, by Morse, by Yoder, and by Cox, Bell, and Pankhurst. What distinguishes this book is the rigour of the treatment of physical and chemical principles. As a consequence, beyond some selected pages, I would not recommend the book to any but the most capable of undergraduates, for graduate students and advanced researchers a copy should be compulsory reading.

Will Maaløe's hopes for a more numerate next generation of igneous petrologists come about? Yes they will, this change is already happening. The service which Maaløe and other authors do for their science is to assist and stimulate this generation of petrologists to acquire the theoretical skills and knowledge necessary to improve the training of research students, and necessary to propel igneous petrology into the next century.

C. H. DONALDSON

Gottardi, G., and Galli, E. *Natural Zeolites.* (Minerals and Rocks: Vol. 18). Berlin, Heidelberg, and New York (Springer-Verlag), 1985. xii + 409 pp., 218 figs. Price DM 160.00.

After a brief introduction, including a listing of the thirty-two zeolite species, the topology of the tetrahedral frameworks of natural zeolites is described. There then follow chapters giving much-needed up-to-date details of each of the zeolites, including their crystallography, major and trace-element chemistry, optical and physical properties, thermal and other physicochemical properties, occurrences and genesis, uses and applications.

The wide use of scanning electron micrographs to illustrate this monograph is to be commended; the SEM photographs of mazzite and erionite are impressive and some of the cathedral-like images of harmotome are unforgettable. The individual species are grouped under seven headings according to their morphology and structure, and each species is described in detail with selected chemical analysis and optical and physical properties where available. The indexed X-ray powder patterns of all the species and infra-red spectra of the fibrous zeolites are given in appendices. Most of the thermal curves and many of the X-ray patterns have been specially recorded and interpreted by the authors, in order to guarantee homogeneity of all the data. For rare species the information in the text and tables represents nearly all that is currently available, whereas for more common minerals a representative distillation of data has been presented. One criticism would be that the sections on occurrence and genesis, although fully covering the geographical distribution of the individual zeolites and the broad nature of their enclosing rocks, offer little information on any zonation among the zeolite species or the occurrence of a particular zeolite in individual lava flows.

Some one thousand references are collected together at the end of the volume and there are separate mineral and locality indexes. The book is attractively laid out with a clear typeface and well-presented diagrams. This work presents a welcome modern approach to the study of zeolites and provides a source of authoritative information

on these widespread aluminosilicates which should be available to all mineralogists and geochemists.

R. A. HOWIE

Gribble, C. D., and Hall, A. J. *A Practical Introduction to Optical Mineralogy*. London (George Allen and Unwin), 1985. xiv + 249 pp., 158 figs. Price: Paper £8·95, Hardback £18.

This introductory student text is intended to be a first stepping-stone to the study of optical mineralogy. After a brief chapter on the study of minerals under the microscope, mineral descriptions are given for both silicates and non-silicates. These chapters are followed by sections on transmitted-light crystallography and on reflected-light theory.

The mineral descriptions for the silicates are arranged alphabetically and are clearly presented with orientation diagrams (where appropriate) and determinative diagrams for the more important solid-solution series. A short paragraph is given on the occurrence of each mineral, with mention of some commonly associated minerals. The non-silicates follow, including polished-section information, using reflected light. In the chapter on transmitted light, the formation of interference figures is explained and numerous diagrams are presented to assist in the determination of optic signs. The coverage of reflected light theory is unique at this level of text and includes a discussion on reflectance and on quantitative colour values.

This book is already proving deservedly popular with students and, in paperback, is good value. By far the worst aspect is the quite awful mud-coloured Michel-Levy chart on the back cover.

R. A. HOWIE

Können, G. P. *Polarized Light in Nature*. Cambridge, London, New York (Cambridge University Press), 1985. x + 172 pp., 73 figs., 87 colour plates. Price: £19·50.

This is a translation of the original Dutch text (1980). Essentially, it is a very gentle stroll through a catalogue of polarization phenomena. Technical detail is kept to a minimum and all the effects described can be seen through a polarizing filter (one is provided with the book).

There is a well-illustrated discussion of numerous atmospheric and astronomical examples, but the formal treatment of mineral optics amounts to a mere nine pages. Minerals are primarily regarded as another source of beautiful colour patterns, and this is really at the thick rather than the thin section level. Calcite is the representative uniaxial crystal, aragonite and brookite the biaxial crystals, whilst quartz is shown as an optically active crystal. Pleochroism is mentioned but the main claim to fame for epidote is for the demonstration of Brewster's brush. There are occasional references to minerals elsewhere in the book, and on p. 30 there is the suggestion that the Vikings may have used cordierite as a polarizing filter to aid navigation. Although the text is aimed primarily at the non-specialist audience there are over sixty references and it would have been nice to see at least one modern citation to optical mineralogy to improve the balance.

R. FREER

Hahn, T., ed. *International Tables for Crystallography* (Brief Teaching Edition of Volume A: Space-Group Symmetry). Dordrecht, Boston, and Lancaster (D. Reidel Publishing Co.), 1985. viii + 119 pp., 87 figs. Price £7·60.

This publication is unusual in being a condensed version of a major work of reference produced specifically for teaching purposes. Twenty-four of the 230 space-groups are presented in the same elegant fashion as in the complete edition. These are preceded by sections dealing in turn with 1. an explanation of the terms and symbols used; 2. a guide to the use of the tables; 3. space-group determination and diffraction symbols; 4. transformations in crystallography by the use of vectors and matrices.

The aims of the editor and contributors, to provide an inexpensive aid for the researcher and students, which can be used both as a classroom text and as a laboratory handbook, are well achieved.

J. ZUSSMAN

Beck, R. J. *New Zealand Jade*. Wellington (A. H. & A. W. Reed), 1984. vi + 174 pp., 17 figs., 83 photos., 18 colour plates, 8 maps. Price $(NZ)24.95.

This fascinating and readable book is concerned with all aspects of New Zealand jade. The author is Director of the Southland Museum, Invercargill (South Island) and is a jade lover, caver and explorer.

Following a brief introduction there is a short chapter on terminology which includes descriptions of the varieties of nephrite recognized by the Maoris. A major part of the book (52 pages) is devoted to accounts of the various jade fields in the South Island. Their geology is clearly explained and is supplemented by descriptions of the Maori and European discovery and exploitation of the