

background information on the Data File, and matters such as how the data have been edited and presented, a very welcome addition to the second issue is a series of three keys to enable the File to be used in mineral identification. Thus, key 1 lists all the minerals in order of increasing reflectance in air at 546 nm, plus the data for the other three COM recommended wavelengths (470, 589, 650 nm) citing, as do the other keys, the page number of the major entry for that mineral. In key 2, colour values are used in a similar way with minerals listed in order of increasing luminance (Y%), and in key 3 minerals are listed in terms of increasing reflectance in air and oil at 440 nm, with data given also at 500, 600 and 700 nm. There is also a brief bibliography and a brief section dealing with the historical background to the Data File.

The whole volume is attractively produced with the same blue used both in the binding and in the headings and subdivisions of the tables, the data standing out in a clear black typeface. The only regret might be that this large body of data is not yet available in a form that can be mounted on a computer and manipulated so as to plot and compare spectral curves with ease; but I believe that plans are underway to make the data available in this form in future issues. However, we do now have this excellent compilation, and no laboratory with a serious interest in ore minerals should be without it. As a contribution to the study of ore minerals it is invaluable; a credit to the editors and to the British Museum (N.H.) who have had the far-sightedness to publish it.

D. J. VAUGHAN

Barker, D. S. *Igneous rocks*. Engelwood Cliffs, New Jersey, U.S.A. (Prentice Hall, Inc.), 1983. xii + 417 pp. 228 figs. Price £43.80.

This book has much to commend it, and some failings. It presumes an elementary knowledge of igneous petrology for its readers, and seeks to enhance their knowledge to a relatively advanced level. As such it occupies the overcrowded 'middle ground' in igneous petrology textbooks. It would not be first choice as a book for describing and classifying igneous rocks. Nor could it be described as an 'advanced' text, detailed discussion of petrogenetic theory is alluded to, but not evaluated. It covers many aspects of igneous petrology, including chapters on the Role of Magma in Geological Processes; Igneous Minerals; Phase Relations; Estimating, Reporting and Comparing Igneous Rock Compositions; Classification of Igneous Rocks; Crystallisation and Textures; Generation and Evolution of Magma; Forms of Igneous Rock Bodies; and Effects of Volatile Components. Some

groups of igneous rocks are selected for Chapters of their own—Ultramafic Rocks, Mafic Rocks, Intermediate and Felsic Silica-Oversaturated Rocks, and Silica-Undersaturated Rocks. These four chapters include sections on most types of igneous rocks, but somehow fail to convey an appreciation of the relative abundances and significance of the rock types. The last three chapters of the book cover Metasomatism, Magmatism and Tectonism, and Relations of Magma to Energy and Mineral Resources.

The overall presentation of the book is good, but not outstanding. The price is high enough to exclude this book from the 'popular' range. There are a large number of carefully prepared figures in the text, although many are small. The photographs are disappointing, especially the photomicrographs, lacking definition and appearing out of focus. The index is comprehensive and the reference list exhaustive, but few papers published after 1980 are included. There is a certain haphazardness in the coverage of topics: pyroclastic rocks are discussed in part of the chapter covering 'Forms of Igneous Bodies', for example. Chapter One (The Role of Magma in Geologic Processes) makes reference to plate tectonics, the lithosphere and asthenosphere, subduction, heat flow within the Earth, geothermal gradients, pressure within the Earth, magmatism on other planets, etc., and yet somehow fails to explain how igneous rocks are produced by partial fusion (this is explained in Chapter 7). Many topics are referred to in the text, but the discussion is frequently unsatisfactory, detailed explanations or their significance is often lacking. Even in a book at this level, some elementary account would be expected of the important conclusions to be drawn from modern trace element and isotopic studies.

Nevertheless the book has much to recommend it. The subject is covered and the book will be useful to the non-specialist. It includes the answers to those questions one did not like to ask the igneous petrologist. Where else could the stratigrapher, palaeontologist or other mortal men find out about A-type granites, spreading centres, fertile mantle, jacupirangite or even KREEP.

J. N. WALSH

Freer, R. and Dennis, P. F. (editors). *Kinetics and Mass Transport in Silicate and Oxide Systems* (Materials Science Forum, Vol. 7). Aedermannsdorf, Switzerland, and Rockport, Massachusetts (Trans. Tech. Publications Ltd.), 1986. xii + 331 pp., 150 figs. Price SFr. 150.00 (\$70.00).

This book represents the proceedings of an international conference held in London in September

1984 and sponsored by the Mineralogical Society, the British Ceramic Society, the Institute of Physics and the Polar Solids Discussion Group at the Royal Society of Chemistry. This symposium sought to review some of the recent developments and achievements in experimental and theoretical techniques for characterising the defect and transport properties, and to illustrate the range of problems encountered in the various disciplines—in both academic and industrial environments. The thirty-one papers are collected under five headings: characterisation, kinetics, modelling studies, mass transport and industrial topics. [M.A.87M/0572-0602]

R. A. HOWE

Boisen, M. B. and Gibbs, G. V. *Mathematical Crystallography: an introduction to the mathematical foundations of crystallography*. Washington D.C. (Mineralogical Society of America: Reviews in Mineralogy, Vol. 15), 1985. xii + 406 pp. Price \$18.00.

The mathematical foundations of crystallography treated in this book are of two kinds. The first (treated in chapters 1–3 and appendices 1–5, amounting to just less than half the book) is the kind of mathematical foundation needed by a crystallographer if he is to take advantage of the essential simplicity of treating crystallographic problems by vector and matrix methods, rather than the trigonometric methods that are being relegated to the past. Such a crystallographer will find here an excellent introduction to the mathematics involved, and one which is wholly relevant to his purpose. There are plenty of exercises provided for anyone using the book as a self-teaching manual, and they are interspersed in the text so as to press home each development of ideas as it occurs. One only wishes that answers were provided to more of them.

The second kind of foundation treated (in chapters 4–7 and appendices 6–8) is the kind that most people prefer to leave buried and undisturbed while they live in the superstructure built on it. This is the mathematical theory and proofs of the existence of the 32 point groups, the 14 Bravais lattice types, and the 230 space groups. Not many practising crystallographers need, or wish, to pursue the subject to this depth, though it would be an excellent preparation for those who aim to follow, or contribute to, current work on modulated crystals and quasi-crystals.

The book has very few misprints or other blemishes. The worst is the orientation of the component drawings of the stereoscopic pairs illustrating the point groups: the principle of them

is excellent, but because the y -axes have been set horizontal on the page instead of the z -axes being set vertical, none of them looks orthogonal when viewed stereoscopically. It is a pity that the authors have used the same word (system) for the concept involved in *both* the six crystal families and the seven crystal systems. However, these are minor matters, and I only wish that this excellent book had been available to me 30 years ago. It is curious that a book with the same main title and with much the same scope was published by H. Hilton in 1903: the crystallography was the same, only the mathematical foundations have changed.

E. J. W. WHITTAKER

Graham, A. L., Bevan, A. W. R. and Hutchison, R. *Catalogue of Meteorites: with special reference to those represented in the collection of the British Museum (Natural History), IVth Edition*. London, British Museum (Natural History), and Tucson (University of Arizona Press), 1985. xii + 460 pp. Price £38.50.

This replaces the 1966 Catalogue by Hey and the 1977 Appendix by Hutchison, Bevan and Hall. It is based on a computer file and is presented as a tribute to Max Hey who hand-crafted two earlier editions. Users of the 1966–77 works will naturally move up to this, but should not allow those earlier volumes to be mislaid, since they contain a measure of information which has now suffered deletion.

In style and format, the new pages are twice the size, laid out in double columns and without the benefit of the old emphatic differences of type face. Even the geographical coordinates have been restyled. The content has been influenced by developments such as the publication of Buchwald's monograph, the reclassification of stones by petrological criteria and a simpler view of their chemistry and the unearthing (?) of the Antarctic hoards.

Although it retains its sub-title relating to the B.M. collection, it has lost its ancient 'History of the Collection' and is very much the standard international work of reference. The Trustees of the British Museum deserve the gratitude of the space community for underwriting this work and it is important that the effort be continued toward the production of later editions. In 1914, just about a biblical lifetime ago, Lazarus Fletcher produced the eleventh edition of his 'Introduction to the study of meteorites with a list of meteorites represented in the Collection'. In 125 pages and at a price of one shilling it stands opposite the present work—providing historical book-markers for a generation of meteorite studies. With both volumes to hand