BOOK REVIEWS

Henderson, P., ed. *Rare Earth Element Geochemistry*. Amsterdam and New York (Elsevier Science Publishers), 1983. xii + 510 pp., 139 figs. Price Dfl 220.00 ($85).

With developments in analytical techniques over the last fifteen years, the rare earth elements (*REE*) have become an integral weapon in the geochemist's armoury. This book brings together reviews of the major applications of *REE* geochemistry written by experts in each field, together with discussions of *REE* mineralogy, economic importance, and analytical techniques.

Whilst there is undoubtedly a need for textbooks dealing with *REE* geochemistry, I feel that this book suffers from attempting to be too comprehensive about the *REE*, yet insufficiently comprehensive about the way that, in practice, *REE* data are almost always considered in relation to other chemical data. Most students or researchers are topic-oriented rather than analytical technique or element-group oriented, so that only a small number of chapters are likely to be relevant to any given reader. This results in topics which are not treated in sufficient detail to be of more than introductory value to researchers. A typical example of this problem is the nature of chapters 7 and 8: these consist of descriptions of chondrite-normalised *REE* patterns for the full gamut of continental igneous rocks arranged in no obvious order, followed by rather simplistic discussions of the way in which such patterns may have arisen, with little reference to the other data, petrographic, chemical, and isotopic, which can readily eliminate several of the hypotheses in specific areas. For example, these chapters readily allow the reader to find out the range of *REE* concentrations in Eu-anomalous kimberlites, but do not easily permit an understanding of the significance of *REE* in understanding the petrogenesis of complete calc-alkaline suites. Incidentally, I found rather curious the use of Eu/Sm rather than Eu/Eu* to express Eu anomalies.

I found that the chapters on petrogenetic modelling (4), ocean basin igneous rocks (6), *REE* mobility (9), aqueous *REE* geochemistry (10), radiogenic isotopes (11), and *REE* analytical techniques (13) provided very helpful and readable discussions of their field and I would not hesitate to recommend these to students. It is noteworthy that, with the exception of the isotope chapter, these are some of the shorter chapters in the book. The chapter on isotopes is a special case because there is at present no textbook available which gives more than cursory mention to the vital role that Nd isotopes play in modern geochemistry, and extension of this chapter could be usefully considered. The chapters on mineralogy (2), cosmochemistry (3), upper mantle rocks (5), and economic importance (12) I found somewhat impenetrable because of their length and extreme detail, but I would suggest they would form a useful reference source.

In summary, I feel that while much of the book is very valuable and should therefore be in geology libraries, it suffers from lack of clarity in target audience and sometimes manages to be over-comprehensive in a way that would not endear it to undergraduate users, while lack of reference to other aspects of chemistry makes it only of introductory or reference value to research workers.

M. F. THIRLWALL

Atherton, M. P., and Gribble, C. D., eds. *Migmatites, Melting and Metamorphism*. Nantwich (Shiva Publications Ltd.), 1983. x + 326 pp., 152 figs. Price £25.00 (hard), £12.50 (paper).

The eighteen papers (and seven extended abstracts) here presented are the proceedings of a meeting held in 1982 at the University of Glasgow and sponsored by the Geochemistry Group of the Mineralogical Society and the Geochemical Society. The contributions are organized into sections on experimental studies, isotopic studies, fluid studies, field and related studies of migmatites, and field and related studies on other rock types. (Abstracts of each paper are given in MA **35**, no. 2.)

In an introductory chapter, B. E. Leake stresses the importance of structural control in relation to these rock types; the association of granite emplacement with episodes of plate movement is fundamentally a structural correlation. Wyllie argues that regional metamorphism, migmatites, and granites are produced by massive influxes of heat carried largely by fluids, but partly by magmas, rising from the mantle, especially above subduction zones where wet crustal wedges are dehydrated and partially melted. Halliday relates the zoned granitic plutons of the Scottish Southern Uplands to intermediate magmas crystallizing from the margin inwards, the magma partially melting the country rock sediments which then mix with felsic differentiates to form a buoyant mass which could intrude the hot plastic core of the pluton.

Several papers stress the importance of fluids. The dominance of H_2O, with some CO_2, in fluid inclusions in high-grade amphibolite-facies rocks in western Ireland is described by Yardley *et al.* and