may be found of occasional use by numerate advanced undergraduates specializing in geochemistry or hard rock petrology and by teachers and researchers in these fields.

W. J. FRENCH

Greg (R. P.) and Lettsom (W. G.). *Manual of the Mineralogy of Great Britain and Ireland.* A facsimile reprint with Supplementary Lists of British Minerals by L. J. Spencer and a Fourth Supplementary List (1977) together with a foreword by P. G. Embrey. Broadstairs, Kent (Lapidary Publications), 1977. xxxiii + 483 pp., illus. Price £10·00 (postage and packing 50p; available from Lapidary Publications, 84 High Street, Broadstairs, Kent).

For more than a century, 'Greg & Lettsom' has remained the only comprehensive mineralogy of the British Isles. Heddle's coverage of Scotland and Collins's of Cornwall and Devon have been valuable contributions but Greg & Lettsom's work is the only single volume to describe the whole of Britain.

Published in one edition in 1858, 'Greg & Lettsom' has long been a collector's item and with the renewed interest in topographical mineralogy apparent in recent years, a reprinting was inevitable. This facsimile reprint, augmented by a historical introduction by Peter Embrey, L. J. Spencer's Supplementary Lists, and a fourth Supplementary List compiled by Peter Embrey brings together a complete record of British mineral species up to 1977.

A complete revision of 'Greg & Lettsom' would have been very welcome but the work and expense involved would, clearly, have been prohibitive. Meanwhile, the present reprint has a great deal in its favour; it retains the full nineteenth-century flavour and provides a valuable insight into the state of the art at that time.

The bonus of the subsequent lists of British minerals is a good reason to further congratulate Messrs. Embrey and Lambert but I would suggest that Spencer's lists of 1898 and 1931 could have been improved by filling them out with localities and more complete references. However, the work is done and very welcome it is.

ROGER S. HARKER

Augustithis (S. S.). *Atlas of the Textural Patterns of Basalts and their Genetic Significance.* Amsterdam and New York (Elsevier Scientific Publ. Co.), 1978. x + 323 pp., 604 figs. Price Dfl. 170.00 ($73.95).

The large-scale petrological studies of lunar rocks and ocean-floor lavas have led to such rapid progress in our understanding of many aspects of basalt textures that an atlas of photomicrographs would seem to be a very timely publication. Presumably, most readers would prefer such a work to give a comprehensive survey of the textures and a balanced account of the genetic interpretations of various workers in this field, together with a statement of the author's own views. Unfortunately, Augustithis has adopted a different approach.

The author's ideas as to the meaning of various textural features in basic rocks may strike many readers as idiosyncratic, to say the least. For instance, although an origin by exsolution is generally accepted for the diopside lamellae within the orthopyroxene of lherzolite xenoliths in basalts, Augustithis interprets this relationship as one of later diopsidic infiltration and replacement of bronzite. He totally rejects the concept of skeletal olivine, augite, or plagioclase phenocrysts and appears to interpret virtually all megacrysts in basalts that enclose pockets of groundmass as late-stage porphyroblasts (some originating as blobs of colloidal gel). He insists that the characteristic ophitic texture of poikilitic augites enclosing numerous plagioclase laths is generated by solid-state replacement of the augite by later-crystallizing plagioclase.

The atlas contains 100 pages of text and 600 plates. These are devoted to photomicrographs supporting the author's concepts and to illustrating his work on the little-known basalts of Ethiopia. There is virtually no attempt to recognize, discuss, and illustrate the work of other current specialists in textural relationships. The result is as overladen in some fields as it is deficient in others. Thus, the selection of photographs of field features of basalts is very poor compared with those in other volcanological publications. The textures of peridotite inclusions in basalts (mostly Ethiopian) are treated at length without any mention, for instance, of Nicholas and his co-workers. No other inclusion types are illustrated. There are no pictures of fresh vitreous basalts, the only variant in which phenocryst–groundmass relationships are entirely unambiguous. All reference is omitted to modern experimental studies of crystallization kinetics and the light they throw on crystal morphology and zoning. Leucitites are included in order for the author to argue that their leucite megacrysts are post-groundmass porphyroblasts. Nephelinites and melilitites, however, are excluded. Amygdale fillings and metamorphism of basalts are illustrated but spilites are not mentioned at all.

The text is partly connected with the plates but digresses for thirty pages (Chs. 25–34) into a general exposition of Augustithis's philosophy for igneous

petrology. The plates vary in quality from extremely good to poor: it is clear that the publishers have done their best with the material submitted to them. Both they and the author have unfortunately failed to eliminate numerous misprints, especially of names, in the text. Some are hilarious but the joke pales when one remembers the extremely high price of this book. There are many thought-provoking textural features illustrated that might make the volume worth consideration by specialists in this field. All potential buyers are advised, however, to take a careful look before committing themselves to a purchase.

R. N. THOMPSON

Fraser (D. G.), editor. *Thermodynamics in Geology*. Dordrecht, Holland (D. Riedel Publ. Co.), 1977. xiv+410 pp., 104 figs. Price Dfl. 90.00 ($36.50).

The aim of the petrologist to understand and predict the stability fields of mineral assemblages over a wide temperature and pressure range can be more readily achieved if the thermochemical properties of minerals, melts, and solutions are established. That the application of thermodynamics has become one of the most important aspects of modern petrology is emphasized by the occurrence of a NATO Advanced Study Institute on this topic, held at Oxford in 1976. This book is the proceedings of that meeting, which had attempted to bridge the information gap between those researching in thermodynamical methods and the more 'conventional' petrologist and geochemist. This educative aim does not, however, come over strongly in the proceedings, as many of the chapters will be of little benefit to a reader unless he is conversant with more than just the elementary basis of thermodynamical petrology.

The book contains nineteen chapters, many of them written by leading authorities in the various subjects chosen for the volume. The coverage is quite wide ranging from high-temperature calorimetry (Navrotsky) to calcite solubility in sea-water (Broecker and Takahashi). The standard is generally good throughout but, perhaps inevitably, the depth to which the different subjects are treated varies significantly. Two chapters (Wood, Newton) deal in some depth with the thermochemistry of garnets and pyroxenes. These are followed by more general topics: activity–composition relationships (Powell); determination of atomic occupancies (a well-written and concise account by Whittaker); two excellent chapters on dehydration equilibria (Anderson, Chatterjee) and one on mixing in multi-component systems (Grover), which includes an annotated list of relevant publications that use the Margules type equations.

An interesting contribution by J. Holloway shows that a simple equation of state (modified Redlich–Kwong equation) adequately describes the thermodynamic behaviour or pure and mixed fluids above the critical point. Three chapters deal with melts, one on molten salts (Kleppa) discusses their thermodynamic properties but does not enlighten us as to the geological applicability. D. Fraser gives a useful and critical review of the polymer model of silicate melts and shows us the geological relevance, while J. Nicholls does the same, but rather uncritically, for the determination of component activities. The metamorphic petrologist is additionally catered for by a chapter (Eugster) on metamorphic solutions.

Three of the contributions, although interesting in themselves, seem inappropriate to a book (or conference) of this kind, principally because their contents are too specialized or pay too little attention to the general thermodynamical aspects. These chapters are on phlogopite stability (Wones and Dodge), fluid inclusions in metamorphic rocks (Touret), and opaque minerals in lunar rocks (El Goresy and Woermann). A brief but lucid account by O'Nions and Powell on trace-element distribution is one of the few chapters that could be used as a teaching text. It is particularly useful because it deals also with gas solid reactions– a topic of current interest to meteoriticists and the like. But, in general, the aspiration of the editor that the whole book will be a teaching aid is unlikely to be realized as far as first-degree students are concerned. However, twelve of the chapters end with related study problems and although of limited applicability they could be useful to students of the subject. Five of the study problems are supplied with their solutions.

This is a worthwhile and interesting text in that it nicely captures the state of the science at the time. It is relatively well produced from camera-ready typescript but some of the illustrations have been reduced to a size much below the limits of clarity and legibility. While it is unlikely to be purchased by students of the subject other than those involved in thermodynamical application for its own sake, it should be in the library of any self-respecting earth science institution. We are reminded by the last chapter on disequilibrium thermodynamics (Fisher) that kinetics is an equally important aspect of petrology. Perhaps that topic will form the subject of another NATO Advanced Study Institute in the near future.

P. HENDERSON