

alphabetical listings in the chapter on specific treatments, turns out to be somewhat deceptive: thus in both places a search for hackmanite refers the reader to lapis lazuli under which entry it is not mentioned. Similarly, for bowenite and meerschaum one is referred to marble, to no avail.

Nevertheless, this book contains a great mass of important information on all aspects of gemstone enhancement, ranging from the often neglected historical descriptions of the art to up-to-date details of many of the latest techniques for fooling the purchaser — and even the gemmologist. It deserves to be widely read. R.A.HOWIE

Buseck, P. R. ed. *Minerals and Reactions at the Atomic Scale: Transmission Electron Microscopy*. (Reviews in Mineralogy, Volume 27) Washington (Mineralogical Society of America), 1992. xvi + 508 pp. Price \$28.00. ISBN O-939950-32-4.

This volume represents the proceedings of a MSA Short Course on TEM, convened in 1992 by Peter Buseck at Hueston Woods State Park, College Corner, Ohio, USA.

The aims of the course were to allow mineralogists and petrologists to gain an appreciation of the data obtainable from a TEM and to enable them to try out the techniques for themselves. Both of these aims were probably achievable for those able to attend the course, with experienced instructors present and instruments available for demonstration and supervised tuition. This course book, used as a stand-alone manual can certainly fulfil the first of these aims, but it would be unrealistic to expect it to serve as a 'DIY' Manual enabling a complete beginner to carry out the techniques without further help (as one bright, eager research student I know found to his disappointment). As pointed out in the preface, modern TEMs are much easier for the inexperienced operator to use than was the case with older instruments, but the range and quality of information that can be obtained increases with experience. With this *caveat* the course book is an excellent introduction to the principles and practice of modern TEMs in mineralogy and petrology. At US\$28 the book is excellent value for money.

The first part of the book provides an introduction to the principles of TEM, in theory and practice, covering imaging (conventional and high-resolution), diffraction (selected-area and convergent-beam) and chemical analysis (X-ray, energy-loss and electron channelling). This section provides an excellent background to the subject

for beginners, though some understanding of the concepts of crystallography and diffraction is required. It is probably of most benefit to those who already have some experience of TEM use, but wish to fill gaps in their background knowledge or gain a better understanding of concepts that are not clear to them.

The remaining part (more than half) of the book describes some applications, divided into three sections: mineralogy and crystallography (nonstoichiometry, polysomatism and replacement reactions; polytypism and stacking disorder; mineral definition by high-resolution TEM), petrology — low temperature reactions (diagenesis and low-grade metamorphism of shales and slates; growth and alteration microstructures in carbonates) and petrology — high-temperature and deformation-induced reactions (deformation analysis; transformation-induced microstructures). These examples of applications are selected and described in such a way that all readers can get a good idea of the range of recent research using TEM in mineralogy and petrology. Those who already have some TEM experience will derive particular benefit from these sections, and will find particularly interesting the accounts of a range of other specialized applications, beyond their own particular branches of the subject.

The style of this book is generally quite readable and it should be of special interest to all mineralogists, but also to other Earth Scientists and anyone interested in the study of crystalline materials. Particularly useful features of the book are that the writers point out some of the practical problems of specimen preparation and highlight some possible pitfalls in the interpretation of results. Each chapter concludes with a fairly comprehensive list of references, useful for those who wish for more detailed information.

The usefulness of TEM in mineralogy and petrology is generally accepted now that modern instruments can provide information on microstructures, micro-textures and micro-analysis with a spatial resolution that is ideal for most minerals. Now that high-resolution, more user-friendly instruments are more widely available, this book is very timely. Although the instrumentation is expensive, the technique is now available to many Earth Scientists, if not in their own institutions then in other laboratories that would be glad to allow access to their facilities (in return for a financial contribution towards the running costs). Looking through the various international journals it is apparent that TEM is not as widely used in the UK as in the USA, for example. This may be partly because of lack of money, or ignorance of what the TEM can do, or fear of this apparently

complicated machine or of inability to interpret its results. This book should go a long way towards dispelling the second of these difficulties, and hopefully it will also help to reduce the fear.

B. A. CRESSEY

Gill, R., Thirlwall, M., Marriner, G., Norry, M., Saunders, A. and Martí, J. *Tenerife, Canary Islands* (Geologists' Association Guide No.49) London (Geologists' Association), 1994. 38 pp., 4 maps. Price £3.95. ISBN 0-900717-62-9.

This field guide to the volcanic rocks of Tenerife is the only modern field guide available in English for this island, on which exceptionally well exposed volcanic geology can be seen. The latter includes a wide range of basaltic volcanic features (pahoehoe and aa lava flows, exposed lava tubes, dissected scoria cones, etc.), outstanding felsic pyroclastic sequences (plinian pumice fall deposits, thick unwelded, welded and rheomorphic ignimbrites, pyroclastic surge deposits, dome-collapse block-and-ash flows), various forms of felsic lava domes, and active fumaroles.

A brief outline of the volcanic stratigraphy of the island is given, before embarking on an itinerary for a six-day excursion with details for a total of 25 stops. These range from the older basaltic series of Miocene-Pliocene age exposed at the three apices of this roughly triangular island, to the younger Cañadas volcanic products (2.5–0.17 m.y.) with their trachyphonolite domes, Strombolian scoria cones and the huge blanket of largely unwelded ignimbrite. Details are also given of the caldera wall and intracaldera volcanic rocks of the Teide–Pico Viejo complex, and of the impressive 12,195 ft stratovolcanic cone of Teide. The sketch-maps are clear but some of the photographs have suffered in reproduction (notably the panoramic view of the Diego Hernandez sector of the caldera wall), the best being the colour photographs on the outside cover. But at such a reasonable price this slim guide is a must for all interested in volcanoes and volcanic products and indeed for geologically aware holiday-makers.

R. A. HOWIE

Pitcher, W. S. *The Nature and Origin of Granite*. Glasgow and London (Blackie Academic and Professional), 1993. xiv + 321 pp. Price £39.99. ISBN 0-7514-0080-7.

It is nearly 50 years since the author was introduced to granites, by H. H. Read at London's Imperial College. He has since accumu-

lated a vast working knowledge of the subject, and the reader will benefit from his astute observations, extensive reference to related researches, and an entertaining, lucid style of writing. He admits to personal bias on granite origins, appropriately ending the book with 'I rest my case'. In fact, his case is mostly well made.

Each chapter is an essay, with splendid detail ranging from isotopic to major tectonic aspects. Unfortunately, the copious text references rarely give the publication's year or authors' initials, so the reader often has to guess. The likely readership (advanced student or research worker) would do best to turn first to Chapter 18. It is an excellent review of the main theme, which is that granitic rocks image the geological environments of their sources. That is, from mid-ocean ridge, through oceanic island arc, continental margin arc, arc-interior thrust belt, and intercontinental collision zone, to continental rift zone.

I would group the other chapters (not in book sequence), as follows. The first group deals with nomenclature and chemical, physical and textural aspects. The second is on more complex topics such as restites, mixing and hybridization, appinites, migmatites, emplacement mechanisms, and cooling histories. The third, rather more descriptive group deals with Cordilleran-type batholiths, intra-plate magmatism and the waning stages (e.g. ore deposits). The former is a superb account based largely on the author's work.

There are a few topics still to be mentioned. The final chapter is a brief but valuable conclusion, liberally employing two of Professor Pitcher's favoured adjectives, multifactorial and multifarious, to illustrate the complexity of granite-forming processes. The opening chapter is less impressive in its objectivity. There, the history of the 'granite controversy' is reviewed, but the author's heroes and villains are too easily identified. The austere magmatist, C. E. Tilley, once told me of a garage in Arizona with a prominent car-waxing placard saying 'Let us granitize your car'. A tyre-screeching departure signalled his reply! I hope that readers of Chapter 1 will not depart from this book so hastily, but pass quickly to the other chapters.

The three remaining chapters in my grouping promised to complete the comprehensive coverage implied by the book's title, but they did not. I had hoped that for Oceanic Plagiogranite, the Volcano-Plutonic interface, and (perhaps) Differentiation in Granitic Magmas, the author would focus on the primary (ultramafic-mafic) sources of granitic derivative melts, and on processes such as crystal differentiation, liquid