

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

immiscibility and partial melting, where extensive studies have been published. With such omissions, a more appropriate book title could be 'Nature and Origins of Complex (Plutonic) Granitic Assemblages'.

Despite such imbalance, this book does inform, stimulate and entertain. It is written by a scientist who has contributed more to the subject than most other living geologists. I recommend it as very good value to those advanced students who have already balanced the options by reading 'Igneous Petrology' (Carmichael, Turner and Verhoogen).

G. MALCOM BROWN

Wilson, M. J., Ed. *Clay Mineralogy: Spectroscopic and Chemical Determinative Methods*. Chapman & Hall, London. 1994. 367 pp. Price £79.00. ISBN 0-412-53380-4

In the preface the aim of the book is stated to be to make more accessible to the non-specialist a variety of spectroscopic and chemical techniques now being increasingly used for the study of clay materials.

After a general introduction to molecular spectroscopy methods there then follow six chapters describing specific spectroscopic methods: infra-red, Mössbauer, nuclear magnetic, electron paramagnetic, X-ray photo-electron and X-ray fluorescence spectroscopy. The final two chapters are devoted to chemical analysis of clay materials and the characterisation of poorly ordered minerals by selective chemical leaching. Each chapter follows a similar format outlining the principles of each technique, experimental procedures and their applications with examples.

This volume can be seen as an accompanying one to the 'Handbook of Determinative Methods in Clay Mineralogy' also edited by Dr Wilson. Three of the chapters from this volume have been reproduced with some updating in the current book, namely those on infra-red spectroscopy, chemical analysis and the characterisation of poorly ordered minerals by selective chemical methods. However, the changes to the chapters are minimal and as these three chapters make up 30% of the new book, this might be a disincentive to purchasing it for those who already have the 'Handbook of Determinative Methods in Clay Mineralogy'.

At times the book seems to belie its title with sections in many chapters devoted to the application of the techniques to the study of non-clay minerals e.g. infra-red spectroscopy of olivines, Mössbauer spectroscopy of feldspars.

Perhaps it might have been more appropriate to have referred to Clay Materials or Soil Mineralogy rather than Clay Mineralogy in the title.

Overall the book achieves its aim of introducing these various spectroscopic and chemical techniques for the study of clay materials to the non-specialist. Anyone embarking on the use of these analytical methods for the first time will find this book of great value. It provides in one volume a good compilation of basic information that would otherwise be available only from a variety of different sources. For this reason, despite its high price, I am sure that it will soon be on the shelves of many libraries and part of the book collections of clay mineralogists and soil scientists.

H. F. SHAW

Guthrie, G. D. Jr. and Mossman, B. T., eds. *Health Effects of Mineral Dusts* Washington, D.C. (Mineralogical Society of America: Reviews in Mineralogy, Vol. 28), 1993. xvi + 584 pp. Price \$28.00. ISBN 0-939950-33-2

This new volume in the series 'Reviews in Mineralogy' breaks new ground in the extent to which it is interdisciplinary in coverage and interest. The primary sources of mineral dusts are clearly in the realm of Geology but mineral extraction, separation and industrial processing are also very pertinent. The structures and physics and chemistry of minerals form an essential foundation, but since we are concerned here not with the minerals *per se* but with their interaction with the human body, we necessarily enter the fields of biochemistry, pathology and epidemiology. And because some of the mineral dusts can constitute such serious health hazards, we need to address methods of identification and measurement, and also control and regulatory procedures. All of these aspects, and others, are examined in this review, which follows from an M.S.A. short course endorsed by the American College of Chest Physicians and the U.S. Geological Survey.

After a general introduction the next chapter summarizes the nature of the major constituents of mineral dusts, particularly two which occur in asbestiform varieties, the amphiboles and serpentines, but also micas, clays, silica and zeolites. A fascinating part of this chapter deals with the generation and migration of natural dusts and their quantitative estimation, an often neglected background upon which man-made dusts are superimposed. A further three chapters deal more extensively with the aforementioned minerals and also with oxides and phosphates,