

of the actual use of SEM, again containing much useful experimental information. Special techniques for TEM (preparation of replicas, ultrathin sections) are covered separately, and there are also sections on recent and specialized methods such as ion-beam thinning and section-etching.

In the final three chapters of the book—*Other Methods of Operation, Quantitative Analysis, and Further Developments*—such fields as cathodoluminescence, electron diffraction and X-ray detectors are introduced, and there is an extended discussion of quantification of electron microscopy observations, an area of much current interest. It would be necessary in most cases here to refer to the original literature before one could actually employ the techniques covered, however.

The book is excellently produced in a clear double-column format. The collection and critical assessment in one volume of so much information that was previously widely disseminated in the literature makes this an essential purchase for any electron microscopist working in similar fields to the authors.

ANDREW PARKER

Fripiat, J. J., ed. *Advanced Techniques for Clay Mineral Analysis* (Developments in Sedimentology: Vol. 34). Amsterdam and New York (Elsevier Scientific Publishing Co.), 1982. vi + 234 pp., 58 figs., 4 pls. Price Dfl 100.00 (\$42.50).

The scientific and technical understanding of clays has progressed rapidly over the last few decades. Information used to be broadly confined to exchange capacities, to elemental analyses (by painstaking wet chemical methods) and to some structural information from X-ray diffraction. Nowadays, novel physical techniques, often centred around specialized instrumentation, are becoming increasingly used in both pure and applied clay mineral research. The quality and quantity of information is now vast.

In recognition of these advances, the Organizing Committee of the 7th International Clay Conference (September 1981: Italy) included a special Symposium on Advanced Methods in Clay Minerals Research with Professor J. J. Fripiat as Organizing Editor. The Symposium was divided into three sessions on different days and 20 min. were allotted for each of the nine Plenary talks. The lectures were distributed to the Conference participants in the form of a soft-back book under the title 'Advanced Techniques for Clay Mineral Analysis'. The book under review is unchanged except that it is in hardback form and contains a nine page Subject Index. There is no Author Index and the Discussions which were timetabled to

follow each group of Plenary talks have not been summarized.

The chapters deal with thermoanalytical methods (R. C. Mackenzie, 25 pp.), high resolution electron microscopy (J. P. Eberhart, 20 pp.), neutron scattering (P. L. Hall, 25 pp.), NMR (W. E. E. Stone, 36 pp.), Mossbauer spectroscopy (B. A. Goodman, 25 pp.), electron spin resonance (T. J. Pinnavaia, 22 pp.), ultraviolet and visible light spectroscopy (R. A. Schoonheydt, 27 pp.), far infrared spectroscopy (J. J. Fripiat, 20 pp.) and ESCA (P. Canesson, 16 pp.).

Most chapters have a common format: a presentation of the theory followed by practical examples ending with an indication of the information which can be obtained. There are about 600 literature references in all. The choice of title is curious since the emphasis is on clay minerals research and not clay mineral analysis.

There is the danger that each area of speciality develops its own specialized language. Each becomes so compartmentalized that instead of a particular technique being used as part of an investigation of the clay material, the objective becomes misplaced: the clay material is used as an example to illustrate the application of the technique. The present volume does not fall into this trap and is a constructive step forward, both in concept and in result.

I have one criticism. Thus in his Preface, Professor Fripiat explains that the authors were asked to 'avoid as much as possible theoretical discussions' and to concentrate instead on results and interpretation. In some of the chapters this does seem to have led to an excessive compression of the theoretical principles to such an extent that the required short introduction has become the quick revision. This is unfortunate. These authors would perhaps have done better to concentrate on transferring the physical principles of their subjects to the non-specialist (and many clay scientists are such because their subject is so broadly based) and for whom the volume is intended anyway. The chapter by R. C. Mackenzie on thermoanalytical methods is an exception: the subject is well organized and the writing is clear.

The material has been reproduced directly from typescript by offset lithography and there is a variation in style. Nevertheless, within this limitation, the printer has produced a good result. The text, line drawings and diagrams are easily read, but the reproduction of the several half-tones falls short of the standard needed for precise assessment of micrographs.

As a 'starter' I recommend the book. It is an 'appetite-wetter' to the many exciting techniques which offer so much promise. I endorse Professor

Fripiat's recommendation of what might be termed the companion book: *Advanced Chemical methods for Soil Clay Mineral Research* (Nato Advanced Study Institutes: Series C: Mathematical and Physical Sciences, D. Reidel Publ. Co., 1980, ed. J. W. Stucki and W. L. Banwart).

W. B. JEPSON

Augustithis, S. S. *Atlas of the Sphaeroidal Textures and Structures and their Genetic Significance*. Athens (Theophrastus Publications) 1982, x + 329 pp. 608 figs. Price 50 \$US (post-free).

This is the most recent in a series of Atlases produced by Professor Augustithis and this volume consists mainly of photographs of sphaeroidal forms found in rocks. These include oolites, pisolites, concretions, stalactites, stromatolites, manganese nodules, nuggets of gold and platinum, amygdales, Rapikivi texture, orbicular texture, pillow structures, augen structure, spherical crystals of plagioclase, rolled garnets, sphaeroidal weathering, perlitic cracks, etc.

There are 28 chapters of text in 89 pages. This is followed by 208 pages containing 608 figures almost all of which are black and white photomicrographs of thin sections of rocks. The quality of the photographs is very variable and although many show what they purport to show, in others it is difficult to know why the photograph is reproduced. This reviewer is very doubtful of the value of a photomicrograph in which the minerals have to be identified by the superposition of letters such as 'pl' over a multiply twinned crystal which looks like a plagioclase, and 'm' over an intergrowth which the photograph is intended to show is myrmekite. In a number of cases a few photographs show almost identical features and the number of illustrations could have been reduced by removing the spare ones.

In view of the fact that this book consists mainly of photomicrographs it is difficult to understand why these are not always sharp—the quality of the paper is good but many of the photographs are distinctly fuzzy while some others have reproduced fairly well.

Reviews in the *Mineral. Mag.* of previous Atlases by Augustithis (R. N. Thompson, 42, 414 and F. G. F. Gibb, 43, 1076) have commented on the fact that this author tends to interpret textures in his own way and to ignore other interpretations. The present reviewer believes that in books of this kind where so many textures are illustrated there is not sufficient space to discuss the evidence for the origin of most of the textures since much of the evidence must come from factors other than just the appearance of the texture.

It is difficult to understand why Professor Augustithis has collected all spherical or sub-spherical textures or structures together in one Atlas. The field covered by this book is too wide for the specialized interests of most geologists. The price of this volume is much less than that of previous volumes of similar size in this series but this reviewer does not envisage a great demand for a book of this type either from students or from teachers.

W. S. MACKENZIE

Berkman, D. A., and Ryall, W. R. *Field Geologists' Manual* (Second Edition). Parkville, Victoria 3052, Australia (Australasian Institute of Mining and Metallurgy), 1982. xiv + 302 pp. Price \$A 25.00.

This book is almost literally a mine of information, containing a wide selection of basic data likely to be required by a geologist during the course of his work. The tables include, for example, a list of some 500 common minerals with their composition, hardness values, and densities; classification schemes for igneous, sedimentary, and metamorphic rocks; size terminology; average abundances for minor elements in the Earth's crust; general notes for geochemical sampling; probability  $\times$  three-cycle log graph paper; geological time scale; checklists for recording outcrop information; classification of folds; airphoto scale nomogram; classification of landslides; notes on water sampling and analysis; stereonet (orthographic, Wulff and Schmidt); metric and SI conversion factors; and a seventy-year calendar. Originally written for Australian use, this second edition contains new and updated material and will again lead to the book's wide acceptance as a field handbook.

R. A. HOWIE

Larson, E. E., and Birkeland, P. W. *Putnam's Geology* (Fourth Edition). New York and Oxford (Oxford Univ. Press), 1982. viii + 792 pp., approx. 1000 figs., 16 colour pls. Price £12.50.

In this latest edition the readable and understandable style of the earlier editions of this well-illustrated elementary text has been retained, though much of the material has been revised and updated in line with new ideas. There are new chapters on the solar system and on energy and resources. The emphasis tends to be on physical geology, but the materials that make up the Earth are described and the importance of time as a geological factor is emphasized.

R. A. HOWIE