

go a long way to bringing these two groups together so that they are on speaking terms at least.

Although the book has three authors they were together in the same department at the time of conception, if not at the actual birth of the book. Each has undoubtedly contributed mainly to his own special interest but the result is a very well integrated and clearly written text. One gets a feeling that the authors are enthusiastic about their subject and some of this enthusiasm will almost certainly be transmitted to their readers.

Although the authors state in their preface that the book is not built round any specific course, it seems likely that some teachers of igneous petrology may wish to build a course, somewhere between second- and third-year level, round this book. The fact that exercises accompany each chapter with answers at the end of the book, is another feature which makes it an attractive book on which to base a course.

Both the authors and publishers are to be congratulated in setting the price at a level which allows lecturers to recommend this text to geology students as an essential purchase. Of course one can find faults but most of these are misprints or small omissions. This reviewer is slightly disappointed in the reproduction of the photomicrographs which are much too black and in some cases this has obscured the features which the authors wish to illustrate.

W. S. MACKENZIE

Gupta (A. K.) and Yagi (K.). *Petrology and Genesis of Leucite-bearing Rocks* (Minerals and Rocks, vol. 14). Berlin, Heidelberg, and New York (Springer-Verlag), 1980. xv+252 pp., 99 figs. Price DM 69.50 (£19.60).

Leucite-bearing rocks have aroused a disproportionately high level of interest compared to their volume. This is probably due to two main factors viz. (a) their unusual chemistry (both major and minor element) which is reflected by such minerals as wadeite, priderite, magnophorite, kaliophilite, and leucite itself, (b) their geographically widespread occurrence in many tectonic settings. One unfortunate result of this unusual chemistry is the evolution of a large, overlapping sometimes confusing nomenclature. Such names as jumillite, orendite, wolgidite, shonkinite, etc., abound and these names must seem unpalatable to many students of petrology.

The number of hypotheses to explain both the origin of the parent magma and the relationships of the many rock types have also built up over the many years of investigation. Thus there is a need for a single publication to gather and explain

(a) nomenclature, (b) petrography, (c) chemistry, (d) experimental work, (e) hypotheses on petrogenesis of the leucite-bearing rocks and it is the expressed intention of the authors to fill this need.

The book consists of 18 chapters and can be divided into 3 parts, (a) chapters 1 to 6 deal with the nomenclature, mineralogy, chemistry, and occurrence, (b) chapters 7 to 15 present experimental data, (c) chapters 16 to 18 cover tectonic setting and theories of origin. The reviewer's opinion on the length of these three sections is that the first is about right, the second far too long, and the third much too short.

The first section should prove very welcome to students and research workers alike since most of the rock types are described (although tephrite is unfortunately omitted) and a clear picture of the interrelationships is built up. The essential and also accessory minerals are described in turn. The description of leucite is marred by a failure to state that leucite is only cubic at elevated temperature and is always tetragonal when examined at ambient temperature, instead the misconception suggested by Carmichael that the high-temperature cubic form could be quenched is perpetuated here.

The middle section is largely devoted to descriptions of synthetic and natural systems and seems too long and tedious. The excessive length is chiefly caused by the inclusion of material which is only marginally relevant to the main theme, for instance two longish chapters are devoted to melilite-bearing systems, a mineral totally absent from many leucite rocks. A third chapter is devoted to the incompatibility of leucite and albite which is not a very positive approach. These three chapters are largely based on the authors' own work, and while it is usual to emphasize one's own experiences to some extent, I think this approach has been overdone in this book. My other criticism of this middle section is that, although it contains much data, the application of this data to elucidating the problems of genesis is not too profound.

The third section is devoted to wider problems on the petrogenesis of  $K_2O$ -rich magmas and the interrelationship of the many rock types. The more important hypotheses for the origin of the leucite rocks are all presented and discussed. The authors come down almost exclusively in favour of a process of partial melting of a mica-bearing mantle for the production of a suitable primary magma. Their dismissal of several of the other hypotheses are all based on too little argument. For instance, the idea of Gorai, which depends on the selective absorption of alkali-feldspar from a granite by a basic magma, is ruled out because of results obtained on equilibrium, heating experiments involving the mixing of granite and basalt powder.

Clearly the experiments were in no way following the natural process. The hypothesis of assimilation of granite by carbonatite melt is discarded because of the lack of superheat. However such a melt produced by immiscibility with a high-temperature, basic melt will be 100–200 °C above its liquidus and be quite capable of digesting heated country rock. Similarly the eclogite fractionation scheme of O'Hara and Yoder is too easily dismissed as are the ideas of Harris on zone refining. Fuller discussion of all these theories at the expense of some of the less relevant experimental work would have been most welcome.

Many of the figures and maps have been taken directly from the literature and in consequence suffer from the drawback that bits and pieces appear on them which are neither used nor explained. In addition, most of the figures have been reduced in size from the originals and some are just too small for comfortable reading.

Thus the reviewer's opinion is that this book is a reasonable chronicle of facts about the leucite-bearing rocks set out in an acceptable format and therefore is a useful addition to the geological literature. However, the standard of scientific argument was disappointingly low.

D. L. HAMILTON

Burns, R. G., Editor. *Marine Minerals* (Short Course Notes, 6). Washington (Mineralog. Soc. America), 1979. x+380 pp., 133 figs., 2 colour pls. Price \$6.

The Mineralogical Society of America should be complimented on producing such a succinct and up-to-date account of the main groups of minerals which develop in marine sediments. There are some regrettable omissions, however, the most striking of which is the absence of discussion of the most important carbonate minerals. This omission has been explained as due to the enormity of data on this group and that it would merit a volume on its own. This is a pity, as it would surely have been possible to have given a review of the more important aspects of this group in the same number of pages devoted to other topics. Similarly,

although they get a brief mention, the absence of a discussion of sulphides and that 'most marine of minerals', glauconite, is surprising.

Nevertheless, in spite of these omissions, the volume is an extremely valuable review of this broad, rapidly expanding field. It is particularly useful in that many of the modern results are presented in journals not seen by all geologists and almost certainly not perused by many mineralogists.

Interesting chapters on the Manganese Oxides by R. G. Burns and V. E. Burns and the Iron Oxides by J. W. Murray are followed by a discussion of Silica Polymorphs by M. Kastner. Other chapters include Zeolites by M. Kastner, Clay Minerals by J. C. Hathaway, Marine Phosphorites by F. T. Manheim and R. A. Gulbrandsen, and Marine Barite by T. M. Church. These are followed by two excellent comprehensive chapters by W. T. Holser on The Mineralogy of Evaporites and Trace Elements and Isotopes in Evaporites. The volume is concluded by a rather cursory review of Marine Placer Deposits by V. M. Burns.

Generally, the various authors have restricted themselves to the primary and early diagenetic minerals that form within the marine realm rather than describe the minerals that develop in marine rocks. There is, for example, no discussion of the precipitation of clays in sandstones or the development of authigenic titania minerals, overgrowths on zircon, feldspar, etc., features which so commonly confront the student of ancient marine sediments.

The various topics are not dealt with in a uniform way but most authors give a brief historical summary of the particular minerals, discuss their structure and chemistry, and give a short review of their various theories of origin. All chapters are accompanied by lengthy and useful bibliographies.

The volume is clearly printed and has few typographical errors. It is illustrated with line drawings, a few black and white, and two colour plates. It is very modestly priced and this should ensure it a wide sale to students as well as professional geologists.

G. EVANS