# BOOK REVIEWS

Dunning, F. W., Mykura, W., and Slater, D., Editors. *Mineral Deposits of Europe. Volume 2: Southeast Europe.* London (Mineralogical Society and Institution of Mining and Metallurgy), 1982. xii + 304 pp. 184 figs. Price £42·00 (£35·00 to Members of either Society).

This is the second of the five volumes (M.M. **43**-451) planned on the geology of European ore deposits. There is an introduction on the main geotectonic and metallogenic features of southeast Europe, followed by chapters on Hungary, Yugoslavia, Albania, Romania, Bulgaria, Greece, and Cyprus, and a final chapter giving statistical commodity summaries for each country. In his introductory chapter W. S. Petraschek points out that the economically important ore concentrations were emplaced principally in the Mesozoic and Tertiary eras, some 71% of all deposits of the Balkan-Carpathian region being of Alpine age and 16% Hercynian. In the northern branch of the orogen, Cu is the most important ore, whereas in the southern branch Pb and Zn are paramount.

In most of the territorial chapters the structure and tectonics are outlined and related to the metallogenesis, though in the chapter on Greece the ores are considered on an elemental and commodity basis. Thus in general this work gives useful reviews in English of the geology of each country as well as of the important economic aspects. The fairly extensive references at the end of each chapter should allow the diligent reader to go further into the literature if required (there is generally some indication of the language of the main text and a statement as to summaries in western languages).

In the central mountains of Hungary the post-magmatic copper and polymetallic ores are associated with Tertiary volcanism, but the Mesozoic formations of the Carpathian basin are also rich in metalliferous and non-metalliferous minerals. The Carpathian orogen controls the metallogenesis in Romania, the subject of the longest chapter in the book. There is a remarkable correlation of Alpine metallogenesis between the Apuseni Mountains and the Carpathian arc with each unit showing different evolutionary patterns as well as indicating the persistence of certain genetic and paragenetic conditions.

In Yugoslavia, and to some extent in Greece, several sub-parallel metallogenetic provinces can be established roughly along the NW-SE grain of the country. The Alpine metallogeny in the Serbo-Macedonian province produced the most significant Pb-Zn, Sb, Bi, and Mo deposits, and the Carpatho-Balkan province in the east passes to the north and southwest into Romania and Bulgaria respectively, but in Yugoslavia includes the important Bor magmatic complex, mainly of volcaniclastics, containing numerous Cu-Mo massive sulphides, and hydrothermal Pb-Zn deposits. The Rhodope zone in Bulgaria is characterized also by important Pb-Zn deposits but is locally relatively rich in Mn. To the north, the Srednogorié zone includes the Panagyurishté porphyry copper deposits. In Albania the chromite deposits occur in ultrabasic rocks with ophiolitic affinities, metallurgical grade chromite being obtained from the Bulqiza harzburgite massif.

In Cyprus the cupriferous sulphide orebodies that have been mined for some 6000 years are restricted to the Troodos pillow lavas; chromite is the second most important metallic mineral mined and occurs in the Troodos ultrabasic plutonic rocks. In the last chapter A. J. G. Notholt gives mineral production figures and commodity statistics for various years from 1960 to 1979.

The book is beautifully produced and printed and well illustrated by numerous geological sketch-maps and cross-sections. Almost all the deposits are described for the first time in English by authors from the countries concerned and some occurrences are new to the literature. It will be of interest to a wide readership and deserves to be in all libraries concerned with the earth sciences.

R. A. HOWIE

Newton, R. C., Navrotsky, A., and Wood, B. J. *Thermodynamics of Minerals and Melts* (Advances in Physical Geochemistry, **1**). Berlin, Heidelberg, and New York (Springer-Verlag), 1981. xiii + 304 pp., 66 figs. Price DM 78.00 ($35.50).

There is much of considerable interest to the theoretical petrologist gathered between the covers of this book. The material included covers a very wide range of topics. As stated in the preface, the volume is an outgrowth from a seminar series held at the University of Chicago. This history maybe explains one or two features of the book. Obviously the choice of papers was (at least partially) mitigated by who happened to pass through Chicago in 1979. It might be argued that the book lacks a sense of unity. Is the book trying to summarize research work, present new work, educate research workers, or educate students? The papers spread

across these diverse categories. Sometimes the papers make strange bed-fellows. For example Tunell's paper seems totally out of place here.

It seems to me that a book of this kind provides an ideal opportunity to proselytize about thermodynamics in geology. The papers should be fundamentally educational although maybe presenting new research, certainly summarizing and rationalizing old research. Holland's paper comes in this category. Straight research papers like the one of Lindsley *et al.* surely should be found in a research journal. The authors may even have benefited from the more stringent reviewing thus entailed.

It might seem churlish to criticize the conception and content of a book in this way. Given that the book now exists, there is much to be learnt from many of the chapters. It is a valuable addition to any theoretical petrologist's library. Unfortunately, the lack of an attempt to educate makes much of the material inaccessible to 'ordinary' petrologists, sadly, as the book is of profound relevance to them.

R. POWELL

West, D. R. F. *Ternary Equilibrium Diagrams* (2nd edn.). London and New York (Chapman and Hall), 1982. viii + 149 pp., 101 figs. Price £13·00 (hardback), £5·95 (paperback).

This is the second edition of a book first published in 1965. The main text of the book is little altered but the overall size is enlarged by the addition of problems (with answers) and a chapter on 'selected case studies of ternary systems'.

It is a book for metallurgy students and therefore pays little, if any, attention to topics of importance in geology such as evolution of melt composition, pressure as a variable, and effect of volatiles. The nomenclature used is somewhat different from that used by geologists: it was interesting to learn that 'eutectic', a word restricted to isobaric invariant situations in ceramics and earth sciences, is used in a wider sense to include univariant situations, i.e. 'field-boundary' is never used, being replaced by 'binary eutectic curve' or 'eutectic valley'. Similarly for peritectic, so that 'peritectic curve' is used in place of 'reaction curve'. West also describes a 'monotectic reaction' but I failed to grasp the meaning of this. His use is certainly different to that of Ricci's.

I was not too happy with West's descriptive treatment of the subject (i.e. the material carried forward from the first edition), certainly a sound knowledge of binary systems is a pre-requisite and greater use of the bounding binary systems would have been appreciated. A few vertical sections are shown but the method of sectioning is not explained. The text deals with plotting on equilateral triangles and then without any explanation certain systems (e.g. Al–Cu–Mg, C–Cr–Fe) are shown on rectilinear diagrams. The Fe–O system surprisingly gets only a brief mention and no attempt has been made to show oxygen isobars on either a binary or ternary diagram.

The strong points of the book are threefold: (1) the very good 3-D drawing) (2) the problems with answers; (3) the presentation of a few 'real systems'. A diligent student will learn a lot by answering the questions.

The book is possibly of much use to metallurgists but I can only give it a moderate recommendation for earth scientists.

D. L. HAMILTON

Hughes, C. J. *Igneous Petrology* (Developments in Petrology, 7). Amsterdam and New York (Elsevier Scientific Publishing Co.), 1982. xvi + 551 pp., 79 figs. Price Dfl. 70.00 ($28.00).

Textbooks on igneous petrology usually fall into one of two categories. On the one hand there are those texts which deal mainly with field relationships, mineralogy and petrography, and form essential references for any student of the subject. On the other hand there are the more advanced texts, dealing with magma series, geochemistry, thermodynamics, isotope systematics and so on—invaluable reading for the more senior undergraduate and research student. This latest book on igneous petrology by Dr Hughes of Memorial University, Newfoundland, seeks to bridge the gap between the two types of text by integrating the various aspects of igneous petrology within a framework of modern global plate tectonics.

The book comprises fourteen chapters covering a wide range of subjects, including mineralogy, petrography, volcanic activity, forms and structures of intrusive rocks, classification of igneous rock series, and degradation of igneous rocks. Chapters 8 to 10 deal with igneous rocks from specific tectonic settings (oceanic areas, continental areas, and supra-Benioff zone regions); Chapter 11 deals with Precambrian igneous rocks; and Chapter 12 deals with the petrogenesis of igneous rocks. In general, the layout of the book is not dissimilar to texts already available, and is aimed ostensibly at more senior undergraduate and higher levels.

The book is lucid and well-referenced, but certain features (or their absence) give rise to serious misgivings. For example, the three chapters on petrography, volcanic activity, and forms and structures of intrusive rocks contain *only one illustration* among them; this, surely, is a serious shortcoming? Indeed, in its present form, the