

BOOK REVIEWS

Symposium volumes, and other books that are collections of papers by individual authors, present a problem for reviewing. The Editor has found it very difficult to get a perceptive review, one that really does very much more than list the papers by author and title. The Editor has recently decided to accept this situation, and at the same time decrease the delay in bringing notice of such volumes to our readers, by simply making up most such "reviews" in this office from the volumes received from the publisher. Where the list of titles is of interest and is not too long, it will be given in full, otherwise only the general coverage will be indicated. A reader of this journal who may become aware of such volumes that need more specific and detailed reviews, should write to the Editor, and our copy will be sent to him for review unless the above style of notice has already been printed.

William T. Holser

MINERAL SPECIMENS. By C. J. MORRISSEY. American Elsevier Publishing Co. Inc., New York, 1968, 202 pages, \$18.00.

This is an attractively produced book describing one hundred minerals in the form of a double-page spread for each—one page of description and a facing page with a color photograph of one or more typical specimens. The descriptions are essentially those of any standard textbook, there being little scope for originality here. The color photographs are a mixed lot, ranging from excellent (rosasite, enargite) through good (galena, prehnite, rhodochrosite) to mediocre (chalcopyrite, crocoite, erythrite). The one hundred minerals are mostly common and important species, but there are a few surprises—fowlerite (as well as rhodonite), campylite, adamite, calaverite, euchroite.

The question in my mind is as to who might profitably buy this book. The foreword indicates that it is intended "to be of use to the amateur mineralogist as a work of reference." I would say that this purpose has been fulfilled—to a limited degree, and rather expensively. Being a "coffee table" sized book, it is hardly useful as a field guide. One hundred species is a limited introduction to the wealth of minerals that even an amateur mineralogist may aspire to know. The fact is that this book does not meet the competition—there are other books for the amateur mineralogist equally or more attractive, lower in price, and more informative and useful.

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INTERNATIONAL MINERALOGICAL ASSOCIATION, PAPERS AND PROCEEDINGS OF THE FIFTH GENERAL MEETING, CAMBRIDGE, ENGLAND, AUGUST 30-SEPTEMBER 3, 1966. The Mineralogical Society, London, 1968, 350 p., \$8.00.

Most papers are published in full for the two very informative symposia, and abstracts of the papers are given for the general sessions.

Symposium I, on Bonding Forces and Crystal Growth in Minerals, includes the following: *L. V. Bershov and A. S. Marjumin*, Paramagnetic resonance of electron-hole centres in minerals; *A. S. Povarennykh*, The strength of bonding forces in mineral structures; *P. J. Shlichta*, The influence of dislocation-strain energy on crystal morphology; *J. Zemann*, Measurement and interpretation of infra red pleochroism in minerals; *K. L. Keester and W. B. White*, Crystal-field spectra and chemical bonding in manganese minerals; *G. M.*

Bancroft and R. G. Burns, Applications of the Mössbauer effect to mineralogy; *P. J. Gielisse*, Growth of diamond and cubic boron nitride from multi-component systems; *B. Poly*, La croissance du quartz lamellaire sur l'exemple des cristaux de la Gardette (Isère, France); *I. Sunagawa and Y. Endo*, Macro- and micro-morphology of quartz and pyrite; *R. Kretz*, Growth of phlogopite crystals in marble from Quebec; *P. Hartman*, Comparison between theoretical and observed morphology of crystals with the rutile type structure; *I. Kostov*, Notation and genetic significance of crystal habits; *J. Banfield and A. F. Seager*, Crystal growth of galena; *H. Arning and A. Preisinger*, Inclusions of gases in minerals; *V. B. Tatarsky and V. F. Chernyshova*, An investigation of natural and synthetic quartz by the Hilger-Chance refractometer; *V. A. Frank-Kamenetsky and I. E. Kamentsev*, Substitutional and interstitial impurities in quartz and their mineralogical significance; *R. O. Radkevich*, The geochemical significance of dendritic-skeletal crystallization in polymetallic ore deposition processes; *K. Recker, A. Neuhaus, and R. Leckebusch*, Vergleichende Untersuchungen der Farb- und Lumineszenzeigenschaften natürlicher und gezüchteter definiert dotierte Fluorite; *M. Bienfait and R. Kern*, Thermodynamique et cinétique de formation d'une texture par nucléation dans un champ de tension; *J. W. Harris*, The relative orientation of solid mineral inclusions in diamond.

Symposium II, on Amphiboles and Pyroxenes, includes the following: *R. G. Burns*, Crystal-field phenomena and iron enrichments in pyroxenes and amphiboles; *M. M. Babkine, J. Bolfa, J. C. Reithler, and C. Zeller*, Étude magnétique de pyroxènes et d'amphiboles; *B. J. Cahill (née Macara)*, The use of amphiboles to illustrate trends in contact metamorphism; *J. Fabriès*, Nature des hornblendes et types de métamorphisme; *I. V. Ginzburg*, An attempt to rationalize the classification of natural pyroxenes of space group C2/c; *A. D. Edgar*, The α - β -LiAlSi₂O₆ (spodumene) transition from 5 000 to 45 000 lb/in² P_{H₂O}; *E. J. W. Whittaker*, Classification of the amphiboles; *Th. J. Hinrichsen*, Hydrothermal investigations and stability relations of synthetic gedrites; *R. Phillips and G. Rowbotham*, Studies on synthetic alkali amphiboles; *K. Schürmann*, Synthesis and stability field of communitingonite; *V. I. Kovalenko*, On the chemical composition, properties, and mineral paragenesis of riebeckite-arfvedsonite; *D. P. Serdyuchenko*, On the amphiboles of the hastingsite-pargasite series; *C. M. B. Henderson*, Chemistry of the hastingsitic amphiboles from the Marangudzi igneous complex, Southern Rhodesia; *W. E. Addison and J. H. Sharp*, Redox behaviour of amosite; *H. Jans and P. de Bèthune*, The alkalic amphibole of the Lueshe carbonatite; *P. de Bèthune and H. Jans*, On the pleochroic formula of alkalic amphiboles; *G. V. Gvakharia*, Some aspects of the chemical composition of non alkaline monoclinic pyroxenes from effusive rocks; *V. A. Kirkinskii*, Phase transitions of enstatite in the Earth's mantle; *A. Neuhaus*, Über Kosmochlör (Ureyit).

William T. Holser

LES CENTRES COLORÉS DANS LES CRISTAUX IONIQUES. Presses Universitaires de France, 108 Boulevard Saint Germain, Paris VI, France (*J. Phys.* 28, Colloq. C4, Suppl. to no. 8-9), 188 p., 35 fr.

Proceedings of the Colloque sur les Centres Colores, held at Saclay in March, 1967. Thirty two papers on color centers in alkali halides, about half in English and half in French.

WILLIAM T. HOLSER

METAMORPHIC PETROLOGY. By FRANCIS J. TURNER. McGraw-Hill, Inc., New York, 1968, 403 pages, \$13.50.

Students of metamorphic petrology will welcome this latest work by F. J. Turner for his treatment of important features that previous textbook writers have presented in more

cursory fashion. Among these are: (1) succinct descriptions of classic metamorphic terranes in Great Britain, the Alps, New England, the Adirondacks, California, Japan, New Zealand and India-Ceylon; (2) detailed discussions of experimentally determined phase equilibria; (3) thermodynamic calculations of univariant reactions, especially those involving calc-silicates; and (4) discussion of the temporal generation and decay of metamorphic conditions, and the relationship of recrystallization to tectonism. Other, more classical, sections deal with the concept and history of metamorphic mineral facies, an inevitable reclassification of specific facies assemblages and facies series, and graphical representation of mineral compatibilities.

Metamorphic Petrology will be especially valuable for graduate students, in spite of certain drawbacks. Absent from such a modern treatment are discussions regarding the fractionations of oxygen isotopes and major and trace elements among coexisting phases, and the effects of variable oxygen fugacity and, to a lesser extent, f_{H_2O} , on mineral parageneses. Turner equates fluid pressure to lithostatic—in carbonate-poor sections, meaning $P_{H_2O} = P_{lithostatic}$. There is no mention of fissure equilibrium and only the barest discussion of the role of fluid in granulite facies metamorphism.

The continued usage of the classic AKF and ACF diagrams in this text points up the inadequacy of such graphical representations to systematize complex mineral assemblage relationships: four, five, or more independent chemical variables cannot be projected satisfactorily into a figure possessing but two independent parameters.

The physical conditions of metamorphism in various terranes have been deduced by application of the results of laboratory and theoretical phase equilibrium studies—principally those performed by researchers associated with the University of California, Berkeley. Turner freely admits this bias in the Preface, and in several passages in the text. Although such parochialism tends to slight the contributions of many other petrologists, the book nevertheless stands as an impressive monument to the productivity of the Berkeley school.

In summary, *Metamorphic Petrology* is the only text which adequately integrates a discussion of progressive and contact metamorphic mineral parageneses with regional geologic relationships and laboratory and theoretical studies; it is in my opinion the best text of its kind currently available.

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METHODS IN SEDIMENTARY PETROLOGY. By GERMAN MUELLER. (Translated by Hans-Ulrich Schmincke). Hafner Publishing Co., New York, 1967, 283 pages, \$12.50.

This book is a summary of techniques used to study sediments and sedimentary rocks. It is superb in summarizing what to do, but inadequate in the treatment of how to do it. Only about 25 percent of the techniques are described in sufficient detail to use the text as a cookbook for students. However, references (more than 500 are cited) to more detailed articles are given in most places where the book is incomplete.

The book is devoted largely to laboratory techniques, but begins with 10 pages on geophysical methods and 20 pages on field techniques. The treatment in these 30 pages is sketchy and incomplete: gravity measurements are described in 11 lines, magnetic measurements are not mentioned; cross-bedding is the only paleocurrent structure mentioned.

Major subheadings in the 220-page chapter on laboratory techniques are: sample preparation, grain size analyses, fabric studies, mineral separation, mineral identification, determination of organic matter, and analysis of pore space and pore content. The range of topics covered is impressive and includes: electro-dialysis, fabric analysis with a universal

stage, phase-contrast microscopy, X-ray diffraction, DTA and paper chromatography.

The book is valuable as an encyclopedic summary or laboratory techniques used in the study of rocks in general, although some techniques are applicable only to sediments or sedimentary rocks. The book is concise and well organized and indexed. A valuable feature is the listing of brand names, and names and addresses of manufacturers of equipment and supplies. Most products, of course, are European. This book is a smooth and fluent translation of the German edition published in 1964.

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THERMODYNAMICS FOR GEOLOGISTS. By RAYMOND KERN AND ALAIN WEISBROD.

Translated by Duncan Mckie. Freeman, Cooper and Co., San Francisco. 1967. 304 p., \$9.50.

The study of thermodynamics can be profitably repeated several times at progressively increasing levels of abstraction and rigor. This book is intended as a first introduction with emphasis on motivation and immediate application. It differs chiefly from the multitude of other books at this level by the inclusion of a host of worked examples from the field of mineral chemistry and by brief discussions of some topics of special interest to geologists (*e.g.*, nonhydrostatic stress, "lithostatic" *versus* hydrostatic pressure, equilibrium in a gravitational field, "inert" *versus* "mobile" components, *etc.*).

All statistical and kinetic arguments are excluded. The concept of chemical potential and treatment of systems of variable composition are deferred to the last half of the book. Discussion of phase diagrams is minimal. There is no discussion of experimental methods, error limits, or the degree of confidence to be attached to various sources of thermochemical data.

Many important examples of thermochemical reasoning taken from the geological literature are worked through in detail. Unfortunately for the unwary reader, uncritical acceptance of obsolete phase diagrams, thermochemical data, and geological interpretations leads to some dubious conclusions (*e.g.*, page 140 "quartz and fayalite, like quartz and forsterite, cannot therefore coexist in the same rock."). Nevertheless these examples are interesting, significant and, for the most part, not available in other textbooks.

As an introduction to thermodynamics, this book will be welcomed by the student who demands the stimulus of immediate geological application and who is untroubled by questions of precision and rigor. Careful further study of one of the standard textbooks listed in the bibliography (*e.g.*, Denbigh) is recommended.

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