BOOK REVIEWS

A NEW PERIODIC TABLE OF THE ELEMENTS BASED ON THE STRUCTURE OF THE ATOM, by S. I. Tomkeieff. Chapman & Hall, Ltd., London, 1954. 30 pages ($13\frac{1}{4} \times 12\frac{1}{4}$ inches), 2 plates, 7 figures. Price 10 s. net.

So many modifications of the periodic table have appeared in recent years that a worthwhile one is likely to be lost in the maze of those that merit little or no attention. The novel arrangement proposed by Tomkeieff lends itself uncommonly well to the graphic representation of certain properties of the elements and of their simple compounds and to comparison of compositions of naturally occurring substances. It should therefore be of interest to geochemists, mineralogists, and teachers and students of subjects dealing with distribution of the elements and with properties of the elements and simple compounds.

The book begins with a brief history of the periodic system and continues with a more detailed discussion of the relation between atomic structure and the periodic system. A 15-page table of the elements gives atomic numbers and weights, mass numbers and relative abundances of isotopes, number and structure of shells, type of atom, group and period, valency, color, state, date of discovery, and derivation of the name of each element. An additional column giving the atomic and ionic radii, insofar as they are known, would have enhanced the usefulness of the table considerably.

The three principal types of the periodic table—rectilinear, helical, and spiral—are discussed briefly, and the advantages of the one chosen by Tomkeieff (the oval-shaped distorted spiral) are outlined:

(1) It gives a marked separation between the long and short periods.

(2) Spacing is more or less even between the symbols for the elements.

(3) The fourth group of the last short period is well separated from the eighth group of the first long period.

(4) Carbon and silicon, two geochemically important elements, are centrally located.

Tomkeieff's scheme also has to a marked degree the more general advantages of a spiral arrangement:

(1) It can be used to demonstrate the structure of the atom and the building up of the periodic system.

(2) Surfaces representing the distribution of numerical values of the properties of the elements and of their simple compounds can be contoured conveniently and continuously. Figure 5 is such a "map," representing the specific gravity of the elements in their solid states; Fig. 6, the hardness of 20 minerals belonging to the type of simple oxides. These diagrams illustrate the relations very clearly and can serve as an aid to memory and to help predict properties of compounds.

(3) Similar contouring can represent the chemical composition of various natural aggregate bodies. Figure 7 shows the average composition of meteorites in this way.

The two plates in the back of the book are duplicates of the cone-shaped periodic chart. One is bound in, but the other, in color, is purposely separate so that it can be cut out, pasted on thin cardboard, and rolled into a truncated cone, about 12 in. high and $3\frac{3}{4}$ in. across the base, to make a handy 3-dimensional model of the periodic system.

The presentation is concerned principally with the construction and general relationships of the table and barely touches on the representation of properties of elements and compounds. A subsequent volume will elaborate on this use and multiply the examples given.

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ANLEITUNG ZU OPTISCHEN UNTERSUCHUNGEN MIT DEM POLARISATIONSMIKROSKOP, by MAX BEREK, (1953) Rinne-Berek: herausgegeben von C. H. CLAUSSEN, A. DRIESEN, UND S. RÖSCH. E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart. xiii+366 pages, 285 figures, 21 tables, and 108 formulae. DM29.—.

Aimed at a wide audience, this text provides probably the most comprehensive introduction to the use of the polarizing microscope yet published. A listing below of the major subject headings serves to give only a slight hint of the amazing wealth of useful information contained in this book.

Part I

A. Introduction to the fundamentals of wave optics (pp. 1–15).
B. Methods of producing plane polarized light (pp. 16–25).
C. Recognition of polarized light (polarizer and analyser) (pp. 26–28).
D. The polarizing microscope (pp. 29–63).
E. Preparation of sections for observation in transmitted light (pp. 63–65).
F. Introduction to the fundamentals of orthoscopic observations in transmitted light (pp. 65–83).
G. Relations of optical phenomena to the structure of materials (pp. 84–145).
H. Simple measurements with the polarizing microscope in orthoscopic view (pp. 146–190).

Part II

A. The stereographic projection (pp. 191–196).
B. The indicatrix and its relation to crystal morphology (pp. 196–213).
C. The conoscopic interference figure (pp. 213–234).
D. The diagnostics of the indicatrix in transmitted light (including a discussion of the universal stage—G.J.N.) (pp. 234–293).
E. Observations and measurements in perpendicular reflected light (pp. 294–331).
F. Observations and measurements in inclined reflected light (pp. 332–346).
G. Exercises for optical investigations (pp. 347–355).

The table of contents and the 10-page index are remarkably complete and useful. Illustrations leave little to be desired; all pictured instruments are those manufactured by Leitz. Not a single reference to the literature is given, although author credit is given on appropriate illustrations. Considering the broad survey of the subject that is offered by this book, the lack of any bibliography must be noted as an extremely serious fault. Errors both of fact and of typography are few, if at all present. Typically, the covers are insecurely attached.

Much of the material covered in this book is either new to texts on the polarizing microscope or poorly if at all covered in other texts. Such include remarks on fine adjustments and tests of the optical system, a section on strain patterns in isotropic media and their study by polarized light, a well-conceived discussion of the actual appearance under the microscope of crystals, crystallites, spherulites, and the like, disturbing optical phenomena such as the pseudo-uniaxial intereference figure obtained from isotropic subjects, and many others. As a whole the discussions, many of which are brief, are remarkably well conceived and highly informative. Relative treatment of the different subjects is quite uneven. Some subjects are given practical treatment, whereas others—e.g., reflected light optics—are treated largely on a theoretical basis. Yet others, like the discussion of stereographic projections in its being devoted almost entirely to the Wulff net, are so one-sided as to be of little help. Despite the wide coverage, a few surprising omissions occur, among which polarization figures from opaque minerals and Chayes' point counter technique for modal analyses seem especially unfortunate.

The book should be unusually valuable to the student for its large collection of special

hints on the use and adjustment of the instrument, for carefully detailed instructions in interpretation of the optical measurements made on crystals in section, and for its explanation of the many bothersome and seemingly inconsequential features seen in the routine study of a thin-section.

Like all texts, this one, as unusually informative as it is, fails to provide all that any one student may desire in his pursuit of the subject. In this light and in view of the large number of textbooks on optical mineralogy now available, it is perhaps not amiss to give one man's opinion of what constitutes the best, namely the following:

(1) The book here under review—for scope of coverage, for detailed and practical instruction in the use of the polarizing microscope, and for a good insight into what a remarkably useful tool the polarizing microscope can be.

(2) Conrad Burri (1950) *Das Polarisationsmikroskop*, Verlag Birkhäuser, Basel—for an exhaustive treatment, slanted practically, of the mathematical-physical bases and techniques of optical mineralogy, for its thorough instruction in the use of accessories most frequently employed by the petrographer, and for an adequate bibliography.

(3) Kurt Michel (1950) *Die Grundlagen der Theorie des Mikroskops*, Wissenschaftliche Verlagsgesellschaft M. B. H., Stuttgart—for an exceptionally authoritative, theoretically modern, and complete treatment and application to optical instruments of optical physics. This book is an invaluable addition to the library of any microscopist.

(4) Hans Schneiderhöhn (1952) *Erzmikroskopisches Praktikum*, E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart—for a full treatment of perpendicular reflected light optics and a useful bibliography.

Yet to be added to this list is a non-existent annotated bibliography of optical mineralogy, an addition which would be most valuable for its use in pointing to the existence of an amazing variety of applications to which the polarizing microscope can be fruitfully employed in geologic investigations. It might not be amiss also at this time to suggest that more effort be given to translation of existing texts, as may be necessary and desirable.

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A GLOSSARY OF CLAY TRADE NAMES, compiled by ROBERT H. S. ROBERTSON and issued by the *Clay Minerals Group of the Mineralogical Society of Great Britain and Ireland*, 36 pages, price 4S, 1954.

The Committee of the Clay Minerals Group of the Mineralogical Society of Great Britain and Ireland has published this glossary of trade names of commercial clays with an appeal to all who read it, or who have information on clay trade names, to send their additions and corrections to the compiler. This first edition is an excellent beginning, which can be improved if all who have information will cooperate to make the revision more complete and serviceable. It is the aim of the next edition to include the trade name or number, the synonyms, chemical analysis, mineralogical composition, uses of the clay, the locality of its occurrence, the supplier, and references to the literature. Special forms have been devised and will be sent to those willing to fill them in and may be secured from the Hon. Secretary Dr. R. C. Mackenzie, Macaulay Institute of Soil Research, Craigiebuckler, Aberdeen, Scotland.

In addition to the Clay Trade Names given in this glossary Appendix I gives a short list of trade names that might be mistaken as referring to clays and Appendix II gives a list of Trade Names used for vermiculite.

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X-RAY DIFFRACTION PROCEDURES FOR POLYCRYSTALLINE AND AMORPHOUS MATERIALS, by HAROLD KLUG AND LEROY E. ALEXANDER. John Wiley and Sons, New York, 1954. vii+716 pages, 324 figs. Price $15.00.

This book is a very welcome addition to the literature on *x*-ray methods. Its scope is indicated by the chapter headings and lengths: Elementary crystallography—(55 pages); Production and properties of *x*-rays—(55); Fundamental principles of *x*-ray diffraction—(51); Powder photograph techniques—(23); Spectrometric powder techniques—(83); Interpretation of powder diffraction data—(71); Qualitative and quantitative analysis of crystalline powders—(50); Precision determination of lattice constants from powder photographs—(52); Crystallite size determination from line broadening—(48); Further applications of poly-crystalline diffraction—(47); Diffraction studies on non-crystalline materials—(48); Small angle scattering—(31). An appendix includes a suggested layout for a diffraction laboratory and a discussion of the handling and processing of *x*-ray film. together with several pages of useful tables. Both an author and a subject index are included, and at the end of each chapter is a list of pertinent books. Over 550 references are given as footnotes throughout the book.

The material is clearly presented, with many examples, and is adequately illustrated with numerous figures and photographs. The reviewer has found very little to criticize.

In the introductory chapter on crystallography, a few of the figures are poorly drawn or oriented, such as Fig. 1–27(8), and especially Fig. 1–6*A*, which gives the very opposite concept to that which the authors are trying to present, namely, that in a distorted crystal the angles are unchanged. It is unfortunate that the authors have helped propagate an all too common error when discussing the relationship of Miller indices to zone symbols. They incorrectly state "Actually, zone symbols *uvw* are simply Miller Indices of the plane normal to the zone axis." This statement applies only to the cubic system, and to certain special zones of the hexagonal, tetragonal and orthorhombic systems. In all other cases the relationship is not a simple one. It can be very concisely stated as "Miller Indices are coordinates in the reciprocal lattice, while zone symbols are coordinates in the direct lattice."

For indexing cubic powder photographs, the rather cumbersome reciprocal lattice and the $\sin^2\theta$ methods are described, while the very simple and convenient slide rule and logarithmic scale methods of Davey are not mentioned.

In discussing the equation of a plane *hkl*, there is developed (1–12) the standard formula for a plane through the origin, $hx+ky+lz=0$. It would seem to be pedagogically sound to have introduced at this point the explanation of the all important use of this formula, not as that of a plane through the origin, but in the form $hx+ky+lz=?$ This occurs in the geometrical structure factor, and gives the position of any atom in the unit cell with respect to any plane *hkl*.

However, these are very minor defects. Either for self study, as a text or as a reference, this book will prove to be of great value. It is written by men who not only know the theory of *x*-ray diffraction, but who have had plenty of practice.

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ROCKS AND MINERAL DEPOSITS, by PAUL NIGGLI, English translation by Robert L. Parker. 559 pages, 331 figures, 73 tables. W. H. Freeman and Co., San Francisco, 1954. $12.00.

The original version, in German, of this book was reviewed in *The American Mineralogist*, **34**, 128–129 (1949). The translation, in general, faithfully follows the European edition, and thus the book remains a work on the principles of geochemistry, crystal chemistry, physical chemistry and classification that are pertinent to the formation of rocks and

mineral deposits. Some new material, particularly in the sections dealing with crystal chemistry and classification, has been added. Some parts have been omitted or shortened; the most conspicuous being the section on geophysics that appeared in the original version. In scope and content the book remains, however, as broad as before. The translation is uniformly good throughout; some usages not generally acceptable to American geologists and mineralogists (wolframates, zincblende) appear here and there. There are still retained, however, most of the difficulties of the European edition, for example the complex notations for the formulae of minerals; the emphasis on the personally developed Niggli systems of graphic representation and calculation; the extraordinary preoccupation with detailed classification and standardization of materials, properties and processes; and the inordinate use of new, obscure and confusing terms, such as lepidide, chymogenic, pseudomorphoid, crystalloplast, magnophyric, merismite, mediiphyric and phlebite.

Most of the illustrations have been transferred without change with retention of their German words. For these, translations appear beneath the figures. In most cases this is satisfactory, but for those that contain much terminology, it is an awkward arrangement. A few figures are set entirely with English words. Most of the examples cited in text, tables and figures are from localities outside of North America, although some American examples are presented. The degree of geographic identification of the localities is irregular; many are carefully located as to countries; for others the placement is incomplete; and some examples are not located at all—an irritating detail.

The book will serve well to introduce the ideas of the late Professor Niggli to those American mineralogists and geologists who lacked the patience (or courage) to struggle with the German version. Despite the extraordinary amount of included material, the wide scope and the carefully outlined presentation, the book cannot be considered monographic because of its personalized viewpoint. Nevertheless, it is the only successful modern integration of the basic principles and laws of mineral and rock genesis.

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PETROGRAPHY, AN INTRODUCTION TO THE STUDY OF ROCKS IN THIN SECTIONS, by Howell Williams, Francis J. Turner, and Charles M. Gilbert. 416 pages, 133 figures. W. H. Freeman and Co., San Francisco, Calif. 1954. $6.50.

There has long been a pressing need for a modern English textbook in elementary petrography. Petrography, by Williams, Turner and Gilbert, in the main fills this gap in the list of earth science textbooks. The book is divided into three parts with separate author responsibility: Part One, Igneous Rocks (Williams); Part Two, Metamorphic Rocks (Turner); and Part Three, Sedimentary Rocks (Gilbert).

Part I begins with a discussion of the origin of igneous rocks, magmatic evolution (crystal differentiation, assimilation and mingling of magmas) and associations. This summary is concise and excellent; the approach to the question of granitization is judicial and the viewpoint is temperate throughout. Next follow descriptions of igneous textures, a section which is logically organized and complete, yet introduces to the student relatively few unnecessary or awkward terms. Some of doubtful significance for the beginning student might be hydatogenic, merocrystalline and diktylaxitic. Problems of igneous rock nomenclature and classification—ever controversial subjects—are next considered. In their preface (page vi) the authors state " . . . we have striven . . . to reduce the list (of rock names) as much as possible." However, for the igneous group this striving seems to have been somewhat faint hearted. Admittedly the decapitation point on varietal names is difficult to establish practically, but should a newcomer to petrography be confronted with such local and special names as georudite, ciminite, kulaite, orvietite, sommaite, ankara-

mite, kaiwekite, madupite, cedricite and others similar? This seems hardly calculated to increase his interest in systematic igneous petrography. Some illustrations also are captioned with varietal names, without their more general petrographic equivalent being stated.

Under classification a brief summary is presented of the various bases that have been and are being used—SiO_2 content, Si saturation, Al saturation, normative minerals, mode of occurrence, textures and mineralogy (color index, quartz, feldspars). The usage adopted includes the separation into igneous clans, a first subdivision on texture and further subdivision chiefly on mineralogy, i.e. mainly on the presence of quartz as an essential mineral and the nature of the feldspars. In some cases, however, color index is employed in addition, which may lead to some confusion on the part of the student. Gabbros and diorites are separated on the basis of plagioclase composition, in general, but in some cases the authors override this criterion and employ color index instead. This is unfortunate, for although color index is described on page 50, the authors do not detail how color indices are determined, nor do they indicate which of several outlined color index classifications they are using.

The descriptions of the various igneous rock types follow. Both general descriptions and many fine detailed examples are given, with commendable emphasis on those from North American localities. Systematic petrographic descriptions have too long been accustomed to habitual reference to the "classic" European localities and have shamefully neglected many more recently better studied localities in this country and elsewhere abroad. The systematic descriptions begin with the gabbro clan, jump back to the ultramafic clan and then proceed to increasingly siliceous rocks. Fine-grained types precede coarse-grained types. From the genetic viewpoint this may be of interest, but is it as practical for teaching petrography to the beginning student? Certainly coarse-grained rocks are easier to identify than their fine-grained or glassy equivalents. Some petrographers might also feel that because of their relative mineralogical simplicity granites represent an easier initial group than do the mafic and ultramafic rocks. If the arrangement is to be genetically significant why group lamprophyres in the same chapter with peridotites? In fact the genetic basis for a wholesale grouping of lamprophyres may be questioned. Other petrographers will doubtless wish to disagree on the value of the use of adamellite for quartz monzonite, of the neglect of tonalite and of the use of rhyodacite for quartz latite and of trachyandesite for latite. A number of statements in the descriptive sections also invite questions: (p. 123) "Phenocrysts of quartz, of the α or β variety, may be present . . . "; (p. 132, with regard to graphic granites) " . . . their composition approximates closely to that of a eutectic mixture of quartz and feldspar"; and (pp. 135 and 136) the implication that secondary muscovite and lithium muscovites in granites are necessarily pneumatolytic and that some andalusite and sillimanite in granites are pneumatolytic because of their association with topaz and tourmaline. The discussion of pegmatites is wisely restricted to granitic types, but on p. 148 eudialite, which is characteristic of feldspathoidal types, is listed as an accessory. Also new evidence as to the nature of the feldspar in rhomb porphyries requires their reclassification.

In Part II, on metamorphic rocks, a much larger discussion is devoted to origin than in the first part. Indeed some sections are heavily weighted with petrogeny rather than petrography, despite the authors' intentions, as stated in the preface, that the book is to deal more with the rocks than with the processes of their formation. Part of this emphasis is due, doubtless, to the preoccupation with the facies classification of metamorphic rocks, which may be a difficult subject for the beginning student in petrology to assimilate and the categories of which do not lend themselves at all readily to grouping by *mineralogical* assemblages, with which, after all, the student must first deal, either in hand specimen or

in thin section. Certainly it is not always possible to assign a rock to a specific facies prior to studying its petrography in detail. For example, marbles and calcareous schists of various grades are more conveniently studied as a unit, rather than under a separation that places some marble descriptions in a chapter with high-grade schists, amphibolites, granulites and eclogites and others with hornfelses. Many significant metamorphic rocks or rock groups are not described or merely mentioned—hematite and magnetite schists, optalites, epidosites, pyrophyllite schists, and even quartzites. Yet the doubtful metamorphic rock, olivinite, rates half a page.

The subdivisions in Part II are: Metamorphism, its petrographic criteria and its products—conditions, types, textures, facies and classification; hornfelses and spotted slates; cataclasites, mylonites and phyllonites; slates, phyllites and schists of low metamorphic grade; and high-grade schists, amphibolites, granulites and eclogites.

Sedimentary rocks, Part III, is subdivided into origin; composition and texture; sandstones; argillaceous rocks; calcareous rocks; and miscellaneous sedimentary rocks. The section on metamorphic rocks was placed before that on sedimentary rocks, apparently in order to emphasize similarities between some igneous and metamorphic environments. It seems doubtful that such placing is of more value to the student than the arrangement which permits him a general understanding of sedimentary petrography *prior* to his beginning metamorphic petrography.

Sandstones are subdivided into two classes on the degree of sorting: a well sorted type, or arenite, and a poorly sorted type, or wacke, a term proposed by Fischer in 1933. It seems unlikely that many American petrographers will adopt this latter term and some students, in not giving it the German pronunciation, may be more inclined to use it as an adjective rather than as a noun.

The descriptions of the various sandstone types are excellent and extraordinarily complete, much more so than in any modern textbook available to the reviewer. In contrast the section on clays and shales is conspicuously but perhaps rightly abbreviated, for microscopic methods form a subordinate technique for the study of these materials. No descriptions are given of bauxite or diaspore clays. Again, the section on the carbonate rocks is well organized and is given with fine detail, although chalk, travertine and some other types are not presented. The last chapter, miscellaneous sedimentary rocks, discusses siliceous sediments, iron-rich sediments, phosphatic sediments, and anhydrite and gypsum, all briefly.

From the viewpoint of the quality and completeness of the petrographic descriptions, the section on igneous rocks probably ranks first, followed by that on sedimentary rocks, in which much new descriptive material appears, and last by that on metamorphic rocks, in which the emphasis is more genetic. No photomicrographs appear, the illustrations consisting chiefly of excellent drawings of rocks in thin section. Nearly all of these illustrations, which constitute one of the most conspicuously successful features of the book, are by Williams. There is no doubt that the book is well conceived, well organized and well executed, particularly for a first edition, and that it will have a widespread success commensurate with its high quality.

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KLOCKMANN'S LEHRBUCH DER MINERALOGIE, by Paul Ramdohr. 14th edition, revised, 1954. 669 pages, 687 figures, one plate, numerous tables. Ferdinand Enke Verlag, 3 Hasenbergsteige, (14a) Stuttgart—W., Germany. Price, paper cover DM 65.00; bound in linen DM 69.00.

This German textbook, now revised for the fourth time by Paul Ramdohr, Professor of

Mineralogy at Heidelberg University, has become, through its 14 editions and 60 years of existence, one of the best known and most widely distributed of all fundamental works in mineralogy and crystallography at the elementary and intermediate level. The new edition continues in the patterns of the early ones, following a conservative, traditional approach in exposition, yet copious in information and modern in fact. Part I, General Mineralogie, deals with systematic crystallography, crystal structure including an introduction to the use of x-rays, physical properties of minerals, mineral and crystal chemistry and mineral formation, occurrence and paragenesis. It concludes with a list of 93 famous mineral localities, briefly described, and a short section on economic mineralogy. Part II, of 360 pages, is the systematic description of mineral species, grouped according to nine classes: elements; sulfides; haloid salts; oxides and hydroxides; nitrates, carbonates, borates (oxygen salts with O in 3-fold coordination); sulfates, chromates, molybdates and tungstates (oxygen salts with O in 4-fold coordination); phosphates, arsenates, vanadates; silicates; and organic compounds. Not only are principal species described, but many rare minerals are treated briefly.

The new edition not merely maintains the high standards of its predecessors but represents a further increase in quality. To those who seek an excellent text or general reference book in fundamental mineralogy, in German, this book is highly recommended.

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THE ORIGIN OF METAMORPHIC AND METASOMATIC ROCKS, by Hans Ramberg. xvii+317 pages, 130 figures, 20 tables. The University of Chicago Press, 5750 Ellis Ave., Chicago 37, Ill. 1952. $10.

The Origin of Metamorphic and Metasomatic Rocks is in the author's words, "A treatise on recrystallization and replacement in the earth's crust." It is an attempt to apply the principles of thermodynamics and crystal chemistry to an explanation of metamorphism and metasomatism. It takes as its basic assumption that ion migration directly through crystal structures or within intergranular films is the dominant process in the reconstitution of metamorphic rocks and formation of some igneous rocks. With this premise constantly in mind Ramberg has skillfully woven a background of physicochemical theory for silicate reactions in the solid state.

About 30 pages are devoted to the thermodynamics of metamorphic processes, followed by another 30-page chapter detailing the equilibrium diagrams of metamorphic minerals, some of which are deduced from observations based on their paragenetic relations in metamorphic rocks. A discussion of crystal kinetics follows, in which are described the mechanisms whereby new equilibria can be achieved by recrystallization in rocks as the result of their reactions to a changed environment. In this section the principles of solid state diffusion are enunciated and the available quantitative data on diffusion rates are listed.

Next follow presentations of the facies principle and of the mechanism of metasomatic transfer of matter through rocks. Various causes of metamorphic differentiation are suggested and described. The last part of the book considers metasomatism in nearly unmetamorphosed and low-grade sediments and in regionally metamorphosed complexes. Granites à la Ramberg result from the gravity controlled upward migration of light ions and the downward streaming of heavy ions. Furthermore, "The growth of pegmatites in regionally metamorphosed areas is just a phase of 'granitization' . . . " (p. 248).

The book is somewhat irregular in its organization, but Ramberg presents his ideas energetically and with distinction. Doubtless the controversial theses presented will please

a few, irritate many and infuriate still others. It should be required reading for all geologists interested in problems of metamorphism.

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THE THIN-SECTION MINERALOGY OF CERAMIC MATERIALS (2nd Edition). by G. R. Rigby. 231 pp., 10 Plates, 14 Figures, 27 Tables, 2 Appendices, 3 Indexes. The British Ceramic Research Association, Queens Road, Penkhull, Stoke-On-Trent. Staffordshire, England. 1953. £ 1. 12. 6d.

The first edition of this book was reviewed in *The American Mineralogist*, **38**, 146–147 (1953). The major changes in the second edition are the inclusion of descriptions of 50 new "minerals," extension of the section, "Raw materials used in ceramics," description of the preparation of polished sections and the inclusion of 40 photomicrographs of commonly occurring ceramic "minerals."

The book is divided into six parts: I—The preparation of sections; II—The identification of mineral phases; III—Optical properties of minerals found in ceramic materials, slags, glasses, and sinters; IV—Determinative tables; V—Photographs of minerals under the microscope; and VI—Appendices. Part II is an abbreviated version of the principles and practices of optical crystallography; part III continues to be the most valuable contribution that the book provides. However some of the usages employed and data cited for the "true" minerals are incorrect or inadequate; for example, the use of octagons for octahedra (p. 93); the non-identification of fluorite cleavage; the inference that cronstedite, amesite and chamosite are clay minerals; the confused intermingling of petrographic and mineralogical names; the lack of mention of the existence of high-temperature plagioclase; the use of obscure and rejected mineral varietal names (turgite, kyanophilite); and the inclusion of rhodonite and wollastonite as pyroxenes. Despite the improvements of this second edition, further refinements are possible. Doubtless the book would be benefited by careful checking of the mineralogical information by a non-ceramic mineralogist. However, the book remains the foremost collection of the properties of the minerals of ceramic raw materials and the "minerals" of ceramic products.

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