

BOOK REVIEWS

LES MINÉRAUX ET LES ROCHES, ÉTUDES PRATIQUES DE CRISTALLOGRAPHIE, PÉTROGRAPHIE ET MINÉRALOGIE, by H. BUTTGENBACH. 8^e édition établie avec la collaboration de J. Mélon. Paris (Dunod)—Liege (Vaillant-Carmanne), 1953. Printed in Belgium. xii+763 pp., 16 by 24 cm., 613 figs., 4 pls. Bound in cloth. 800 Belgian francs (about \$16).

In the preface to the 6th edition,* which appeared in 1935, Professor Buttgenbach commented that this edition was probably going to be the last one he would publish. A 7th edition was nevertheless printed in 1943. Now with the 8th one, coming as it does on his 80th birthday, we are happy to note that his gloomy prediction has twice come untrue!

Dr. Mélon, now a professor at Liège, is a co-author of the new edition. The most notable changes are as follows: The Miller notation is used throughout the text, jointly with the old Lévy form symbols. This will make the book easier to read outside French-speaking countries. So will the comparison between the co-ordinate axes used in the text with those commonly used in America, for the hexagonal and the rhombohedral systems. The presentation of the law of rationality is revised to include one of its important aspects—the simplicity of indices. The description of twinning follows Friedel (exception must be taken to the definition of twinning by merohedry). The law of Bravais is no longer credited to Mallard. The classification of silicates is based on their crystal structures.

A few species have been added, such as pentlandite and kernite. The Dana classification is followed, though not blindly. In a praiseworthy effort to keep the price of the volume from soaring even higher, the authors have kept the traditional crystal settings for descriptive purposes. For about 50 species the structural cell obtained by *x*-rays differs from the morphological cell; for these the transformation matrices relating the two cells to each other are tabulated in an appendix. More sweeping innovations in matters of symbolism would seem desirable: the Hermann-Mauguin symmetry notation, which has truly become the *lingua franca* of present-day crystallographers, should be adopted. Isomorphism, polymorphism, and alterations have been grouped in a new chapter entitled crystal chemistry. This is a step in the right direction. More will be needed to do justice to the paramount importance of crystal chemistry in modern mineralogy.

The 8th edition remains faithful to the teaching philosophy that made the success of its predecessors. The Liège textbook is here to stay. We are looking forward to its 9th edition!

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SPEZIELLE MINERALOGIE AUF GEOCHEMISCHER GRUNDLAGE, by FELIX MACHATSCHKI, Vienna, Springer-Verlag, 1953, vii+378 pages, 228 figures. Price, \$8.60.

Machatschki has written a mineralogy which, although at a moderately elementary level, is up-to-date and authoritative. No attempt is made at completeness; about 800 species are described, most of them quite briefly. The more important ones are treated fairly completely, composition, crystallography, hardness, optical properties (including properties by reflected light for opaque minerals), varieties, properties of isomorphous series, and even a summary of the information about their crystal structure, where known, being given. Treatments range from this to a one or two-line statement of composition, color, crystal habit and fracture or cleavage for some of the less common species.

The book begins with a brief discussion of mineral formulae, names, and classification. This is followed by a one-page tabulation of "radii of the building blocks of mineral crys-

* Reviewed in *Am. Mineral.*, 21, 211–213 (1936).

tals." A short (11 page), generalized, elementary discussion of the principles of geochemistry and a seven-page outline of the geochemistry of the atmosphere, hydrosphere, and lithosphere complete the 29-page introduction.

No references to literature are given in the text, but there is a list of references for supplementary reading on pages 354-355.

In the main part of the text the arrangement and treatment emphasize the genetic viewpoint. Under "primary minerals" those of igneous rocks are discussed in 70 pages; pegmatites, 34 pages; hydrothermal (deposits), 34 pages; and volcanic exhalations, 6 pages. Minerals of weathering products and sedimentary rocks are allotted 28 pages; those of metamorphic rocks, 22 pages. The "ore" minerals are not treated genetically, but are classified primarily according to the (principal) heavy metal contained and secondarily by the non-metal or non-metallic radical. These are treated in part four, of 74 pages.

Each of the three "genetic" parts opens with a short discussion of principles and includes a very brief classification of the rocks involved. The book is primarily mineralogy, so the short discussions of rocks are appropriate,—but this very brevity makes it more imperative that the statements on rocks should be accurate and to the point. It is disconcerting, therefore, to find rather serious inaccuracies in the discussion of igneous rocks. It should be noted in the table on page 97, for example, that diabase and proterobase are not extrusive rocks. Picrite, although it is an extrusive rock, is certainly not the extrusive equivalent of anorthosite, as indicated in the table. Kimberlite is a variety of peridotite, not its extrusive equivalent.

While no actual inaccuracy is involved, it is unfortunate to follow in so modern a book the antiquated system of assigning different names to identical extrusive rocks just because they are of different ages.

It should also be noticed that in this table on page 97, in the list of minerals to the lower left, "Peridotit" should read "Olivin."

The table, or diagram, on page 94 also leaves some erroneous impressions. If interpreted strictly it indicates, for example, that peridotite always contains basic plagioclase, and that granite always contains albitic feldspar and muscovite. Neither, of course, is the case. If appropriate parts of some of the lines had been dashed these inconsistencies could have been avoided.

The genetic approach applied in this book gives a geologic setting to the descriptions of minerals and a geologic feel to the reader not ordinarily imparted by systematic treatments of mineralogy. This arrangement could undoubtedly be used very effectively in organizing certain types of courses.

For other purposes, such as reference, however, it has more or less serious drawbacks. In some of the sections mixing of processes with descriptions of minerals is a little confusing. A much more serious difficulty is the very considerable overlap in mineral species among the genetic groups treated. Quartz, for example, is described in considerable detail under magmatic minerals, but is not mentioned in the descriptions of pegmatite or hydrothermal minerals, although for many purposes these varieties are much more important, interesting and impressive than igneous quartz. Careful reading of the introductory remarks of these sections discloses casual, but to the reviewer entirely inadequate, mention of quartz. There is no indication in the index that quartz is mentioned at all as a pegmatitic, hydrothermal, or metamorphic mineral.

Likewise, feldspar is described as a magmatic mineral, but is entirely neglected in the discussion of pegmatites. It can be inferred from the names of the pegmatites mentioned in the introduction of the section,—granite pegmatite, syenite pegmatite, and gabbro pegmatite,—that they must contain feldspar, but it is not mentioned specifically either there or in the mineral descriptions that follow.

Some phosphates are described under magmatic, some under pegmatite, and some

under hydrothermal minerals. Most of these minerals occur in at least two of these categories, some in all three, and a few also in sedimentary rocks.

The iron oxides are mentioned as igneous accessories, but described under ore-minerals. Their distribution, of course, is much wider than this.

These examples could be multiplied many times. There would be no point, of course, to describing the same mineral in two or more sections. The treatment would have been much more satisfactory, however, if the important minerals that occur in each category, but are described elsewhere, could have been listed, with references to where the descriptions are to be found. This is done in part (minus the references) for the hydrothermal minerals (p. 135).

A 52-page appendix classifies all of the minerals described in the text in a crystal chemical system much like that used in the 7th Edition of Dana's System of Mineralogy. Cell dimensions and space groups are given for all species for which these data were available in the literature by the end of 1952.

Machatschki has produced a textbook of mineralogy with a refreshing point of view and a novel approach. With appropriate explanatory and additional material for beginning students and those who lack geologic background this book should provide much broader and more varied training than that given by more conventional texts.

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MANUAL OF THE POLARIZING MICROSCOPE, by A. F. HALLIMOND, second edition, 204 pp., 92 figures, Cooke, Troughton, and Simms, Ltd., York, England, 1953, distributed in the United States by R. Y. Ferner Co., Inc., 110 Pleasant Street, Malden 48, Massachusetts, \$3.00.

At the outset Dr. Hallimond, in his Manual of the Polarizing Microscope, reviews briefly the historical development of the polarizing microscope. Following the historical development, the construction of microscopes and microscope accessories is described. Special emphasis is given the Cooke, Troughton, and Simms instruments, which are built with an Abbe condenser, its use made possible by the substitution of polaroid for calcite prisms. Accessories useful in studying opaque as well as transparent crystals are explained.

Methods of accurately determining path-difference and extinction positions are treated in some detail. Certain advantages of making these measurements conoscopically are pointed out. The use of the Koenigsberger and Nakamura plates is described. The accuracy indicated for the measurement of the thickness of a specimen by means of the fine focusing adjustment is somewhat greater than that of the reviewer's experience. It seems that by labeling the ordinate in figure 31 *d* (p. 58), "phase angle of the retarded wave," some confusion is introduced. Perhaps just phase angle would be better. Brief chapters are devoted to the dichroscope, to the dispersion of birefringence, and to binocular and stereoscopic microscopes. Accompanying the chapter on the interference figure and the Bertrand lens is an excellent series of photographs of conoscopic figures of phlogopite, which illustrate not only the effects due to birefringence, but also those due to pleochroism. The photographs show the appearance of figures of phlogopite between crossed polars, with polarizer only, and in ordinary light. The value of these illustrations might be enhanced if the numerical aperture of the objective used and the thickness, indices of refraction, and suitable absorption moduli of the phlogopite were stated.

A very useful summary of the theory and practice of the examination of polished opaque substances in polarized reflected light is given in four chapters. The theoretical treatment is based largely on that of Berek. This section of the book should be of especial interest to students of mineralography. Following the chapters on reflected light is a description of a relatively simple microphotometer.

The use of the three-axis universal stage is simply but adequately described. The author includes in his discussion the extrapolation of a third principal index, Berek's method of determining axial angle, and the Emmons double variation method.

The reader is assumed to have a basic knowledge of crystal optics. The book as a whole is non-mathematical, although a number of important relations are derived. Of particular interest should be the section on strongly absorbing crystals in reflected light. Throughout the book the treatment is concise and accurate. Ample references to the basic literature are provided, and the text is well illustrated. Some of the methods described are more refined than is usual for ordinary work. While the book is not intended to be an elementary or complete text of crystal optics, it contains an uncommonly good treatment of many important aspects of the use of the polarizing microscope.

Although Dr. Hallimond stresses Cooke, Troughton, and Simms instruments, the book should be of considerable interest to all serious students of crystal optics, to students of mineralogy, to research workers, and to teachers.

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EDELSTEINE UND PERLEN, by K. SCHLOSSMACHER. viii+280 pp., 103 illustrations in the text, 3 tables, and 3 plates (2 colored). 16×24.5 cm. E. Schweizerbart'sche Verlagsbuchhandlung (Erwin Nägele) Stuttgart, Germany, 1954. Price, bound, 25 DM.

According to the author, this text is designed for all lovers of gemstones and pearls, but more especially for jewelers, goldsmiths, diamond cutters, lapidaries, and dealers in gemstones and pearls. The book can be considered as an abridged replacement of Dr. Schlossmacher's two-volume revision of Max Bauer's classical *Edelsteinkunde*, published in 1928-32, which is now out of print and cannot be revised on account of its size and present unfavorable economic conditions. The author was for many years professor of mineralogy at the University of Königsberg, East Prussia, and is now director of the Gemological Research Laboratory at Idar-Oberstein, the world-famous gem cutting center.

The book is divided into three parts, designated as *general*, *special*, and *practical*. The general part includes, aside from the foreword and introduction, rather comprehensive descriptions of the various properties of gemstones (58 pages) and of the methods and instruments used in investigating them (16 pages).

The special section, which comprises the bulk of the book (167 pages), contains detailed discussions of the properties, occurrences, production, and imitations of the important inorganic gemstones. Fourteen gemstones not commonly encountered in the trade, such as fluorite, obsidian, euclase, etc., are described briefly. The organic gems—pearls, amber, coral, and jet—are considered next. In twenty pages natural and cultured pearls, including the methods of identification, are treated rather exhaustively. The syntheses of the diamond, corundum, spinel, emerald, rutile, and quartz, as well as reconstructed stones, are amply described. With regard to the synthesis of the diamond, Schlossmacher concludes that thus far the diamond has not been produced in the laboratory, and that the identification of the alleged product is not the determining factor but that the whole process must be critically investigated by competent scientists. It is also pointed out that in some cases there has been evidence of fraud.

In the third section the cutting, engraving, and methods used in obtaining uncut material and in the sale of cut gems are described in considerable detail. There are three tables listing indices of refraction, specific gravity, and hardness. These tables are adapted from the *Handbook of Gem Identification* by R. T. Liddicoat, Jr. The two colored plates add interest to the text. There is a good index.

The treatment throughout is authoritative. The book should appeal strongly to the

German public and gem trade. It can be recommended as a helpful reference work to all interested in gemology.

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THE CHARNOCKITE PROBLEM, by C. S. PICHAMUTHU. Mysore Geologists' Association, Bangalore, India. 1953, 178 pp.

The main features of this monograph on the characteristics and origins of the charnockites formed the basis for the presidential address delivered at the 1952 annual meeting of the Mysore Geologists' Association by C. S. Pichamuthu, who is director of the Mysore Geological Department. In the 18 chapters the following main topics are treated: nomenclature, occurrence, distribution, petrography, origin and age of charnockites. Considerable detailed information also is presented on charnockites in India, particularly in Mysore, and one chapter is devoted to summaries of the literature on charnockites. Although the study is a thorough one, it presents little new general information on charnockites that was not gathered by Quensel (*Arkiv Min. Geol.* 1 (10), 227-332, 1951). However, the information on Indian charnockites that has accumulated since the classic studies of Holland (*Mem. Geol. Surv. India*, 28, pt. 2, 1900) is carefully digested and well integrated. After demonstrating that strong arguments may be advanced for both the magmatic and metamorphic genetic hypotheses, the author concludes that there are "charnockites and charnockites" and no one theory of origin adequately explains the formation of all types. According to him, Indian charnockites are of two generations, the older being developed by regional metamorphism and the younger by metasomatism and palingenesis.

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SPOMENICA MIŠE KIŠPATICA. Edited by FRAN TUČAN. Yugoslavian Academy. 247 pp. 1952 (?).

This is a jubilee volume to commemorate the 100th anniversary of the birth of Mišo Kišpatić, the famous Yugoslavian scientist, who was born in 1851 and died in 1926. Kišpatić, who founded the Institute of Petrology and Mineralogy at the University of Zagreb, was a petrologist, mineralogist, crystallographer and seismologist who held advanced ideas in the fields of earth science, many of which have received substantiation in the light of more modern facts and theories. The papers, which are in Serbian and are followed by summaries in German (two in English), include (titles in translation):

1. Luka Marić, Mišo Kišpatić in the light of contemporary petrology.
2. Fran Tučan, A new contribution to the knowledge of the crystalline rocks of Moslavačka gora.
3. Ljudevit Barić, Ludlamite from the Stari Trg (Trepča) mine at Kosovska Mitrovica.
4. Miroslav Tajder, Petrography of the Srebrenica ore district in Bosnia.
5. Vladimir Majer, Chabazite and stilbite from Bor (Yugoslavia).
6. Luka Marić, The extrusive rocks of the ore district between Zletovo and Kratovo.
7. Ivan Jurković, Barite from the Dobrevo mine at Zletovo.
8. Stevan Karamata, General characteristics of the melaphyres in the vicinity of Vareš (Bosnia).

The excellence of the contributions guarantees the quality of the tribute to this remarkable pioneer in the fields of petrology and mineralogy.

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