

BOOK REVIEWS

BIBLIOGRAPHY OF HARDNESS AND HARDNESS TESTING. 118 pp., name and subject indexes, offset-lithographed, 1955/1956, Industrial Diamond Information Bureau, London E.C. 1. Price 5s. 6d.

The BIBLIOGRAPHY OF HARDNESS AND HARDNESS TESTING from 1937 to 1955 includes published material on the subject of hardness testing, applied and fundamental. The compilers of this bibliography intend to give the worker in the field of hardness, and in particular microhardness, a tool which will enable him to obtain up-to-date information on any particular branch or aspect of hardness, or to compare his own work with that of others. Items are listed as follows:

- A. Books, brochures, and bibliographies, 1822–1955 (7 pages).
- B. National Standards (4 pages).
- C. Publications in Technical Journals, 1937–1955 (78 pages).

Two indices, a name index including proprietary names, and a subject index are useful.

Symbols are given which indicate the general scope of the entries. English translations of French and German titles are given in addition to the original titles. Russian titles are given in English translation only. Publications from a large variety of journals are included, mechanical, metallurgical, chemical, and ceramic engineering, mineralogical, geological, and others.

The papers from these journals are listed according to year and also alphabetically by author within the year.

The magnitude of the task is so great that errors of omission are almost a foregone conclusion at the outset. The reviewer noted the absence of a number of papers in the field of diamond hardness, namely, Bergheimer (1938), Whittaker and Slawson (1946), Slawson and Kohn (1950), Hukao (1953), Denning (1953, 1955). Kohn's paper on silicon carbide (1951) was omitted, as also was Winchell's (1946) paper on orientation and hardness variation. (These references are given below.)

The failure to include these publications in the bibliography would lead one to question whether omissions might be numerous in other fields of hardness investigation. Nevertheless, the work constitutes a significant collection of references which are widely scattered through an unusually large variety of literature. All persons engaged in research in practical hardness testing methods, as well as those engaged in the theoretical aspects of the study of hardness, should find this bibliography invaluable.

REFERENCES

- BERGHEIMER, H. (1938), Die Schleifhärte des Diamanten und seine Struktur: *Neues Jahrb. Min. Geol. und Pal.*, **74**, 318–332.
- DENNING, R. M. (1953), Directional grinding hardness in diamond: *Am. Mineral.*, **38**, 108–117; reprinted *Ind. Diamond Rev.*, **13**, 175–182.
- (1955), Directional grinding hardness in diamond, a further study: *Am. Mineral.*, **40**, 186–191; reprinted *Ind. Diamond Rev.*, **15**, 185–191.
- HUKAO, Y. (1953), Abrading tests of diamond: *Ind. Diamond Rev.*, **15**, 45–48; 107–109.
- KOHN, J. A. (1951), Directional variation of grinding hardness in silicon carbide (SiC): *Ind. Diamond Rev.*, **11**, 211–212, 235–237.
- SLAWSON, C. B., AND KOHN, J. A. (1950), Maximum hardness vectors in the diamond: *Ind. Diamond Rev.*, **10**, 168–172.

WHITTAKER, HARRY, AND SLAWSON, C. B. (1946), Vector hardness in diamond tools (Third Symposium on Diamonds): *Am. Mineral.*, **31**, 143-149.

WINCHELL, H. (1946), Observations on orientation and hardness variations (Third Symposium on Diamonds): *Am. Mineral.*, **31**, 149-152.

REYNOLDS M. DENNING,
*University of Michigan,
Ann Arbor, Michigan*

DIAMOND—THE SPECTACULAR STORY OF EARTH'S RAREST TREASURE AND MAN'S GREATEST GREED, by EMILY HAHN. 314 pp., Doubleday and Co., Inc., Garden City, New York, 1956. Price, \$3.95.

Although the author was graduated from the University of Wisconsin in 1926 as a mining engineer, she has devoted much time to activities which have involved extensive travels the world over and is widely known as a prolific author of articles and books of general interest. It is estimated that she traveled over 20,000 miles to gather material for this book—DIAMOND—much of which originally appeared in the *New Yorker*.

In nine chapters—Kimberley, Old Digger—Old Fool, The Giants, The Premier, And Son, The Cutters, The Shade of J. Ballantine Hannay, Staring at Stones, and Paradise-Limited—the results of her interviews with many of the present leaders in the mining, cutting, and marketing of gem and industrial diamonds are discussed in a style which appeals to the general reader. Throughout, an attempt is made to piece together the history of the discovery and recovery of diamonds in Africa and to present interesting and some not well known facts of the activities and characteristics of such leaders as Cecil Rhodes, Barney Barnato, Sir Ernest Oppenheimer and his brothers, as well as of many others. The book is of general rather than of scientific interest to those who desire information about the diamond. There is a selected bibliography and an index. There are no illustrations in the book.

EDWARD H. KRAUS,
*University of Michigan,
Ann Arbor, Michigan*

LAS ESPECIES MINERALES DE BOLIVIA, by FEDERICO AHLFELD and JORGE MUNOZ REYES, 180 pages. Banco Minero de Bolivia, La Paz, 1955. Price \$3.50*

Although there is no indication of the fact on cover or title page, the current volume is essentially a third edition, two earlier works by the same authors having appeared with slightly different titles: *Mineralogía Boliviana* (1937) and *Los Minerales de Bolivia* (1943). The first of these was translated into German (*Mineralogie von Bolivien*, Gebruder Borntraeger, Berlin, 89 pages, 1938; see *Am. Mineral.*, **23**, p. 538, for review) and probably enjoyed a greater circulation than either of the Spanish versions.

There are essentially twice as many pages in this edition as there were in the first, although the species described have increased only 42% (From 170 to 242 definitely identified; in an appendix six more doubtful species and several unidentified ones are briefly mentioned, but not numbered). The increased number of pages, therefore, is due in large measure to more detailed treatment of individual species. Cassiterite, for example, has five pages and four crystal drawings in the 1938 publication, but is given eight pages, 18 crystal drawings, three photomicrographs, and one picture of a hand specimen in the volume under review. This increase in illustrations is reflected throughout the book, with 121 crystal drawings against 30 in the earlier edition and 16 photographs and photomicro-

* Can be ordered from Dr. Federico Ahlfeld, Naciones Unidas TAA Casilla 686, LaPaz, Bolivia.

graphs as compared with two pictures before. There are 129 literature references whereas the first edition had 75.

The mineral descriptions are concise with more emphasis on distinguishing characteristics and localities of Bolivian minerals than on general characteristics, these latter being confined commonly to a brief introductory paragraph in fine print.

No attempt is made to multiply the mineral species that occur in Bolivia. Only the ones that have been positively identified are described. Of the rock forming minerals only the more important ones are treated, and these very briefly. For example, only three feldspars are mentioned and these are disposed of in slightly over one page. Agate, chalcedony and other varieties of silica (except opal and tridymite) are treated under quartz.

There are complete indices of minerals of economic interest, arranged by elements, and of localities, as well as one of mineral species listed alphabetically. The book is a very attractive, well-printed and usable compendium of information on Bolivian minerals and mineral localities.

EARL INGERSON

U. S. Geological Survey, Washington 25, D. C.

CLAYS AND CLAY MINERALS, EDITED BY ADA SWINEFORD. *National Academy of Sciences, National Research Council Publ. 456, viii+444*, Washington, D. C., 1956, \$6.00. (*Proc. 4th Natl. Conference on Clays and Clay Minerals, University Park, Pa., Oct. 10-13, 1955.*)

About a third of the papers in this volume were contributed by foreign scientists. Although some of these articles are quite specific as to topics discussed, others are so general in nature as to lead merely to the conclusion that clays and scientists investigating clays are widely distributed geographically. This conclusion, to be sure, is not very profound, but neither are several of these papers.

A twenty-page guide to the field trip is followed by 46 papers (or abstracts in a few cases) and a general index. Discussions, which may be more interesting and even more informative than the scheduled contributions, were not recorded for this conference.

Several corrections have come to this reviewer's attention: legends for Figs. 2 and 3 (pages 33, 34) are transposed; for Figs. 2, 3 and 4 (pages 129-130) the curves are for meta-metahalloysite (top), metakaolinite and metadickite (bottom); Fig. 5 (p. 131) curves are for kaolinite (Pugu), halloysite, dickite, nacrite and kaolinite (top to bottom). "Wolchonskoite" is something betwixt and between German and English. Although "puguite," a term used orally at the conference, might have some onomatopoeic value, this reviewer—and probably several other persons—was pleased to find it had got lost before the recording of these proceedings.

As is true of earlier publications of this series, this document will be essential to the libraries of certain ultra-ultraspecialists as well as all mineralogists who attempt to keep informed on clay minerals.

DUNCAN McCONNELL,

Ohio State University, Columbus, Ohio

ELEMENTARY CRYSTALLOGRAPHY (AN INTRODUCTION TO THE FUNDAMENTAL GEOMETRICAL FEATURES OF CRYSTALS), BY M. J. BUERGER. John Wiley and Sons, Inc., New York, 1956, xxiii+528 pp., 610 figs., 6×9 in. Price \$8.75.

In the preface to the first edition of the well-known book "An Introduction to Crystallography," the author, F. C. Phillips, states "text-books of science, in the mind of the discerning critic, usually fall readily into one or the other of two groups, the helpful and the impressive, accordingly as the author's outlook is directed mainly toward the reader's

progress or towards the enhancement of his own reputation." In the case of the book under review here, it is clear that notwithstanding the fact that the author's outlook is "directed mainly towards the reader's progress," he has in spite of himself added appreciably to an already considerable reputation in the scientific community by its writing.

The book is concerned solely with the symmetry properties of crystals and with some of the physical manifestations of these properties. The mathematical theory of the symmetry operations possible for crystals is developed in considerable detail. In this development the author has made every effort to avoid the use of complicated mathematics and at the same time to maintain rigor; because of this some of the exposition is necessarily lengthy. Perhaps the most satisfactory way of handling the mathematical treatment of symmetry operations is with the concise and elegant method of group theory. The author uses the notation and ideas of group theory informally throughout the book, without identifying these as such. In the last three chapters he presents a formal unified discussion of the elementary theory of groups as applied to symmetry operations. Roughly half the book is devoted to a discussion of the megascopically observable symmetries of crystals; the other half discusses the internal symmetries. The purely geometrical aspects of the crystal are related to the physical aspects in a most effective manner, in three excellent chapters. These are Chapter 10, "Crystal Forms," Chapter 11, "Practical Determination of Point-Group Symmetry," and Chapter 19, "The Determination of Space-Groups and the Utilization of Space-Group Information."

In keeping with the text-book aspect, most of the chapters are followed by a small number of exercises. The numerous line drawings, so necessary to a book on the subject of crystallography, have been carefully thought out and executed. There are a large number of useful tables. The general format of the book is up to Wiley's usual high standards: the type is very readable and particularly effective use has been made of varying type face.

With regard to the use of the word "elementary" in the title, the book is elementary in the sense that it presents the elements—the fundamentals of crystallography, namely, the theory of symmetries of crystals. It is also elementary in the sense that every attempt has been made to develop the subject in such a way that the minimum prior knowledge of crystallography is necessary on the part of the reader.

Previous to the publication of the present book there existed in print no modern, extended, elementary (in the usual sense) treatment of the symmetries of crystals. It will, therefore, be used not only by the student but will be welcomed by the practicing crystallographer in general.

C. L. CHRIST
U. S. Geological Survey
Washington 25, D. C.