

## BOOK REVIEWS

DIRECT ANALYSIS OF DIFFRACTION BY MATTER. R. HOSEMANN AND S. N. BAGCHI. North-Holland Publishing Company, Amsterdam, 1962. xxi+734 pp. \$21.50.

The title of this book is confusing. After glancing through the contents one might well suppose that the part of the title "analysis of diffraction by matter" was an uncorrected transposition of "analysis of matter by diffraction." But the title is evidently intended to mean "The direct [mathematical] analysis of diffraction-by-matter." The authors are concerned with discussing all diffraction from a unified point of view, whether the diffracting matter is ideally crystalline, imperfectly crystalline, or "paracrystalline." To do this from their own point of view they discard the standard mathematical discussion of diffraction and invent a new mathematical discipline to treat it. This is by no means easy reading, since one's past acquaintance with diffraction theory is of little help. This does not imply that classical mathematics treatments are not used in the discussion when there is any excuse to slip it in. The use of all conceivable sophisticated vehicles is well stated in the author's own words on the dust jacket: "The method is based on the integration of the wave equations of Maxwell and Schrödinger and yields fundamental equations of scattered intensity; these, with the help of a so-called Q-function (a generalization of the Patterson function), can be transformed to a folding-root. This root is a well defined  $\xi$ -average of the structure under investigation."

Several topics discussed in the book are of potential interest to mineralogists. These include scattering by poorly crystallized or non-crystalline matter, the Patterson function and homometric sets. Unfortunately the mathematical treatment will not recommend the book to many mineralogists. For example, an extended mathematical treatment is made of a so-called "Q-function." In practice this appears to behave as a Patterson function applied to a non-infinite crystal or other diffracting object. One of the themes of the authors is that the "Q-function" has edge effects which permit a structure to be solved from its diffraction, whereas the ordinary Patterson function applied to an infinite structure does not. Of course, to derive the "Q-function" by x-ray diffraction requires an impossibly small fragment of matter, so that, at the moment, the theory of the "Q-function" does not have a practical application. There is an interesting discussion of homometric structures. This is compared with Babinet's theorem, which is concerned with similar diffraction intensities for complementary objects.

There are some 600 abbreviated citations (title and page range omitted) covering 12 pages. A full page is devoted to some 50 papers by the authors. The next nearest competitor is Laue, with 14 references.

This book ought to be authoritative when treating the Patterson function, but unfortunately it is not. It appears from discussions in the text that many of the references quoted have not been read. For example, on p. 47, the authors describe an optical device which produces a Patterson diagram corresponding to a given set of points. It is implied that this is an invention of the authors, and in a footnote, it is stated that in any case it is an improvement over the prior art in that a lens is used to focus the effect. But actually it is a pure copy of a device described by Bragg, whose paper is cited, so that one must conclude the authors cited but did not read this paper. Vand's later paper, also making use of a lens, is not cited. In another instance, in describing an illustration in their book, the authors state, "In Fig. 8a we have an asymmetric structure of 5 points representing the well known 'cross of the southern sky' often cited by Wrinch [1939] and Buerger [1950]." But, the fact is that Wrinch did not cite the Southern Cross and, indeed, this was not introduced until 1950. To complicate matters, Hosemann and Bagchi have confused the Southern Cross with its inverse. It is difficult to escape the conclusion that the authors are not actually very familiar with the literature of vector space.

This book is not recommended for those who do not enjoy mathematical developments.

On the other hand it is recommended to those who wish to have an integrated account of the developments originating in Hosemann's laboratory. Their treatment of paracrystals has already had a considerable influence in the study of high polymers.

M. J. BUERGER

NEW DATA ON RARE ELEMENT MINERALOGY. A. I. GINZBURG, ed. Transl. from the Russian. 8½×11", hard cover, 140 pp. Consultants Bureau, 227 W. 17 St., New York 11, N. Y. \$17.50, 1963.

This is an 18-paper collection of articles on a variety of rare minerals and their deposits, among other:  $\beta$ -fergusonite, stannotantalite, lithiophosphate, nigerite, djalmaite, ram-sayite, britholite, alumobritholite, gadolinite, RE-miserite, fergusonite and malacon. Types of deposits involved include complex granitic pegmatites, Be-F veins, alkalic pegmatites, albitized syenites and granites with Li mineralization, alkalic metasomatites rich in Ca, and albitites. The initial article by A. I. Ginzburg is an excellent summary of the scattered data of the other papers, brought into paragenetic perspective, along with additional correlative new information on similar deposits.

The translation is excellent, and the presentation and format are also first class. Illustrations are good to fair, but I doubt that the very same photomicrograph can be used to illustrate both a "veinlet of third-generation malacon in albitite," ×37 with nicols crossed (p. 122) and the "crystal form of red fergusonite," ×18, with single nicol (p. 116)! Admittedly such translations are expensive and serve a limited market, but I think in this case the price will serve to restrict the market further.

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ZUR GEOCHEMIE UND LAGERSTÄTTENKUNDE DES URANS. JOSEF DYBEK. 163 pp., 32 tables, 24 figs., paper bound, English Summary. Clausthaler Hefte zur Lagerstättenkunde und Geochemie der mineralischen Rohstoffe Vol. 1, 1962. Gebrüder Bornträger Berlin-Nikolassee/an der Rehwiese 14. DM 50.00.

This is a conventionally organized survey of the crystal chemistry, mineralogy, geochemistry and occurrences of uranium, more complete summaries of which have appeared in book form in the past. The section on mineralogy is essentially just a listing or mention of the various species, and even this is not complete. No data suitable for mineral identification are included. Neither monograph nor text book, the work offers little that is new or not readily available in other sources.<sup>1</sup> Its sins are of omission rather than commission, but its commission is of low rank.

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DAS URAN UND SEINE GESCHICHTE. FRANZ KIRCHHEIMER. 372+vii pp., 4 color plates, 57 figs. E. Schweizerbart'sche Verlagsbuchhandlung. Johannestrasse 3/1, Stuttgart W., Germany. DM 51.40.

This is a scholarly and painstakingly accurate and detailed account of the history of uranium from its "prehistory," through its discovery, up to the discovery of radium in 1898. The author presents a concise account of everything known about uranium from the earliest date of knowledge of its minerals and points out that many of the purposes to which the element and its compounds are now placed were first considered and developed as early as the 19th century but were later forgotten. A summary of the chapter titles will indicate the scope of the work: first information on uranium minerals; discovery of

<sup>1</sup> See for example, *The Mineralogy and Geology of Radioactive Raw Materials*. McGraw-Hill Book Co., N. Y. 654 pp. (1958).

uranium (1789); preparation of metallic uranium (1841); discovery of radioactivity (1896) uranium minerals and their occurrences—those described by 1898, localities found by 1898 (geographical survey); uranium ores and their application up to 1898—uranium mining in Saxony, Bohemia, Cornwall and Colorado, preparation and use of uranium compounds, uranium in metallurgy; and literature on uranium occurrences (1789–1898).

The book represents an immense effort of literature research resulting in an extraordinarily valuable source book, completely definitive.

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PROCEEDINGS OF THE SIXTH CONFERENCE ON THE SILICATE INDUSTRY.

Budapest, October 1961. Edited by BÉLA BEKE AND FERENC TAMÁS. Akadémiai Kiadó, Publishing House of the Hungarian Academy of Sciences, Budapest 1963. 469 pages. Price \$12.00.

Every two years, under the auspices of the Hungarian Scientific Society of Silicate Industry, a conference of research scientists in Budapest is organized for exchange and discussion of recent advance and investigation. The Sixth Conference in 1961 was the first really international convention in this series, with 73 reports presented, of which 44 papers were translated into English and offered in the present book. Among the authors, representatives from Austria, Bulgaria, Czechoslovakia, France, Germany, Norway, Poland, Rumania, the United Kingdom, the Soviet Union and Yugoslavia have contributed.

Although particular emphasis was given in the reports to industrial problems of silicate ceramics, many contributions have also a high rank in basic investigation. Among these we find fascinating articles on minerals as raw materials for ceramic manufacturing, physical-crystallography studies of fundamental constituents of modern ceramics, high-temperature synthesis, solid state reactions, and related items. We list here the following contributions as being of specific interest in applied mineralogy, physical crystallography, and constitution investigations of silicate materials:

- R. Bárta and Zd. Bruthans (Prague): Effect of Grinding on the Structure of Crystalline Substances, Investigated by Differential-Thermal Analysis. (pp. 17–28).
- M. Bartuška (Prague): Corundum Refractories with Alumina Bond. (pp. 29–44).
- I. Bubik (Budapest): Factors Influencing Technology and Preparation of Barium Metatitanate Base Ceramic Materials. (pp. 101–108).
- Marta Déri (Budapest): Results of Recent Investigations in the Field of Seignette-electric Titanate Composites. (pp. 133–144).
- M. Ferić (Zagreb): Some Aspects of Silicate Analysis. (pp. 151–155).
- M. Gregor and L. Híveš (Pressburg, Bratislava): Potash Balance of Cement Shaft Kilns with Special Regard to Possibilities of Potash Recovery. (pp. 177–189).
- Ć. Jelačić and Emilia Tkalčec (Zagreb): Separation and Quantitative Determination of Montmorillonite in Clays. (pp. 191–198).
- Lidiya Kachalova and M. Fodor (Budapest): Preliminary Investigations on the Preparation of Uranium Dioxide Ceramics. (pp. 199–205).
- P. Krumbiegel (Leipzig): Stable Isotopes in Silicate Research. (pp. 257–261).
- W. Kurdowski (Groschowitz, Silesia): Polymorphic Transformation of Dicalcium Silicate at Low Temperatures. (pp. 263–272).
- H. Lehmann, H. Dutz, and M. Koltermann (Clausthal-Zellerfeld): Investigations on the Crystalline Solution Series Forsterite-Fayalite by Infrared Spectrography. (pp. 273–277).
- B. Löcsei (Budapest): Contributions to the Solid-Phase Kinetics of the Reaction between  $\text{AlF}_3$  and  $\text{SiO}_2$ . (pp. 291–296).

- O. P. Mchedlov-Petrosyan (Khar'kov): The Formation of Cement Stone as a Theoretical Basis for Modern Concrete Technology. (pp. 315-321).
- I. Náray-Szabó and A. Kálmán (Budapest): The Lattice of  $K_2Pb_2Si_2O_7$  and the Structure of Lead Glass. (pp. 329-335).
- Z. Patzek and W. Szyborski (Gleiwitz, Silesia): Production of Forsterite Refractories from Serpentinite. (pp. 345-352).
- St. Pawlowski (Gleiwitz, Silesia): Semitechnical Experiments in Preparing and Roasting Refractory [Neurode] Clay Slate in Fluidization Kiln. (pp. 353-360).
- J. Sövegjártó (Budapest): Manufacture of High-Density Basic [Magnesite] Refractories. (pp. 383-388).
- A. Székely (Budapest): Experiments with Carbonate-Bound Lightweight [Perlite] Concretes. (pp. 389-397).
- T. Takáts and Margit Boros (Budapest): Derivatographic Examinations in the Ceramic Industry. (pp. 409-423).
- S. Urnes (Trondheim): Crystallization of Glasses in the System  $SiO_2-Al_2O_3-SiO_2$ . (pp. 437-443).

Many of the titles of this list will not immediately make evident how close the connections are between their subjects and mineralogic-petrological methods. But a detailed study will disclose how indispensable is the progress of mineralogical examination tests, particularly x-ray diffraction analysis, and more recently the use of the electron microscope, for the study of reactions in modern ceramic manufacturing.

The relatively low price of the very well printed and illustrated volume may help to introduce it into the libraries of many ceramic and applied-mineralogical laboratories, with a great profit for research, also in Western countries. From the respectable results of the Sixth Conference, one may expect that a forthcoming Proceedings volume on the International Conference in Budapest 1963 will present additional valuable reports and research results, from a Symposium of numerous leading scientists in Eastern countries.

W. EITEL

THE BONANZA WEST, THE STORY OF WESTERN MINING RUSHES, 1848-1900. WILLIAM S. GREEVER. 430 pp., 36 plates, 8 figs. (maps). The University of Oklahoma Press, Norman, Oklahoma. \$5.95. 1963.

*The Bonanza West* retells the histories of the major North American prospecting rushes: in California, Sutter's Mill and the Mother Lode; in Nevada, the Comstock and Pioche; in Colorado, Silver Cliff, Leadville, and Cripple Creek; in Montana, Bannock, Alder Gulch, Butte and Phillipsburg; in Idaho, Elk City, Orofino, Boise, Coeur d'Alene and Salmon River; in the Black Hills, Deadwood, French Creek and Lead; in the Klondike, Bonanza Creek, Dawson and the Yukon.

The book is intended for both the general reader and the scholar. It is a highly readable synthesis of the breathless events that lead to the precipitation of a mining camp and the kaleidoscopic activities that characterized its early development, and in some cases, its rapid demise.

Recounted are the events of the rush itself, the major personages, the nature, problems and life of the camp and how each rush affected the course of history of the United States. The book is a fluid integration of details on the culture, economy, politics, religion, as well as mining activity of the major individual mining districts of western North America, that successfully portrays a complete panorama of the West in its Bonanza era. Fully documented, the volume will also serve mineralogists and geologists as a source book on the history of development of the major Western ore deposits; highly recommended reading.

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