BOOK REVIEWS

X-RAY OPTICS. THE DIFFRACTION OF X-RAYS BY FINITE AND IMPERFECT CRYSTALS, BY A. J. C. WILSON (Department of Physics, University College, Cardiff), pp. viii+128, $4\frac{1}{2}$ by 7 inches, 33 figs. Cloth. Methuen & Co., Ltd., 36 Essex St., London, W.C. 2. **1949**. Price 6s.

This is the forty-fifth of "Methuen's Monographs on Physical Subjects" (B. L. Worsnop, ed.), among which crystallographers still remember "X-Ray Crystallography" by R. W. James and "X-Rays" by Worsnop and Chalklin. As stated on the flap of the jacket, this series is intended for readers of "average scientific attainment," such as "the Honours student and the research worker in other branches of physics."

The book deals with the effect on x-ray reflections of crystal size and of such crystal imperfections as are due to strain, structural mistakes, distortion, and thermal motion. This, the first connected account to appear in the field, is very satisfying in most respects. The interpretation of x-ray diffraction patterns rests on the reciprocal lattice (Ch. II). The reciprocal space corresponding to small crystals is studied (Ch. III) as a prerequisite for the treatment of line broadening (on powder patterns) as a function of crystal size and shape (Ch. IV). In faulty crystals the structure amplitude has different values in different cells, which vary in cell contents. The general calculation is given for mistakes in layer structures—the most common case (silicates, cobalt, graphite); as to the (much rarer) mistakes "in three dimensions" ($AuCu_3$), their effect on powder patterns is treated like that of crystal size (Ch. V–VI). Complex quantities are then introduced, briefly but adequately (Ch. VII), in order to cope with the more difficult problems encountered in the preceding two chapters and with the added complication of crystal distortion (cells varying in size and shape as well as in contents). The latter is illustrated (Ch. VIII) by Cu_4FeNi_3 and by copper aluminum alloy (4 wt.% Cu). A discussion of the effects of thermal agitation (Ch. IX) completes the book.

The presentation is condensed, yet lucid and elegant. Professor Wilson uses no more mathematics than he needs (probabilities, integral calculus, complex quantities, but no vectors) and introduces it gradually, "the earlier chapters requiring little more than elementary trigonometry." Having done considerable research himself on almost all the problems he covers, he knows whereof he speaks.

The book has been reviewed by H. Jagodzinski (*Acta Crystallographica*, **2**, 340, 1949), by F. A. Bannister (*Min. Abs.*, **10**, 504, 1949), and by A. R. Stokes (*Science Progress*, **37**, 749, 1949).

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J. D. H. DONNAY
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ECONOMIC MINERAL DEPOSITS BY ALAN M. BATEMAN, second edition, John Wiley & Sons, Inc., New York, 1950. Pp. 916, Illus. 308. Price $7.50.

The first edition of this excellent text was published in 1942 (*Am. Mineral.*, **28**, 340–341). In the second edition, the outline of the first is retained and the material is divided into three parts: (I) Principles and Processes (415 pages), (II) Ore Deposits (213 pages), and (III) Nonmetallic Mineral Deposits (245 pages). Following an introduction and interesting historical review, the principles relating to the formation of mineral deposits are covered in the following chapters: Materials of Mineral Deposits and Their Formation; Magmas, Rocks and Mineral Deposits; Processes of Formation of Mineral Deposits; Controls of Mineral Localization; Folding and Faulting of Mineral Deposits; and Classifications of Mineral Deposits. Important revisions in this part of the text have eliminated cer-

tain duplications evident in the earlier edition and have permitted a more comprehensive review of the major topics without greatly increasing the size of the book.

The author gives a clear outline of the crystallization and differentiation of the magma and an impartial summary of the prevailing views as to the origin of the ore fluid. He attributes the formation of contact silicates and certain deposits of the contact metasomatic type to an early vapor phase but regards most hydrothermal deposits as the product of late residual fluids which may leave the magmatic environment either as liquids or as gases which later condense to liquids.

In the important chapter on the formation of mineral deposits, nine processes are distinguished and each is clearly explained. Outstanding are the sections on Magmatic Concentration, Residual and Mechanical Concentration, and Oxidation and Supergene Enrichment. Proper emphasis is given to hydrothermal deposition with a detailed description of both open filling and replacement. Sublimation, Contact Metasomatism, Sedimentation, Evaporation, and Metamorphism complete the list of nine processes.

Bateman presents a genetic classification of mineral deposits with nine major divisions, each corresponding to a process of mineral formation. In the classification of the hydrothermal deposits, he emphasizes processes and structural control rather than intensity of deposition and recognizes two subdivisions, deposits due to open filling and those due to replacement. The major classes proposed by Lindgren, hypothermal, mesothermal and epithermal, are reviewed briefly and the terms are used by the author to define the intensity range of many individual deposits.

From the standpoint of teaching, a more extended discussion of wall-rock alteration, intensity and geologic environment of ore deposition, and hypogene zoning might be desired. However, this is largely a matter of personal opinion, and on the whole the basic subjects are adequately covered, clearly presented and in proper balance.

Additional chapters in Part I are devoted principally to mineral resources, geophysical prospecting and extraction of metals.

Part II gives a concise summary of representative ore deposits arranged by metals. Pertinent information is given on production, distribution, uses and technology of each metal, and this is followed by a survey of the geologic occurrence with a list of the major deposits arranged by genetic type. The individual districts are well selected and the descriptions, although necessarily brief, give the essential facts as to the ore deposits. The information is up-to-date and the major post-war developments have been noted. A more detailed description of certain significant deposits might be included, such as the iron ores of the Lake Superior district, the Tri-State zinc deposits and the mixed ores of the San Juan region.

Part III, comprising ten chapters, covers the nonmetallic products grouped according to their principal use. Eight chapters give an up-to-date, systematic review of the industrial minerals, with an account of important technological as well as geological features. The section also includes a summary of coal (18 pages), petroleum and gas (41 pages) and ground-water supplies (19 pages).

A few inaccurate statements were noted as well as a few typographical errors, but these are of minor importance. The material, which covers a wide field, is well organized and the illustrations are exceptionally good. The book is outstanding as a text for the first courses in economic geology and it constitutes a valuable reference book for engineers and geologists in the field.

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University of Michigan

A ROMAN BOOK ON PRECIOUS STONES, including an English modernization of Pliny's 37th book of his HISTORY OF THE WORLD by Sydney H. Ball, pp. xii+338, octavo, Gemological Institute of America, Los Angeles, **1950**. Price $6.75.

This book is a very important and informative contribution to the literature of gemology. It is the result of a labor of love by Dr. Sydney H. Ball, a noted economic geologist, who for many years was intensely interested in the history of gems, their occurrence, mining and superstitions concerning them. Dr. Ball's many contributions on gems include the authoritative chapters on gemstones in the *Minerals Yearbook*, and on precious stones in *Industrial Minerals and Rocks;* also the annual reviews of the diamond industry published by the *Jewelers' Circular Keystone.*

Unfortunately, Dr. Ball died before the manuscript was ready for the printers. Great credit is due Miss Kay Swindler of the Gemological Institute of America for completing the text and seeing the book through the press, which she has done very successfully.

The volume is based upon the 37th book of the *Natural History of the World* by Pliny the Elder, 23 to 79 A.D., as translated into English by Philemon Holland and printed in London by Adam Islip in 1601. In Section I, 108 pages, Dr. Ball discusses the life of Pliny and his standing as a mineralogist and gem expert. Roman jewelry, jewelers and lapidaries, geographical sources of gems, ancient commerce in gems, their value and relative rank, gem mining, treated and false stones, and industrial uses of gems in Pliny's time are described in subsequent chapters. These are followed by two comprehensive and very helpful tables, which identify Pliny's gems and minerals with their modern equivalents.

In Section II ninety-two pages are devoted to the Holland translation with a foreword by Miss Swindler. Section III contains Dr. Ball's very extensive notes, 125 pages, which explain and amplify many of Pliny's statements and allusions, or correct his errors. There is also a comprehensive index.

That Dr. Ball had been engaged for many years in preparing this volume, which involved much painstaking research, is recognized at once by the extensive documentation of Pliny's sources, and the author's many comments and references to ancient and recent publications. There can be no doubt whatever concerning Dr. Ball's very comprehensive knowledge of the literature on gems from the earliest time to the present.

A ROMAN BOOK ON PRECIOUS STONES now makes available to all mineralogists and dealers and lovers of precious stones a wealth of information, which thus far has not been readily accessible. The volume adds materially to Sydney H. Ball's reputation as an authority on gems. The Gemological Institute of America deserves great credit for publishing this volume, which is well printed and attractively bound.

<div style="text-align: right">EDWARD H. KRAUS
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LEITFADEN FÜR DIE EXAKTE EDELSTEINBESTIMMUNG by K. SCHLOSS-
  MACHER, pp. 174, 21 illustrations and 8 tables in the text, and 3 plates with 18 micro-
  photographs, 6"×9", E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, Germany,
  1950. Price 13.60 German marks.

The author of this manual for the determination of gemstones, Dr. K. Schlossmacher, was formerly professor of mineralogy at the University of Königsberg. He is now director of the Gemstone Research Laboratory at Idar-Oberstein. Dr. Schlossmacher is the well-known author of the third edition of Max Bauer's *Edelsteinkunde* published in 1932.

The purpose of this manual is to make available to the German gemstone industry, collectors, and lovers of gems information concerning the progress made in gemology during recent decades. The various properties which are essential in gemstone determination are discussed in an easily understood manner. These properties include specific gravity, optical properties, methods, and instruments, and hardness. The principal gems, pearls, corals, synthetics, imitations, and doublets are then briefly described. Twenty pages are devoted to a discussion of methods and tables for the determination of gemstones. Three plates con-

tain excellent microphotographs of a selected list of gems showing structural features and inclusions. These illustrations were furnished by Dr. E. Gübelin of Lucerne, Switzerland, who is a specialist in this field.

The book is well printed. It is hoped that it may appeal strongly to the German public interested in gemology.

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CORRECTION

(1) Vol. 33, page 344, Table I, 1948:

As is:		*As should be:*	
Number of Run	Factor	Number of Run	Factor
C-60	40.92	C-60	40.78
C-158	40.78	C-158	40.64

(2) Vol. 35, page 221, par. 3, 1950:

As is:

The value of the heat of the reaction, ΔH, . . . as follows 9,680 joules at 800°C.; 8,132 joules at 1,000°C.; and 8,654 joules at 1,200°C. The value of ΔH at 898.6°C. . . . is 9,426 joules.

As should be:

The value of the heat of the reaction, ΔH, . . . as follows 169,452 joules at 800°C.; 160,498 joules at 1,000°C. and 151,503 joules at 1,200°C. The value of ΔH at 898.6 . . . is 165,017 joules.

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G. T. FAUST

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Martin Alfred Peacock, professor of crystallography and mineralogy at the University of Toronto, and past president of the Mineralogical Society of America, died on Oct. 30, 1950, at the age of 52 years.

Otto C. von Schlichten, associate professor of geology at the University of Cincinnati, died on Oct. 4, 1950, of a heart attack. His special fields of interest included mineralogy, petrology and the geology of southwestern Ohio.

The Editorial Board of the new geochemical journal, *Geochimica et Cosmochimica Acta*, consists of the following:

Professor C. W. Correns (Göttingen)
Dr. Earl Ingerson (Washington)
Dr. S. R. Nockolds (Cambridge)
Professor F. A. Paneth (Durham)
Professor L. R. Wager (Oxford)
Professor F. E. Wickman (Stockholm)
Professor Paneth will be responsible for the cosmochemical part.

The Editors will be assisted by an honorary Advisory Board, the names of its members are given on the cover of the journal. The journal will be published every second month, six numbers form one volume, and the subscription price for one volume is $9.50.