BOOK REVIEWS

CRYSTAL DATA. DETERMINATIVE TABLES. Second Edition. J. D. H. DONNAY, General Editor, GABRIELLE DONNAY, Assistant Editor. Pp. ix+1302. Monograph Number 5 of the American Crystallographic Association. (1963) (Obtainable from Polycrystal Book Service, G.P.O., Box 620, Brooklyn 1, New York.) $20.00, to ACA members $15.00.

The first edition of Crystal Data was reviewed in *The American Mineralogist* (**40**, 784–786, 1955) by the undersigned and accorded the highest praise. Some other reviewers had misgivings and one went so far as to question the wisdom of making such a compilation. One young colleague, a chemist, has just told me with some emphasis that the new edition of Crystal Data is "*The* most valuable book (for crystallographers), even more valuable than the International Tables."

The first edition contained, in addition to the determinative tables, Part II, a classification of substances by space groups, Part I, by Werner Nowacki. This classification is absent in the present volume, but a second edition is said to be "in preparation." The determinative tables have been greatly expanded, now running to an estimated 13,000 entries against 6,000 in the first edition. Many persons have been involved in the massive task of compilation carried on for five years or more in several countries. On the title page E. G. Cox, Olga Kennard and Murray Vernon King are listed as responsible for the compilation of data for inorganic compounds, organic compounds and proteins, respectively.

The form and scope of the tables, described in the earlier review, remain unchanged. There are sections for each crystal system. In order that each system may be identified by a different initial letter the name "anorthic" is used. Within each section substances are listed in order of the value of a/b for the trimetric systems, c/a for the dimetric systems and a_0 for the isometric system. The *reduced cell* according to Buerger is now used for anorthic substances in place of the *Delaunay cell* used in the first edition. In the formula and name indexes, which run to 236 pages, each substance is identified by key letter and numeral, *e.g.*, kyanite A-0.9184, hawleyite C-5.818. There are numerous multiple entries, four for goethite, eight for graphite. Protein crystal data are gathered separately in an appendix by M. V. King.

The first edition of CRYSTAL DATA was used by some crystallographers as a tool in the solution of problems in crystal chemistry and even in crystal structure. The new edition will be even more useful for these and other purposes in addition to the stated purpose of being a set of tables for the identification of crystalline substances by their lattice dimensions. All crystallographers should have this book at hand and they should be grateful to Professor Donnay and his coworkers for the great service that they have performed.

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STRUCTURE REPORTS FOR 1953, Vol. 17. General editor: W. B. PEARSON; section editors: W. B. Pearson (Metals), J. Wyart (Inorganic Compounds), J. Monteath Robertson (Organic Compounds). Published for the International Union of Crystallography by N. V. A. Oosthoek's Uitgevers Mij, Utrecht, Netherlands, 1963, viii+863 pp.

Crystallographers need little introduction to this latest volume of "Structure Reports." Two of its abstracting features are: 1) abstracted structural data are reported "so completely that no further structural information would be gained by consulting the paper itself"; 2) non-structural data are not included. Completeness and organizational convenience are two outstanding characteristics of "Structure Reports."

DONALD R. PEACOR
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STRUCTURAL ANALYSIS OF METAMORPHIC TECTONITES, FRANCIS J. TURNER and LIONEL E. WEISS, McGraw-Hill Book Company, Inc., 1963. pp. ix+545, 269 figures and 11 tables, $17.50.

This extensive treatment integrates field and microscopic study in the analysis of structural complexities of deformed rocks. With the pioneer work of Bruno Sander as a foundation, this book summarizes the descriptive analyses of rock bodies and then applies genetic interpretations to the descriptive data. It does both in a most comprehensive manner. Descriptions of structures range from the microscopic to the macroscopic; interpretations are preceded by a discussion of experimental deformation and its relation to the various structures analysed.

Arrangement into three sections facilitates use of the book. Part I (5 chapters, 241 pp.) is primarily descriptive and emphasizes observations and techniques of studying tectonite fabrics; Part II (3 chapters, 102 pp.) discusses stress-strain relationships and experimental deformation techniques and results; Part III (5 chapters, 163 pp.) presents interpretations of structural data with emphasis on kinematic and dynamic approaches. This last section incorporates many of the newer ideas of interpretation of tectonites with the most recently published field examples. By the authors' admission, this part is most subject to revision and expansion, but in many respects is the most important section of the book.

Numerous aspects make the book an important contribution, destined to become a standard reference in this field. It is especially well documented, with abundant footnote references to recent literature. The illustrations are numerous (Chapter 4 alone has 42 figures) and well done with three-dimensional sketches which are particularly helpful for the reader to visualize the fabric discussions. Moreover, the book is self-contained; each topic is introduced at the basic level and carried to the advanced application. For example, Chapter 6 (Microscopic Analysis-Descriptive) contains sections on field sampling and laboratory preparation of oriented sections and universal-stage measuring and plotting procedures; Chapter 4 (Mesoscopic Analysis-Descriptive) includes discussions of structures such as bedding, foliation, lineation, and folds (including terminology and classification of folds by geometry and style).

Another contribution is the clarification of several ambiguities in the terminology in the published literature, or at least the controversies are clearly outlined. Among these are: fold symmetry based on axial plane orientation; the definition of foliation and the several overlapping terms such as slaty cleavage, fracture cleavage, and axial-plane foliation; fabric axes as distinct from kinematic axes with independent application of each.

The most prohibitive aspect of this book is the high cost, but its comprehensive nature eliminates the need for several related source books, and the book is therefore a bargain at the price.

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SPEKTRALANALYSE VON MINERALIEN UND GESTEINEN. EINE ANLEITUNG ZUR EMISSIONS-UND ABSORPTIONS-SPEKTROSKOPIE. H. MOENKE, Verlag Akademische Verlagsgesellschaft Geest & Portig, K.-G. Leipzig, 1962. x and 222 pp. 58 text figures, 21 Tables. Price DM 23 (bound).

One cannot better characterize the purpose and contents of the present short compendium on the use of modern spectral-analytical methods in the mineralogical laboratory, than by the words of the author himself in the Preface:

"An attempt is made to combine the chemical emission spectral analysis, in the range from 2200 to 9000 Å., with the absorption spectroscopy in the range from 5000 to 400 cm^{-1} (2 to 25μ), for a time-saving analysis of minerals and rocks. The aim of this attempt is to

use in research laboratory work much more generally the direct current-arc emission methods in the ultraviolet, combined with the spectroscopy in the visible range and the near-infrared absorption methods. The author wishes to direct the interest of mineralogists, geologists, geophysicists, hydrologists and agricultural chemists to the abundant fields of application of molecular spectroscopy of inorganic solids."

"By the serial production of modern, fully automatized spectral photometers and spectrographs with prisms or gratings in fine-mechanical optical industry, in the last time a reliable basis is created for a general reduction of time required in analytic operations. Essential improvements in the techniques of sample preparation were also achieved. . . . However, there is still an evident lack of useful information on the analytical methods here recommended in common textbooks of inorganic chemistry or mineralogy. This gap is to be closed by the present compendium."

"The devoted endeavors of investigators, and the many contributions made in literature will not earlier find their meritful success than when qualitative emission spectroscopy will belong to the routine methods of every laboratory, as well as quantitative spectroscopy, with or without the application of inner standards, and frequency spectroscopy in the infrared, for inner molecular oscillations."

Moenke's book is clearly written, and a very careful compendium for the practical use of spectral analysis with modern instrumentation for mineralogical studies of every kind. The rich experience of the author is visible in every detail of the text not only when he describes typical instruments available in their construction principles, but every detail is given for manipulation of sample preparation and of processing for qualitative and quantitative determinations of 50 chemical elements in emission analysis and of molecular groups in infrared spectroscopy. The literature references (34 pages) are chosen with greatest care and are therefore of highest value for research studies of all kinds. From his personal rich experience, the author illustrates the application of the methods recommended by describing special examples and by presenting many valuable aids in practice. With particular interest one must study his descriptions of the spectral-analytical investigation of potassium salt deposits and their minerals, corresponding investigations of borate deposits, of the minerals in the oxidation zone of sulfide ore deposits, of different sediments and soils, mineral oil occurrences, coal seams, or on the geochemistry of waters of all kinds. Petrographic problems of the study of granitic and basic rocks, of gneisses and other metamorphites are not less fascinating subjects for successful spectral-analytical investigations, not only for the determination of trace elements by emission spectroscopy, but also for abbreviated routine determinations of rock-forming minerals in powder samples by infrared spectroscopy.

Besides the practical methods recommended by the author, his compendium contains a most useful introduction into the theoretical background of infrared absorption from the mechanisms of the molecular oscillation process. With great care, a brief introduction is presented into the symmetry principles ruling these oscillations of molecule particles as developed in the papers of J. Cabannes and P. Niggli, the latter author starting from crystallographic-morphological viewpoints.

Equally impressive is the mastership, with which Moenke recommends chemical auxiliary methods; *e.g.*, for the enrichment of trace elements by adsorption precipitation or by distillation, extraction methods with organic agents (including the well-known dithizon methods), and ionic exchange with Amberlite and other synthetic resins for cation or anion exchange. Refined problems of molecular chemistry are also discussed; *e.g.*, the application of polarized infrared radiation in the study of monocrystals, and that of Raman spectra, specifically for a correct assignment of oscillations, as an indispensable method for supplementing infrared analysis.

Moenke's compendium is a most enjoyable enrichment of our mineralogical literature, with its rich suggestions based on the solid experience of a successful investigator. Its bibliographic section is a true treasure of information on widely scattered publications of applied spectroscopy, especially on the use of infrared spectrometry. It may be used with greatest profit in combination with the beautiful collection of mineral spectra.[1] The book will soon prove indispensable in the hands of investigators in this field.

[1] See following review.

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MINERALSPEKTREN, AUFGENOMMEN MIT DEM JENAER SPEKTRAL-PHOTOMETER UR 10. Deutsche Akademie der Wissenschaften, Kommission für Spektroskopie. Prepared by HORST MOENKE, Jena. Akademie-Verlag, Berlin 1962. Introductory Text 42 pp. with 5 text figures and 2 tables, 355 charts ($8\frac{1}{2}'' \times 11\frac{1}{2}''$) for mineral determination, the whole in a firm wooden case.

At the same time an excellent critical bibliography of R. J. P. Lyon appeared in American literature on the use of infrared absorption photometry for mineral identification purposes (Minerals in the Infrared, Stanford Research Institute, Menlo Park, California), the German Academy of Science sponsored a most valuable collection of infrared spectrometric data. H. Moenke is the editor of the present important and monumental enterprise. He is well known for his careful studies on rock-forming salt minerals and on salt petrology in which he used infrared absorption spectrometry (most of these papers appeared since 1960 in the Jenaer Jahrbuch). Moenke demonstrated the particular importance of infrared absorption methods for petroleum sediments, with application of the Zeiss UR 10 spectrophotometer.

The present collection of infrared absorption photometer curves includes frequent and economically important halogenides, oxides, hydroxides, carbonates, nitrates, borates, sulfates, chromates, tungstates, molybdates, phosphates, arsenates, vanadates, and silicates. This wide program makes it particularly valuable for the use in the mineralogical laboratory, but also for sediment petrology and inorganic chemical studies, as well as for practical problems of a rapid and accurate determination of complex mixtures; *e.g.*, in petroleum sediments.

For all kinds of such diversified investigations the collection is a fundamental thesaurus of standard spectra, based on reproductions from the original spectral curves, with indication of the wave numbers and frequencies (cm^{-1}) of absorption bands. The value of the charts for mineral identification is considerably increased by additional notes on spectra of macroscopically similar compounds. In the introductory textbook a systematic classification of the minerals concerned is presented (following in general Dana's System of Mineralogy), supplemented by pertinent literature references.

The preparation methods used by Moenke for obtaining reproducible infrared spectrophotometric data are described in detail. The KBr pressed pellet method is used as the standard. For the fully automatic recording Zeiss UR 10 instrument, prisms of NaCl, KBr and LiF are equally suitable. This makes possible accurate measurements of absorption and dispersion over the range from 400 to 700 cm^{-1} up to 1900 cm^{-1} with KBr and NaCl prisms, in addition for the range of the OH and NH valence oscillations (near 3100 cm^{-1}) with LiF prism. From the diagrams with a scale of 32 mm/50 cm^{-1} and 32 mm/100 cm^{-1} the accurate character of low half-width values are tabulated separately as demonstrated for the bands of brochantite as an example.

Particularly useful are the infrared absorption characteristics of water containing

minerals, and their behavior in the range of the hydroxyl valence and H_2O deformation oscillations at 3300 and 1640 cm^{-1}, further on the shiftings occurring *e.g.* in water containing phosphates and arsenates (erythrite, annabergite, cabreraite). Infrared absorption data, on the other hand, offer a rapid and unequivocal method of distinction of different hydrates; *e.g.*, of calcium sulfate as gypsum,hemihydrate (bassanite) and anhydrite. The application of this method is for mixtures of these crystal phases even superior to the conclusiveness of *x*-ray powder diagrams. Highly fascinating are, in addition, critical remarks on the literature with the infrared absorption spectra of silicates as published *e.g.* in the Landolt-Bornstein Tables of Physical-Chemical Constants, 6th Edition, Springer Verlag, Vol. I, Part 4, 1955. The reasons why many of the reference data here found cannot make possible conclusive assignments of bands and band groups to definite structural units are seen in the following points and postulations:

1) Many spectra discussed in literature were recorded by infrared spectrophotometers the resolution of which was unsatisfactory or did not permit investigations below 600 cm^{-1} due to their prism material.
2) Data below 400 cm^{-1} are particularly lacking.
3) Infrared spectra of silicates, even when produced by modern instruments, must be supplemented by RAMAN spectra.
4) Early reflection spectra alone are not sufficient, they must be supplemented by absorption spectra.
5) Very few infrared absorption measurements extend to oriented crystal plates in polarized radiation.

The previous conclusions made by F. Matossi and his collaborators in their pioneer investigations (since 1934) for an assignment of single band groups to definite structural units were seriously criticized by V. E. Kolesova (since 1954), especially those applying to silicates with single structural groups (soro- and cyclic silicates). Nevertheless, Moenke emphasizes the importance of these problems by degenerated infrared oscillations and RAMAN activity (*cf.* H. Lehmann and H. Dutz, 1958). Since antisymmetric Si-O-deformation oscillations postulate splittings of absorption bands lower than 400 cm^{-1}; *i.e.*, in a range not yet easily accessible for absorption measurements, an accurate assignment from silicate spectra is, as a matter of fact, not yet possible. It is, on the other hand, very important to know that, according to Kolesova, complex absorption bands between 720 and 780 cm^{-1} indicate a possibility of discerning [AlO] tetrahedra in aluminosilicates (*e.g.* in albite), and to distinguish these from silicates with [AlO_6] groups (*e.g.* in garnets). In the latter silicates the infrared absorption spectra do not show those bands. Kolesova's conclusions are also confirmed in distinctive characteristics of the infrared absorption spectra of sillimanite (with a 750 cm^{-1} band indicating tetrahedra), and kyanite (in which no band appears between 720 and 780 cm^{-1}). Moenke further emphasizes the importance of recent results of P. Tarte on Ti garnets which show at 650 cm^{-1} a typical band, the intensity of which increases with increasing Ti contents.

We cannot discuss here in details the fascinating and suggestive introductory text of H. Moenke. We only briefly emphasize the problems of order/disorder relations in feldspars (*cf.* F. Laves *c.s.* since 1956) and still incomplete, but valuable data on zeolites. It is surprising to see that so little information can be achieved from the absorption bands caused by H_2O bound to tectosilicate frameworks even when the KBr method is used. Moenke confirms recent observations of R. G. Milkey (1960) that tectosilicates can be very well identified by absorption bands with wave numbers below the ν(a)SiO_2 oscillations.

It is most evident that the imposing collection will become indispensable for every investigator in the field of infrared absorption methods for mineral identification and

structure problems of inorganic compounds. Particularly for the silicate chemist the results of infrared absorption have a rapidly increasing importance. In this respect the monumental work presented in this collection will be a reliable standard basis. Only one purely technical recommendation may be added, namely that in a new print of the valuable charts a somewhat more smooth paper should be used. Reproductions from the original spectrophotometric records are most welcome, in comparison with only hand-redrawn curves. But for such a highly valuable material the best possible reproduction with a finer screen, on smooth-coated, if not high-gloss paper would be more desirable.

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SEDIMENTARY PETROGRAPHY, HENRY B. MILNER. 4th edition, 1962, Vol. 1, Methods in Sedimentary Petrography, 643 p., 93 figs., 25 plates; vol. 2, Principles and Applications, 715 p., 82 figs., 71 plates: London, George Allen & Unwin, Ltd.

The long-awaited fourth edition of Milner's "Sedimentary Petrography" has at last come off the press (see review 3rd ed., *The American Mineralogist*, **26**, p. 135). And like each earlier edition it has grown larger than its predecessors. The new Milner consists of two volumes, separately indexed, of 643 and 715 pages respectively. There has been a more than commensurate increase in price. The new edition is $35.00.

Volume one is a synoptic summary of virtually all known analytical methods appropriate to the examination of geologic samples written with special reference to sedimentary materials. As such, it is a useful guide to the literature on the subject and gives the reader an insight into the analytical procedures now available to him. It is not, however, a laboratory work book nor a guide to either the fundamental theory or actual analytical practices. The investigator wishing to employ one of the methods will have to have had prior knowledge and experience in the subject or will have to turn to original materials to acquire the same.

On the sixteen chapters in volume one, eleven were written in part or wholly, by collaborators. Included here are the chapters on chemical analysis, microchemical and electrochemical methods, spectrographic methods, methods utilizing x-ray fluorescence and x-ray diffraction, electron microscopy, nuclear methods and statistical analysis.

Volume two contains that material which most readers associate with the traditional Milner, namely the tabulated and illustrated section on the detrital minerals. This section some 200 pages, will be the principal reason why most persons will buy Milner. It has the same format as its predecessors; it has been, however, appreciably enlarged from 132 species to some 168 species. Unlike some other sections of this volume, this chapter has been adopted with many new references. Two chapters by Dorothy Carroll, one on the clay minerals and the other on sedimentary petrography and the study of soils, are well-written and worthwhile additions to this volume. They are the best-documented chapters in the book. The clay mineral chapter was obviously written about 1955 (no later references) and is a good summary of the clay minerals, their determination and mineralogy and their occurrence and significance. Several chapters are reprinted with little or no revision. This is true of the chapter on principles and practice of differentiation and correlation of sediments by petrographic methods (latest reference 1935), the chapter on examples of differentiation and correlation of sediments by petrographic methods (only one reference later than 1934), the chapter on the bearing of sedimentary petrography on paleogeographic problems, and the chapter on the consolidated sediments (latest reference 1937, excepting only in the portion on clay and related materials).

The fourth edition of Milner, therefore, is a work of very uneven quality. It contains some good up-to-date sections together with some very antiquated sections; some well-

documented chapters and some with little or with obsolete documentation. Much of the new Milner, like the old, is very parochial. In the second chapter of Volume two, for example, the only bedded iron ores mentioned are British; the only reference is to Hallimond, 1925. Some 86 bulk chemical analyses of sedimentary materials are presented in Volume one—almost all of them British. The scholarship in certain parts of the new edition is sloppy. For example, on page 135 of Volume one, in the presentation of Stoke's equation. "d" is said to be the diameter but the unit of measurement is not specified; likewise "U" is the rate of fall, but again the units of measurement are not given.

Despite these shortcomings the new Milner, like the old, will prove to be a very useful book for many years to come.

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THE GEOLOGY OF EGYPT by RUSHDI SAID. Elsevier Publishing Co., Amsterdam-New York, 1962, xvii+377, $27.50.

This book is a comprehensive synthesis of the available literature on the geology of Egypt. It is well organized and gives a well balanced account of the geomorphology, sedimentation, structure, tectonics and mineral deposits. After an introductory Part I on the general Geology and Structure of Egypt, the principal topics are organized on a tectonic basis, covering the basement complex of the Arabo-Nubian Massif, the Stable Shelf, the Gulf of Suez taphrogeosyncline, and the Unstable Shelf. The last part (Part VI) covers the mineral deposits with metals and non-metals lumped together in order of age, and the final chapter discusses the Oil Prospects of Egypt.

The text is well illustrated with 71 figures, which include the geological and tectonic maps of Egypt and numerous geological maps of oases and other local areas, several cross sections, numerous facies maps, composite columnar sections, and logs of 14 wells. These are all black and white page size or fold-ins, but are well designed to show the significant features. Unfortunately, the fold-in Geological Map of Egypt is not patterned, but shows only letter symbols, and thus is rather difficult to visualize. Table I gives a very concise and well organized picture of the stratigraphic succession of Egypt. Six photographic plates serve mainly to illustrate the aridity of much of the country, and 4 plates of line drawings show some of the significant fossils of Egypt.

A major feature of the geology of Egypt is a north-northwest gently-dipping homocline of sediments ranging from Carboniferous to Pliocene. Metamorphic and igneous rocks of supposedly Precambrian age form the bulk of the rugged mountain masses of the Eastern Desert and the southern part of the Sinai Peninsula. The Precambrian basement complex is divided into 5 major groups: 1) the ancient mica and hornblende schists and gneisses with associated amphibolites, serpentines, and gabbros; 2) early aegirine and hornblende granites; 3) the Dokhan volcanic series, which includes the famous purple Imperial Porphyry; 4) the Hammamat "series" of conglomerates, graywackes, and red beds; and 5) the "newer" muscovite-rich granite and associated acidic intermediate and basic dikes.

The sedimentary rocks, forming the gentle homocline, are divided into 3 main divisions: 1) the lower clastic division, mainly sandstones of Carboniferous to lower Cretaceous age; 2) the middle calcareous division, mainly limestones, several of them massive, from Upper Cretaceous (Cenomanian) to Upper Eocene age but including the very widespread Nubian sandstone; and 3) the upper calcareous division of Miocene to Recent sandstones, limestones, and poorly consolidated sands and gravels. Most of the great oases of the western desert have been carved out of the middle calcareous division, presumably by wind action, and the Nubian sandstone and massive limestones form prominent escarpments.

The tectonic picture includes the Arabo-Nubian Massif of the Eastern Desert and

southern Sinai Peninsula; the Stable Shelf of the southern part of the Western Desert, which is gently warped into a series of "rolls"; the Unstable Shelf of the northern part of the western desert and northern Sinai Peninsula, which is characterized by a series of gentle anticlines and synclines of northeasterly trend, and the great complex graben structures of the Red Sea, Gulf of Suez, and the Gulf of Aquaba. The principal faults are of north-northwest trend, but there are also systems of northeast, northerly and easterly trend. Much of the course of the Nile is controlled by faults of northerly and north-northwesterly trend. The author suggests that the fault blocks of the complex graben structures have been active since at least the Paleozoic, but much of the movement has occurred since the Cretaceous.

The metallic and non-metallic mineral deposits, grouped together according to age and origin, include chromite, nickel, ilmenite-magnetite, tin, tungsten, molybdenum, gold, zinc, copper, iron (both Lake Superior type and minette type), asbestos, vermiculite, graphite, marble, phosphate, gypsum and salt. Unfortunately, there is not much indication of the relative economic importance, but of particular significance are the Precambrian hydrothermal gold veins, which were worked by the ancient Egyptians and some of which are still worked today; the widespread phosphate deposits of Upper Cretaceous age; and the Miocene gypsum deposits along the northern part of the Red Sea and the Gulf of Suez.

The oil prospects of Egypt, covered in the final chapter, are discussed on the basis of tectonic environment. The producing oilfields, 12 in number, are fault-controlled in the complex graben structures of the Gulf of Suez taphrogeosyncline. A total of 142 wells have been drilled in Egypt since 1958—9 in northern Sinai, 13 in the Western Desert, and 120 in the Gulf of Suez and Red Sea regions. The author believes that there are distinct future possibilities in the Unstable Shelf, and perhaps in the Stable Shelf areas of the Western Desert.

THE GEOLOGY OF EGYPT represents a thorough investigation and synthesis of the available literature by the author, and should prove invaluable to all those interested in the geology of north Africa and the Middle East.

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GEM CUTTING, A LAPIDARY'S MANUAL, second edition, JOHN SINKANKAS. D. Van Nostrand Company, Incorporated, Princeton, New Jersey. 286 pages, $8\frac{1}{4}'' \times 11''$, 191 black-and-white illustrations. $11.75.

The first edition of Sinkankas' GEM CUTTING was heralded as an outstanding contribution to the literature in the amateur lapidary field when it was published in 1955. The new second edition represents a significant improvement over the first. The book is considerably larger in format and the illustrations are much more numerous. They convey essential information more effectively, so the book is much easier for the amateur lapidary to use.

Professional lapidaries are notorious for their reluctance to divulge any information whatsoever about their trade. Each seems to feel that every step he takes is known only to himself. Thus, at the time that former Navy officer John Sinkankas tried to learn gem cutting as a hobby, he found there was almost nothing available in the literature, so that he was largely self-taught. A painstakingly careful worker himself, Sinkankas felt that a step-by-step manual laid out to lead an amateur by the hand would be well received. Many of the recent additions to the gem displays of the Smithsonian Institution were cut by him, so he was well qualified to write it. The success of the first edition proved him right.

Captain Sinkankas's instructions for sawing, grinding, and all of the other steps are easy to follow. He has included chapters on many other requirements of the lapidary's

art, such as cutting spheres and beads, tumble polishing, engraving, mosaic and inlay work, etc.

As in his first edition, Sinkankas has a separate chapter on the specific precautions necessary to the cutting of a wide variety of gem materials and of unusual minerals sometimes cut by, or for, collectors. Included among the materials seldom encountered in gem collections are anatase, domeykite, anthracite, euxenite and mordenite, to give an idea of the scope of this section.

In comparison to the detail with which he handles cutting instructions, Sinkankas is cavalier in his treatment of proportions and angles. Since these are keys to beauty in a transparent stone, more attention seems merited. In the 2.0 to 2.5 refractive-index range. he recommends 37° to 40° for pavilion angles. A 37° pavilion on strontium titanate or diamond brilliant gives it a "dead" center.

For the amateur cutter, the Sinkankas book is one of two or three to be regarded as almost a must.

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PARTICLE SIZE: MEASUREMENT, INTERPRETATION, AND APPLICATION. R. R. IRANI AND C. F. CALLIS. John Wiley & Sons, Inc., New York and London, 1963, 165+viii, $7.50.

This book is the outgrowth of equipping a laboratory for particle size analysis and the recognition of the need for a single volume which summarizes the technology on particle size measurement and the statistical theory on particle size distributions. It covers particle size measurement, interpretation and application. Although brief, it gives adequate treatment to theory in a clear and concise manner. Particular stress is given to very small particles (<50 microns) which are of particular importance in many phases of the chemical industry.

The mineralogist who deals with fine particulate rocks and minerals will find the book most useful. I would draw it to the special attention of the clay mineralogist. The sedimentary petrologist and hydrologist also will find the book a useful reference.

LOUIS I. BRIGGS, JR.
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GEOLOGY OF NORWAY, ed. by OLAF HOLTEDAHL. Number 208, Norges Geologiske Undersökkelse, Oslo University Press, Oslo, 1960; paper-bound, 540 pp. 184 figs., 19 pl., plus geological and glacial maps of Norway (in separate cassette). $15.00.

The GEOLOGY OF NORWAY, which appears as No. 208 in the Norges Geologiske Undersökkelse series, is an extensive discussion of the geology of Norway published to coincide with the Scandinavian meetings of the International Geological Congress in 1960. Professor Olaf Holtedahl is the editor, and also a contributor along with 20 other prominent students of Norwegian geology.

In general, this book follows a chronological outline with rocks of similar ages further subdivided geographically. The following are the principal headings: The Precambrian; the carbonatite and per-alkaline rocks of the Fen area; the Sparagmite group (Eocambrian); the Cambro-Silurian; the Devonian (including Downtonian); the Permian; the Jurassic and Cretaceous; and the Quaternary. The various sections, written by different authors, are largely devoted to areal geology and are almost entirely descriptive. Each section, however, contains a lengthy list of references to more specialized publications. The most interesting parts of the book for mineralogists may be the discussions of the pegmatites of Østfold and Sørland, and the carbonatite and per-alkaline rocks of the Fen area.

The reader will rarely be reminded that this is basically a translation. It is a tribute to Professor Holtedahl and his colleagues that, notwithstanding the 21 contributors, the text carries little of the "Tower of Babel" effect so common to multiple author surveys. The printing errors are few, and the illustrations, with some exceptions, (Fig. 58, p. 195; Fig. 129, p. 396, for example) are adequate. The 19 plates and two maps are a credit to the publication. For the mineralogist the content may appear unbalanced; for example, 171 pages are used for the Quaternary and only 92 pages for the Precambrian.

Rare is the individual with the catholic interest to read this book from cover to cover, however, it will serve as a fundamental reference for years to come. It is for this reason that the lack of any index greatly restricts the value of this excellent contribution.

This synthesis of the geological investigations in Norway up to 1960 contains much information for both "The Friends of the Pleistocene" and those who look upon all rocks younger than Precambrian as "cover." Do not allow the price to preclude the purchase of this book without an individual perusal.

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PUBLICATIONS RECEIVED

Univ. Leeds, Res. Inst. African Geol. 6th Ann. Rept. Sci. Results **Sess. 1960–61.** 59 pp. 1961.

A. H. VAN DER VEEN. A study of pyrochlore. *Verh. Kon. Nederlands Geol. Mijnbou. Genootschap. Geol. Ser.* **22,** 188 pp., 19 plates.

TOSHIO SUDO. *The Principles of Mineralogy.* The Asakura Publ. Co., Ltd. Japan. 1963. 565 pp. (in Japanese).

Association Géologique Carpato—Balkanique V-ème Congrès 4–19 *Sept.* 1961, *Bucarest. Guide des Excursions.* A. Baia Mare B. Carpates Orientales C. Carpates Meridionales D. Dobrogea.

Acta Geologica Alpina, **No. 8.** *In Memoria de Ciro Andreatta*, 1962. 486 pp. 16 papers, chiefly on the petrology of Italian igneous and metamorphic rocks.

Stromboli. Rivista Internazionale di Vulcanologia. **No. 8.** (no date) Four articles on vulcanology and volcanoes; one on determination of 2V from bisymmetrical interference figures.

Diamant. **No's 49 and 50.** March, April, 1963. An international monthly magazine of diamond news. Consciencestraat, 18 Antwerp, Netherlands.

NOTICES

INTERNATIONAL MINERALOGICAL ASSOCIATION

The following notice supersedes the earlier announcement (*The American Mineralogist* **48,** 222, 1963) on the place of meeting of the International Mineralogical Association in India in December 1964.

The fourth general meeting of the Association will now take place in New Delhi concurrently with the twenty-second session of the International Geological Congress, December 14 to 22, 1964. Notice to this effect is contained in the second circular (p. 6.) of I.G.C. issued in Calcutta, September 1, 1963.

There will be no special field excursions offered by I.M.A., and arrangements have now been made for attending members to register for hotel accommodation in New Delhi and for field excursions of the International Geological Congress (see I.G.C. second circular for the description of these). Applications should be made directly to the Secretary General, Organising Committee of the International Geological Congress, Geological Survey of India, 27, Chowringhee, Calcutta 13, India, to be received before 1st February, 1964.