BOOK REVIEWS

ZUR STRUKTUR UND MATERIE DER FESTKÖRPER. Diskussionstagung der Sektion für Kristallkunde der Deutschen Mineralogischen Gesellschaft am 1./2. Mai 1951 in Frankfurt/M. 1952. Springer-Verlag, Berlin, Göttingen, and Heidelberg. 14×21 cm., v+304 pp., 95 figs. Paper bound, Price DM 28.60 ($7.00).

In the spring of 1951 the newly founded Section on Crystal Science of the German Mineralogical Society held its first meeting. Outstanding German crystallographers, physicists and chemists, active in far-flung fields, were invited to acquaint mineralogists with the results of their work. The usefulness of such contacts is well demonstrated by the book under review, in which eight lectures are presented together with carefully edited discussions.

The introduction is a welcoming address to the visitors, in which section leader O'Daniel explains the purpose of the meeting. In the first paper (24 pp.) Niggli deals with the symbolism of groups of symmetry operations useful in spectroscopy as well as crystallography. He summarizes a lifetime of work in the field. C. Hermann takes the reader to the realm of n-dimensional translation groups. His crisp mathematical treatment (6 pp.) is not easy to follow for the uninitiated, who will be grateful for the three pages of helpful discussion that follow it. Sublimation of crystals is discussed by Knacke, Stranski, and Wolff (22 pp.). In claudetite theory and observation agree; in arsenolite a strong deformation must be postulated in the interior of the crystal. Kossel (40 pp.) convincingly advocates the use of monocrystalline spheres in the study of surface phenomena, such as etching and crystal growth. A review of his theory on crystal growth is included. Jagodzinski summarizes and expands his work on order-disorder in crystals (31 pp.), a topic which should become increasingly important to mineralogy. There follows a long paper (96 pp.) by Hosemann on the statistical nature of the structure of macromolecules and colloids. The concept of "paracrystals," previously introduced by Kratky and referring to crystals whose lattice vectors vary slightly from unit cell to unit cell, is found useful. Smekal surveys our knowledge of the structure of solids in the glassy state, and the conditions under which they form and persist in metastable states. Many points of interest to the mineralogist are covered by him (49 pp.). In the last contribution (32 pp.) Witte tells of new experiments on the influence of Brillouin Zones on physico-chemical properties of alloys.

The papers are not grouped around one subject and the bearing of some of the topics on mineralogical problems is as yet remote. This statement, however, is not intended as an adverse criticism—understanding of basic crystallographic problems will make for better mineralogy.

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ROCKS FOR CHEMISTS, AN INTRODUCTION TO PETROLOGY FOR CHEMISTS AND STUDENTS OF CHEMISTRY, by S. JAMES SHAND, New York, Pitman Publishing Corporation, 1952, xii+146 pages; 32 plates. Price, $4.50.

In this little volume Shand recognizes and tries to do something about one of the great problems of modern science—cooperation among disciplines where specialization has taken a subject as far as it can go without help. It has been realized for decades that petrology has gone about as far as field studies, descriptions, and classifications can take it without more fundamental data on which to base interpretations. Fortunately, some of the foremost chemists of the day have turned their attention to these problems, with gratifying results. If this book succeeds in interesting other chemists in Nature's great laboratory with its

innumerable chemical problems, to the point of helping solve some of them, it will have been eminently worthwhile.

The above point of view is outlined in a 2-page Preface, which is followed by a brief Historical Introduction. There are short chapters on Rocks in the Field, Rock-forming Minerals, The Nature of Active Lava, The Nature of Underground Lava, and The Classification of Eruptive Rocks. The eruptive (igneous) rocks are then discussed in seven chapters covering 61 pages. One chapter of 12 pages is devoted to Rock Weathering and Sedimentary Rocks; metamorphic rocks and processes are allotted 2 chapters comprising 20 pages.

The book is well written and nicely printed; it should appeal to a much wider audience than just the chemical fraternity, for whom it was written. The splendid plates (photographs of field occurrences, hand specimens, and thin sections of rocks) lose some of their effectiveness by being grouped together at the back of the book so that reference to them from the text is inconvenient. The index of $2\frac{1}{2}$ pages is unnecessarily short; it contains no names of authors or localities and so is little more than a list of the minerals and rocks discussed, with a few important subject headings thrown in for good measure.

As one would expect, most of the statements in the book are petrologically and chemically sound. Here and there, however, inaccuracies have crept in. Some of these are merely failures to consider the more recent literature on a subject. For example, the 1921 statement by Shepherd on the plutonic origin of volcanic gases, quoted on page 23, was modified later (1938) when Shepherd came to realize the variable, but considerable contamination of such gases on their way to the surface. The measurements of temperatures of lava cited on page 25 are badly out of date now, as are the methods of making them. Recent measurements with optical pyrometers have given much more reliable results. The temperature of 1350° mentioned in paragraph 2 on page 27 for fire fountains must represent local flame temperatures; no lava that hot has ever been measured.

There are a few statements in the book that are definitely in error. For example, on page 18 reference is made to the escape of hot, highly compressed gas from lava. The gas is not present as a separate phase as the lava ascends, but is actually *dissolved* in the silicate melt. On page 59 it is stated that "even quite siliceous obsidian" occurs in the Hawaiian Islands; no rocks more siliceous than trachytes have been described from the Islands. On page 69 corundum is listed as a constituent of granite pegmatites, but it is incompatible with quartz, as stated on page 39, which occurs in large quantities in such pegmatites.

Other statements, while not actually in error, leave erroneous impressions. For example, on page 18, paragraph 2, and again on page 21, paragraph 2, the impression is created that all of the gas escaping from a lava is combustible, but numerous analyses show the gas to consist almost entirely of H_2O, CO_2, N_2, SO_2, A, and other oxidized or inert gases; commonly only a fraction of one per cent could burn. At the end of the first paragraph on page 20, the volcanic Hawaiian Islands are said to be "arranged along the top of a submarine ridge." It should be emphasized that the "ridge" is merely the bottom part of the immense pile of lava that has poured out along a fissure or structural line of weakness in the floor of the Pacific.

A number of other questions concerning usage and interpretation should be pointed out. It is surprising to find hornblende and melilite grouped together in a classification of rock-forming minerals (p. 14–15). In paragraph 2, page 20, two possibilities are mentioned for the origin of magma reservoirs in the earth's crust; a third alternative—local relief of pressure—is probably more generally accepted today as the mechanism of generating magmas than either of the ones mentioned. In the chapter on classification of eruptive rocks Shand points out the inconsistencies, limitations, and other disadvantages of existing mineralogical and chemical classifications. His criticisms are perhaps a little too severe. On page 67, paragraph 2, the statement is made that the term *granodiorite* is used in America "for any granitic rock holding a rather large proportion of plagioclase." That depends on who uses

the name; some authors stay by Lindgren's original definition, which gives the term a definite and restricted meaning. The last sentence of paragraph 1, page 131, states flatly that metasomatism takes place by migration of ions of Na, K, Ca, and other elements, together with silica, through the medium of intergranular water films; at present there is not even agreement as to the reality of migration of ions through solid rocks, much less as to the mechanism whereby it takes place.

On page 19 the statement is made that "the new volcano (Parícutin) has remained in almost constant activity to the present day." This was certainly true at the time the manuscript of the book was prepared. Now, however, it has been completely inactive for more than a year (since March 4, 1952) and observations on numerous comparable volcanoes in the region make it appear extremely unlikely that Parícutin will become active again.

There are not many typographical errors in the book. The following should probably be mentioned: p. 18, par. 2, line 5 *unwelling* should read *upwelling;* p. 49, line 8 from bottom, *Fig. 1* should read *Fig. 2;* on p. 109 it is stated that "In the purest glass sands SiO_2 may exceed 90%—." SiO_2 must exceed 90% in any glass sand and in very pure ones used in optical glass the percentage must exceed 99.8%. This is probably a typographical error for *99%*. P. 125, par. 3, line 9, *proportion* should read *portion;* p. 128, par. 4, line 6, *Plate 13B* should read *Plate 12B*.

As Shand so effectively points out in his historical introduction, chemists were particularly and chiefly interested in rocks and minerals until the middle of the 19th century. In the intervening 100 years, however, their attention has turned to investigations of synthetic organic and inorganic products, while that of geologists has focussed largely on stratigraphic and paleontologic problems. However, analytical chemical methods applicable to rocks and minerals as developed by Hillebrand toward the end of the 19th century, and work by other chemists, have convinced petrologists of the essential bond between chemistry and petrology. If this book can persuade the chemists that their original field of investigation, natural materials, still offers challenging problems, as I think it can, then it will have fulfilled its author's wish. Certainly the straightforward, lucid style of presentation will go a long way toward accomplishing this end.

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SCHMUCK- UND EDELSTEINKUNDLICHES TASCHENBUCH, by KARL F. CHUDOBA AND EDUARD J. GÜBELIN, XII+158 pp., 2 colored plates, 25 illustrations and numerous tables in the text, and a supplement of 24 pages containing 124 half-tone cuts of mineral inclusions. Verlag Bonner Universitäts-Buchdruckerei, Gebrüder Scheur, G.M.B.H., Bonn, Germany, 1953. Price 19.60 marks.

Since World War II there has been greatly increased interest in Europe in ornamental and gem minerals, which has resulted in the publication of several books on gemology, the formation of several gemological associations, and the establishing of a specialized journal. The book by Chudoba and Gübelin is a recent addition.

Following a brief introduction, 32 pages are devoted to a glossary and the listing of approved names of gemstones and those commonly used in the trade. Terms used in the occurrence and cutting of gem minerals are discussed in 34 pages. Chemical and physical properties are sketchily described in Chapter 3 (33 pages). A rather comprehensive treatment of inclusions is given in Chapter 4 (24 pages), which is supplemented by 124 half-tone cuts. Then follow various summary tables and brief discussions of coated, synthetic, and imitation stones. There is also a very short chapter on the use of the microscope as applied to gemstones. Determinative tables make up the last chapter. There is no index.

The authors apparently aimed to have the book serve (1) as a dictionary and reference work and (2) to some extent as a text, which would appeal to jewelers and dealers in and

cutters and lovers of gemstones. Much valuable information has been compiled and arranged for ready reference. It is, however, doubtful that the book can be used successfully as a text, especially by beginners in gemology or by the general public, for the treatment is too sketchy and superficial. Moreover, even for one well versed in the German language the style is frequently very involved.

The book is well printed on good paper and bound with a flexible cover, but on account of its size, $5\frac{1}{2}\times8\frac{1}{4}$ inches, it is not a "pocket" edition in the usual sense.

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THE MINERALOGY OF GREENLAND, by O. B. BØGGILD, pp. 422, 87 illustrations, and 1 map of Greenland, Vol. 149, No. 3, of Meddelelser om Grønland. C. A. Reitzels Forlag, Copenhagen, Denmark, 1953. Paper cover, price 65 kroner.

For more than 50 years Professor O. B. Bøggild has been an intensively active student of the minerals of Greenland. In 1905 he published "Mineralogica Groenlandica," 625 pages, as Vol. 32 of Meddelelser om Grønland. Since then many new mineral localities have been discovered. Moreover, during this period various scientific expeditions interested in the minerals of Greenland and the officers of mines and government stations collected quantities of minerals which were sent to Denmark for study. As a result, it was obvious that either a supplement to "Mineralogica Groenlandica" should be published or a new edition prepared. It is fortunate that it was decided to publish a new edition in English in order to make it more generally useful than the first edition which was in Danish. Less interesting occurrences were omitted and many descriptions of minerals and localities shortened. The various properties and the important occurrences of 251 minerals are described. In each case there is an exhaustive bibliography. The crystal drawings are excellent. There are also some very good half-tone cuts. There are alphabetical lists of localities and minerals. Dr. Bøggild indicates that 61 elements occur in the minerals of Greenland.

This volume, the result of an exhaustive and painstaking study, will long serve as a most valuable reference work on the mineralogy of Greenland.

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MEASUREMENT OF RADIO ISOTOPES, by DENIS TAYLOR, 118 pages, 40 diagrams, John Wiley and Sons, Inc., New York, 1951.

This highly useful small "pocket" book contains succinct descriptions of the various types of apparatus by means of which radioactivity may be detected and measured. Beginning with a chapter on fundamental theory, it continues with descriptions of radioactive measuring apparatus and counting systems, including D. C. ionization chambers, vibrating-reed electrometers, quartz-fiber electrometers, Geiger-Müller counters, beta-ray counters, gamma-ray counters, x-ray counters, flow-type proportional counters, and scintillation counters. Other chapters provide information on problems of source geometry, source absorption, dilution effects, source mountings and source standardizations. Also the author, who is head of the Electronics Division, Atomic Energy Research Establishment at Harwell, England, discusses in detail methods of measurement, correction factors, health hazards and the use of radiomonitors. The book is of considerable value to geologists and mineralogists who are interested in a general coverage of the field of radio isotope measurement and who do have neither the time nor inclination to search for such information in larger and more encyclopedic treatises on the subject.

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GEOLOGY OF THE CABALLO MOUNTAINS, by VINCENT C. KELLEY AND CASWELL SILVER, University of New Mexico Publications in Geology No. 4, 286 pages, 19 plates, 26 figures, 1952, $2.50.

This publication on the general geology, stratigraphy and mineral deposits of the Caballo Mountains in central southern New Mexico continues the previously established high standard of the University of New Mexico Publications in Geology. The sequence of general subjects covered by the work is, introduction, stratigraphy (pre-Cambrian, Paleozoic, Cretaceous, Tertiary and Recent rocks all occur in the region), structure, physiography, ground water, and mineral deposits. Under the last heading are described a group of hypogene deposits, including those of lead, copper, fluorite and minor gold, silver and barite; supergene deposits of lead, copper, manganese; placer deposits of gold and manganese; and non-metallic mineral deposits including those of iron, limestone, dolomite, gypsum, clay and shale, sand and gravel, guano, as well as coal, oil and gas.

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REPORT OF THE COMMITTEE ON THE MEASUREMENT OF GEOLOGIC TIME, 1951–1952. Division of Geology and Geography, National Academy of Science-National Research Council, Publication 245, 151 pages, 1953, $1.50.

This publication of the Committee on the Measurement of Geologic Time, which has appeared regularly since 1924, has gained in value with each new succeeding issue. The work of the late A. C. Lane and John P. Marble and their associates in attempting to bring under one cover a yearly condensation of the immense amount of work that is being carried on in many parts of the world on the methods and problems of measuring geologic time is a most necessary, difficult but deeply appreciated task. The Committee, of course, concerns itself not merely with radioactive age determination techniques, but also with many of the other less widely employed methods of geological chronology. The 1951–1952 report includes the following reports: (1) Summary report of the Committee by John P. Marble, Chairman. (2) Annotated bibliography of articles related to the measurement of geologic time compiled by John P. Marble. (3) Progress reports on work directed by various members of the Committee. (4) A translation from the Russian of an article by G. V. Voitkevich (*Acad. Nauk. S.S.S.R. Dokady n.s.*, 77(3), 461–464, 1951) entitled, Concerning the Age of the Earth. (5) Abstracts of a group of papers on radioactivity delivered at the 1952 meeting of the American Geophysical Union. (6) A note on the radioactive halo method by I. Hayase of Kyoto University, Japan. (7) A short summary of recent work on natural variations in stable isotopes by John P. Marble.

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