

BOOK REVIEWS

ROCK FORMING MINERALS, Vol. 2, CHAIN SILICATES; Vol. 4, FRAMEWORK SILICATES, by W. A. DEER, R. A. HOWIE AND J. ZUSSMAN, John Wiley and Sons, Inc., New York, N. Y. Vol. 2, ix+379 pages, 89 figures and 58 tables, 1963, \$18.00; Vol. 4, ix+435 pages, 118 figures and 53 tables, X-ray diffraction powder data for the zeolites, 1963, \$15.50.

Reviews of Volume I, ortho and ring silicates, and Volume III, sheet silicates, have been published in *The American Mineralogist* in volume 48, page 218, 1963, and volume 49, pages 825-826, 1964, respectively. The same general approach, that is, (1) the relation of crystal structure to physical and chemical properties, and (2) the correlation of the relations between physical chemistry, chiefly phase equilibria, and mineral paragenesis is maintained in these two volumes. There is an abundance of data relating optics and cell dimensions to chemical composition. The reader is referred to the previous reviews for details.

Volume II is principally concerned with the pyroxenes, 166 pages, and the amphiboles, 171 pages. The related minerals, wollastonite, pectolite, rhodonite, bustamite, and pyroxmangite, are covered in 36 pages. The pyroxene group is divided into the orthopyroxenes—enstatite and orthoferrosilite, diopside—hedenbergite, johannsenite, aegirine—aeirine—augite, spodumene, jadeite, augite, pigeonite, omphacite, and fassaite. The nomenclature of the clinopyroxenes in the four component system $\text{CaMgSi}_2\text{O}_6$ - $\text{CaFeSi}_2\text{O}_6$ - $\text{Mg}_2\text{Si}_2\text{O}_6$ - $\text{Fe}_2\text{Si}_2\text{O}_6$ is based on that of Poldevaart and Hess. Curiously, after stating that "acnite has generally been adopted to describe the $\text{NaFe}^{3+}\text{Si}_2\text{O}_6$ 'Molecule'" the authors change the usage to aegirine even in the phase diagram of Bowen, Schairer and Willems. The nomenclature of the pyroxenes needs some reconsideration and revision.

There are 202 analyses of pyroxenes, 5 of wollastonite, 9 of pectolite, 10 of rhodonite, 6 of bustamite, 8 of pyroxmangite and 209 of the amphibole group. The selection is representative of the divergence in composition of the various minerals and of their occurrence in different paragenetic assemblages. The treatment of chloromelanite is, on the other hand, uncommonly brief.

Volume III takes up the framework silicates (Tectosilicates of Strunz) that is the feldspar group, 178 pages; the silica minerals, 52 pages; the feldspathoid group, 103 pages, the scapolites, 17 pages, and the zeolite group, 78 pages.

The classification of the alkali feldspars into four series is based on their optical properties and is as follows:

- 1: high-albite—high sanidine
- 2: high-albite—low sanidine
- 3: low-albite—orthoclase
- 4: low-albite—microcline

and it takes into consideration both the chemistry and the structural state of the members. The structural state depends on the temperature of formation and the later thermal history of the feldspars. Adularia is a variety "recognized principally by its habit and paragenesis." A detailed discussion is presented of crystal structure, twinning relations, and optics. The chemistry of these feldspars is treated in great detail with 70 analyses and, in addition, eight analyses of the iron-orthoclases are included.

A similar detailed treatment is given to the plagioclase feldspars, and their chemistry is illustrated with 87 chemical analyses selected from about twice that number of good analyses. The constituents present in small amounts in natural feldspars, *viz.*: Fe^{3+} , Fe^{2+} , Mn, Mg, Ba, Sr, and Ti, are also considered. The albite from near Court House, Amelia County, Virginia, is accorded nine analyses because this locality has furnished material excellent for many precise physical and chemical studies. The barium feldspars are treated separately in

a section of 13 pages. The use of both the alkali and plagioclase feldspars in interpretative petrology is stressed. The paragenesis of the barium feldspars is very interesting and suggests that they may have been overlooked in earlier studies.

The silica minerals are treated briefly but very interestingly. The section on paragenesis will be very useful. The chapter on the nepheline group is an excellent illustration of the up-to-date treatment of a mineral group in this book. Petalite is included because of its occurrence in lithium pegmatites. Leucite is treated succinctly but fully and the congeners of nepheline and leucite, the sodalite group, are well presented. The helvite group is included because of the continuing recognition of its members in skarns, contact deposits, and granitic rocks.

The solid solution series, cancrinite-vishneville, is named on the basis of the substitution of CO_3 for SO_4 . Cancrinite is limited to the carbonate-rich end of the series, sulfatic cancrinite from 80 to 50%, carbonate vishneville 50 to 20%, and vishneville 20 to 0% of the cancrinite end-members. Microsommitte is reserved for the cancrinites rich in potassium and chlorine. The chapter on scapolites includes a good review of the paragenesis of this series. Analcite is placed between the feldspathoids and the zeolites because of its chemistry and paragenesis. The intense interest in research on the zeolite group, in both field and laboratory studies, is manifest in the authors contribution to the understanding of the zeolite group—particularly that dealing with paragenesis.

For anyone engaged in the study of rock-forming minerals or the origin and stability of rocks, these volumes are absolutely necessary.

GEORGE T. FAUST

APPENDIX TO THE SECOND EDITION OF AN INDEX OF MINERAL SPECIES AND VARIETIES ARRANGED CHEMICALLY by MAX H. HEY. The British Museum, England, xii+135 pp. British Information Service, Sales Sec. 845 Third Ave., N. Y. 22, N. Y. \$4.00, Dec. 1963.

The First Edition of the principal volume which appeared in 1948 was reviewed in *The American Mineralogist* in vol. 36, p. 634, 1951, and the system of classification and numbering was described. The Second Edition appeared in 1955 and was reviewed in *The American Mineralogist* in vol. 41, p. 812, 1956. The present Appendix to the Second Edition contains the information in the Addenda to the Second Edition and all the material available to Dr. Hey up through December 1962. Errata in the Second Edition (1955) are also given.

Dr. Hey carefully emphasizes in the "Introduction" that the inclusion of a name in the book does not "imply any recommendation of its use." A rather large number of the entries in this Appendix are "minor chemical varieties." At the conclusion of the volume three pages of unnamed minerals, most of them mentioned in the literature since 1953, are listed according to the locality of origin. The number of these entries, 60, is surprisingly large, even though four of the unnamed minerals of the previous editions have been named in this appendix and three have been shown to be identical to other species.

This appendix to the "Index of Mineral Species and varieties named chemically" is indispensable to those engaged in the study of minerals.

GEORGE T. FAUST

THE PHYSICAL CHEMISTRY AND MINERALOGY OF SOILS, Vol. I SOIL MATERIALS by C. E. MARSHALL John Wiley and Sons, New York 388 pp. 1964, \$12.00.

The physical chemistry of soil mineral-water systems is treated with emphasis on the thermodynamic and non-thermodynamic energy relations of cation exchange, titration curves, vapor pressure, osmotic pressure, Donnan equilibrium, suspension effects, mem-

brane potentials, hydrolysis, electrophoretic velocities, liquid junction potentials and oxidation potentials, in Chapters 1, 6, and 7. Atomic structures of common sand, silt, and clay minerals are described and pictured in Chapters 2 and 3. Atomic models and electron micrographs assist in presenting structural concepts. Relations to mineral hydrolysis properties are included.

A brief characterization of soil humic matter is given in Chapter 4, with chief consideration of classical literature (the latest references are to 1952 and 1953). Molecular adsorption of inert gases, water molecules, and organic molecules are discussed in Chapter 5, with a consideration of the effects of cation saturation. Fixation of cations and anions is developed in Chapter 8.

Coagulation, viscosity, thixotropy, swelling, electrokinetics, isoelectric pH values, and other electromechanical properties of clays are discussed in Chapter 9. Adsorption of gold particles on the positive edges of kaolinite and nonadsorption of kaolinite treated with pyrophosphate are beautifully shown in electron micrographs at 75,000 magnification.

The author is to be commended for this book representing a scholarly and well documented, advanced treatment of a broad range of highly complex subjects. Although the text addresses itself to too broad a range of subjects to fit into any single course in soil science, it is none-the-less an indispensable reference work for mineralogists interested in equilibria of minerals with liquid and gas phases, for soil chemists and for Ph.D. level graduate students in mineralogical and soil sciences.

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BIOGEOCHEMICAL METHODS OF PROSPECTING by DIMITRII PETROVICH MALYUGA, Consultants Bureau Translation, New York, 1964, 205 pp., \$27.50.

This publication can be described in a few words as a very good translation of a very good book.

Biogeochemical methods of prospecting as defined by Malyuga include the use of plant and humus analyses to delineate areas where anomalous accumulations of metals occur, and also the use of abnormal changes in the growth of the vegetation that is affected by any unusual availability of metals over mineralized ground.

The history of the development of prospecting by biogeochemical means throughout the world is reviewed thoroughly and completely by Malyuga.

Plant prospecting in Russia, where it has been more extensive than in any other country, is described in detail. In a given area, in Russia, biogeochemical surveying crews investigate the geochemical peculiarities of the element sought, climatic factors, geology, and the soil-forming process, as well as the vegetation. The experiences of Russian biogeochemical crews as well as those of scientists from the other countries are used to illustrate and to authenticate the theories that are developed chapter by chapter on the migration of chemical elements over ore deposits resulting in the creation of dispersion halos, on the patterns of heavy metal distribution in the various soil zones, and on the conditions necessary for the accumulation of heavy metals in plants.

More than 100 pages are devoted to a fine review of Russian experiences with the application of biogeochemical methods of prospecting. These descriptions are well written and the illustrative materials that accompany these reports are of much higher caliber than those of previous Russian reports of prospecting. It is unfortunate for the reader, however, that the scale of the maps in this, as well as in other geochemical prospecting reports from Russia, has not been specified.

Malyuga's final evaluation of the method points out the greater effective depth of ore detection by biogeochemical methods over those of the metallometric survey methods used

by the geologist. This depth varies with the thickness of barren rock, the permeability of the rock and location of the ground water table, and the depth of root penetration of the various species of plants in a particular environment. Malyuga points out the advantages, under certain circumstances, of combined soil-plant surveys and recommends the use of companion elements, which may be more mobile or in greater abundance than the ore metal sought, for prospecting in certain paragenetic ore environments.

The bibliography, of world-wide coverage, contains more than 400 references.

The book is well written and valuable reading to anyone interested in prospecting and is by far the best review of botanical prospecting that has been published in the U.S.S.R. It is at present the only text of its kind in the world. It is, therefore, invaluable to anyone planning to use plants in prospecting or to anyone interested in the study of plant capacity for accumulation of metals.

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SHORT GUIDE TO GEOBOTANICAL SURVEYING by S. V. VIKTOROV, YE. A. VOSTOKOVA, D. D. VYSHIVKIN. Translated by J. M. MacLennan, 1964, Pergamon Press, N. Y., 158 pp.

This small handbook was prepared as a Russian field guide for producing a geobotanical map, a type of geographical map that outlines distribution of plant communities. Geobotanical maps may be regional maps showing plant zones as related to differences in altitude or in soil composition. They also may be detailed maps showing the distribution of certain species in particular areas and drawn for an economic purpose, such as range management, forestry, marsh or peat reclamation, or the delineation of ground water, soil salinity, or mineralized ground.

Directions, for both the field worker and the office compiler of geobotanical maps, are given for all types of plotting of plant species—for detailed mapping done along a transect to a more generalized type covering a large area and done from an airplane. The handbook includes advice on selection of indicative plant units, on use of vegetation symbols and map scales, and on construction of geobotanical profiles. It also discusses preparation of maps for specific economic purposes.

The book will be a very useful textbook for plant ecologists and for geographers. It may also be useful to geologists in certain specialized studies that involve plant mapping.

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FÜHRER ZU VULKANOLOGISCH-PETROGRAPHISCHEN EXKURSIONEN IM SIEBENGEIRGE AM RHEIN, LAACHER VULKANGEBIET UND MAARGEBIET DER WESTEIFEL by JOSEF FRECHEN, E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, vii+151 p, 39 illustrations, Bound DM 19.60, 1962.

For anyone planning a petrologic visit to the Siebengebirge on the Rhine, the Laacher See region, or the Maargebiet of the West Eifel, this book is an absolute necessity. The reviewer had the good fortune to visit the Eifel and some of the other areas mentioned in this text under the guidance of Professor Frechen in 1958. Frechen's knowledge of the geology, mineralogy and petrology is first hand.

The text abounds with chemical analyses and modes of the rocks of which 22 chemical analyses are new and were made in the Fresenius Chemical Laboratory in Wiesbaden.

Geologic maps of the Siebengebirge, the Laacher See, and Maargebiet are mounted as folded plates. The areas described in this guide are classics in the field of petrology. They have served as examples of rocks of alkalic suites in the books of Harker, Iddings, Rosenbusch, Rinne and many other writers. The occurrence of the pumice in the Eifel is world famous.

This book should be in all petrological collections. It will be a valuable aid to anyone teaching courses in petrology.

Mineralogists will also profit from a study of its contents for it describes the areas from which many outstanding specimens have come. Haiiyne and other feldspathoids, the zeolites, and sanidine occur in the Laacher See rocks. The textbook example of "sanidine" from the trachyte of the Drachenfels—a locality made famous by the structural studies of the brothers Cloos is described.

GEORGE T. FAUST

DIE URANFUNDE IN BAYERN VON 1804 BIS 1962 by HUGO STRUNZ. Gebrüder Borntraeger, Berlin-Nikolassee, 92 p., 66 illustrations, 28 tables, 4 geologic sketch maps. Paper covers DM 24-; Half-linen DM 28-, 1962.

The mineral occurrences of Bavaria and their geologic relations have been studied, both in the field and in the laboratory, by Professor Strunz for sometime, and the results have been published in many journal articles. An earlier book by him on this region, of interest to readers, was reviewed in *The American Mineralogist* vol. 40, p. 938-939, 1955. The present book is confined to the occurrence of uranium minerals and radiometric measurements in Bavaria. The excellence and wide variety of the illustrations are noteworthy. They include photographs of crystals and specimens, crystal drawings, photomicrographs of polished sections, of pleochroic haloes, of heavy mineral concentrates, copies of woodcuts from C. W. von Gumbel's work and photographs of famous quarries in this region. Most of the geologic sketch maps are conveniently included as folding maps.

The book covers (1) the discovery of uranium, including quotations from the original works of Klaproth; (2) the history of the early discovery of uranium minerals in Bavaria; (3) the principal occurrences of uranium minerals in the Fichtelgebirge, Oberpfälzer Wald and the Bayerischer Wald; (4) Radiometric measurements in Bavaria; (5) Summary.

The uranium occurrences are described and then documented by reference to the literature including the extensive research of Professor Strunz. The radiometric measurements are tabulated and they consist of data on minerals, rocks, and spring waters. The location of springs and wells is plotted on a geological sketch map to facilitate interpretation.

This book will be of value to mineralogists, economic geologists, inorganic chemists, those interested in topographical mineralogy, and advanced mineral collectors.

Professor Strunz's books radiate a feeling of closeness to his subject. The book is a worthy addition to libraries—both institutional and personal.

GEORGE T. FAUST

MINERALOGY AND TYPES OF DEPOSITS OF SELENIUM AND TELLURIUM.

N. D. SINDEEVA. Interscience Publishers, John Wiley & Sons, Inc., 605 Third Ave., New York 16, N. Y. 363 pp., 89 figs., 1964, \$13.50. Translation from the Russian published in behalf of the Geochemical Society with assistance provided by a grant from the National Science Foundation.

The first chapter contains general information on physical and chemical properties; on application, economics and technology; and on qualitative and quantitative determina-

tion of these two elements. Their mineralogy is the subject of Chapter 2, and Chapter 3 describes Se and Te deposits. The last chapter is an account of their geochemistry. The Reference Tables include 1) *x*-ray powder diffraction data for the Se and Te minerals (40 entries); and 2) Properties of the minerals in polished section (37 entries). There are also a bibliography; an index of mineral names; and an author and subject index.

Although it is clearly intended as a definitive monograph on the mineralogy and geology of these two elements, the book contains data of mixed quality. Among other things it lists and describes in detail discredited mixtures along with valid species; "Pleochroism" is used for birefractance; some of the optical properties data listed are incorrect or incomplete for hessite, petzite, calaverite, sylvanite, melonite and tetradymite. Paratellurite is not mentioned. A general lack of acquaintanceship with recent U. S. literature on tellurides is evident.

The work also suffers from lack of careful proofreading; errors in spelling are numerous.

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GEOCHEMISTRY, MINERALOGY, AND GENETIC TYPES OF DEPOSITS OF THE RARE ELEMENTS. Vol. I. GEOCHEMISTRY OF THE RARE ELEMENTS.

K. A. VLASOV, chief editor, D. P. SERDYUCHENKO, E. M. ES'KOVA AND L. S. BORODIN, associate editors. Inst. Mineral., Geokhim. i Kristalloghim Redkikh Elementov, Moscow, 1964, 685 pp. (4 rubles, 43 kopecks, about \$5).

Vol. II, MINERALOGY OF THE RARE ELEMENTS. K. A. VLASOV, chief editor, N. D. SINDEEVA, D. P. SERDYUCHENKO, E. M. ES'KOVA, M. V. KUZ'MENKO AND YU. A. PYATENKO, associate editors. *Ibid.* Moscow, 1964, 829 pp. (5 rubles, about \$5.50) (both in Russian).

These two volumes (with a third promised) are collaborative efforts of a large number of contributors. The elements discussed include the following: Li, Rb, Cs, Be, Sr, Sc, Y, the lanthanides, Zr, Hf, Nb, Ta, Cd, Ga, In, Tl, Ge, Se, Te, and Re. These reviews are comprehensive; the literature has been covered thoroughly through 1961, with some 1962 references. The data in the volume on mineralogy are presented very much as in Dana's System, with the addition of *x*-ray powder and DTA data; this volume also has an English index of mineral names. Printing and paper are satisfactory. The two volumes are recommended as highly useful reviews.

MICHAEL FLEISCHER

SHORT NOTICES

MINÉRALOGIE DE LA FRANCE ET DE SES ANCIENS TERRITOIRES D'OUTRE-MER Vol. 6. A. LACROIX. Librairie Scientifique et Technique. Albert Blanchard, 9 Rue de Medicis, Paris, France 1964, 254 pp., paper cover Fr. 50.00. The first edition of this important work by Lacroix was completed in 5 volumes in 1912. A committee has arranged Lacroix's notes (up to 1922) and compiled a bibliography (see next entry) up to 1963. This bibliography (next entry) is included as part of Vol. 6, so if you purchase this item you also get the next, which also has been published separately.

BIBLIOGRAPHIE MINÉRALOGIQUE DE LA FRANCE ET DE SES ANCIENS TERRITOIRES D'OUTRE-MER DE 1913 à 1963. Same publisher, 1964, 204 pp., paper cover, Fr. 40.00 Published under the direction of Prof. J. Orcel and Miss S. Caillère.

VITREOUS LITHIUM SILICATES. PROPERTIES AND APPLICATIONS. SARRA KONSTANTINOVNA DUBROVO. Consultants Bureau Enterprises, Inc., 227 W. 17th St.,

New York, N. Y. 46 pp., paper cover, 1964, \$12.50. (Transl. from the Russian). A discussion of glass formation and crystallization in lithium silicate systems followed by tabulation of the properties of lithium silicate glasses.

AN INTRODUCTION TO THE THEORY OF THE FORMATION OF FROZEN ROCKS. I. A. TYUTYUNOV. Pergamon Press, The Macmillan Co., 60 5th Ave., New York 11, N. Y. 94 pp., 1964, \$7.50. (Transl. from the Russian). A comprehensive physico-chemical theory of cryogenesis.

THERMONUCLEAR POWER. T. S. GREEN, Philosophical Library, Inc. 15 East 40th St., New York, N. Y. 168 pp., 1964, \$10.00. A survey of investigations leading to the controlled release of thermonuclear power.

THE MINERAL RESOURCES OF THE SEA. JOHN L. MERO. American Elsevier Publ. Co., Inc., 52 Vanderbilt Ave., New York, N. Y., 1964. 312 pp. \$9.75. A valuable pioneering summary of all phases of marine economic geology—beach placers, sea water extractives, continental shelf deposits, deep-sea deposits, ocean mining methods, and economic and legal aspects.

THE GEOCHEMISTRY OF OIL AND OIL DEPOSITS. L. A. GULYAWA (Ed.) Daniel Davey & Co., Inc. 257 Park Ave., South, New York, N. Y. 220 pp., 1964, \$6.75. (Transl. from the Russian). A series of 11 papers on minor elements, organic composition, oxidation and migration of petroleum and bitumens.

THE MICROSCOPICAL CHARACTERS OF ARTIFICIAL INORGANIC SOLID SUBSTANCES: OPTICAL PROPERTIES OF ARTIFICIAL MINERALS. A. N. WINCHELL AND HORACE WINCHELL. Academic Press, Inc., 111 Fifth Ave., New York, N. Y., 1964. 439 pp. \$14.50. A compilation of all available optical data of inorganic solids. X-ray powder diffraction data also are included. An immense effort is represented, with invaluable results. An essential reference work for all mineralogists and inorganic chemists.

DIE BERGWIRTSCHAFT DER ERDE. FERDINAND FRIEDENSBURG. 6th rev. ed. Ferdinand Enke Verlag, Hasenbergsteige 3, Stuttgart W., Germany, 1965. 566 pp., 43 figs., numerous Tables. DM 93.00. A country-by-country tabulation of the ore deposits, mining industry and mineral resources of the world!

KEYS TO THE ILLUSTRATED MANUAL OF MINERALS AND ROCKS IN FULL COLOUR. HIDEKATA SHIBATA AND TOSHIO SUDO (In Japanese). Hokuryu-Kan Co., Ltd. Tokyo. 344 pp., 1964 ¥3,000 (ca. \$8.50). Every mineral and rock described is accompanied by an illustration *in color*—paintings of hand specimens, crystals, thin sections, etc.—a fantastic and exquisite book. Mineral names are also in English and there is an English index. Even if you don't read Japanese either, the illustrations are more than worth the modest price.

THE PHANEROZOIC TIME-SCALE. A symposium dedicated to Prof. Arthur Holmes. Ed. by W. B. HARLAND, A. GILBERT SMITH AND N. WILCOCK. Vol. 120s. A supplement to the *Quart. Jour. Geol. Soc. London*. Burlington House, London, WI England. Hardcover ed. \$14.50, paper back ed. \$11.75. A collaborative and critical compilation of radiometric data for construction of a Cambrian-to-Tertiary time scale in five parts: Part 1. History and relationship of radio ages and geological processes. Part 2. The three main radiometric methods. Part 3. Original data. Part 4. Reviews of the time scales for each period from Tertiary to Cambrian. Part 5. A compilation of 337 relevant determinations.