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BOOK REVIEWS

MINERALOGICHNII SLOVNIK (Mineralogical Dictionary). By E. K. Lazarenko and O. M. Vynar. Naukova Dumka, Kiev, 1975. 772 p. [Ukrainian, with English index] Price 5 Krb., 78 kop. (approximately $16.00 US).

This Ukrainian dictionary of mineralogical terminology gives definitions of more than 14,000 terms, including minerals described through 1973. Russian and English translations are provided for each term. For each mineral, the information given includes: composition, analysis, origin of name and reference to namer (but only as E. F. Glocker, 1839, *etc.*), crystal system (but not unit cell or space group), physical properties, and mode of occurrence.

A very useful reference book.

MICHAEL FLEISCHER
U.S. Geological Survey

CRYSTAL STRUCTURE DATA OF INORGANIC COMPOUNDS. By Wolfgang Pies and Alarich Weiss. Volume 7, Part e (substance numbers el-13525): Key elements Cu, Ag, Au, Zn, Cd, Hg, Sc, Y, La-Lu, Th, Pa, U, Np, Pu, Am, Ti, Zr, Hf, V, Nb, Ta, of Landolt-Bornstein: Numerical Data and Functional Relationships in Science and Technology. Edited by K-H Hellwege and A. M. Hellwege. Springer-Verlag, Berlin, 1976. xxvii + 739 pages, 14 figures. $278.80.

See reviews of volume III/7, parts a, b, and g (*Am. Mineral* **59,** 1142; **61,** 344). Part e extends the coverage to oxycompounds of the above elements belonging to the first to fifth subgroups of the periodic table. Several systems are illustrated with those diagrams. The data content per page is high, but the price of the volume is a severe limitation on possible purchases.

BRIAN MASON
Smithsonian Institution

ELECTRON MICROPROBE ANALYSIS. By S. J. B. Reed. Cambridge University Press, New York, 1975. 400 pages. $34.50.

This book is one of more than a score in the series entitled *Cambridge Monographs on Physics*. It is written by a physicist for physicists, but I am happy to say that most of it was found to be readily readable by this merely mortal mineralogist.

In Reed's own words: "This book is intended to provide a fairly complete coverage of electron microprobe analysis for users of the technique in metallurgy and materials science, geology, biology, *etc.* The treatment emphasizes *physical principles* [italics mine], in relation to the design and operation of the instrument and the interpretation of results, but every effort has been made to avoid superfluous theoretical detail. Much of the material included is relevant not only to the conventional electron microprobe, but should also be of interest to users of scanning electron microscopes, which nowadays are frequently fitted with X-ray spectrometers for analytical purposes." (Preface, p. xv and xvi). Chapter 1 cursorily introduces the principles of microprobe analysis, including X-ray generation by both electron and X-ray (secondary) excitation and X-ray absorption. However, the pertinent physics of X-rays is consigned to just seven pages of text in the appendix. Therein lies what I consider to be the book's chief weakness. The electron gun (Chapter 3) merits nearly twice the coverage, and in Chapter 6 more than 20 pages are devoted to every conceivable type of X-ray diffraction spectrometer—Bragg, Johann focusing, Johnasson focusing, semi-focusing, linear focusing, Siegbahn diffraction grating, blazed grating, phase grating, and polar coordinate grating spectrometers. But the fundamentals of X-ray physics are weakly presented.

Beyond that, about half of the 400 pages is devoted to the mechanics and electronics of the instrument itself. Chapter 2 sketches the "Essential features of the electron microprobe," albeit without the benefit of a master schematic to indicate the relationships of X-ray, electron, and light optical systems to the X-ray and electron signal-processing electronics (detectors, pre-amps, PHA's, scanning circuitry, *etc.*). Chapters 3 and 4 concern "The electron gun," including details of LaB_6 and field emission sources, and "The probe forming system"—an excellent treatment of microprobe electron optics. The only missing feature is a discussion of the three-lens systems which are common in the latest generation scanning microscope–microprobe instruments. Chapter 5 on electrostatic, electromagnetic, and mechanical scanning techniques applied to the formation of X-ray and electron images and to phase analysis is well done; and as mentioned earlier, Chapter 6 contains all you need to know about X-ray diffraction spectrometry. Chapter 7 is about proportional counters, both orthodox and unorthodox, and Chapter 8 gives details of the X-ray pulse amplification, discrimination, and counting electronics.

Chapters 9 and 10 contain an introductory treatment of the lithium-drifted silicon detector that is now widely used, as both a qualitative and a quantitative tool. The discussion of energy-dispersive X-ray spectrometry (EDS) and the associated methods of quantitative analysis (Chapter 17) that are rapidly being integrated into microprobe and SEM systems is timely indeed and a real plus for the book. Of course, one can expect Chapter 17 to be outdated rapidly, but it is a useful introduction.

Chapter 11 discusses sample preparation, sample damage and contamination under the electron beam, as well as standardization, analysis conditions and detection limits. Chapters 12–15 tediously deal with 'most everybody's ideas and mathematical approximations of the so-called matrix corrections necessary to translate raw X-ray counts into reliable, quantitative chemical analyses. "X-ray generation, stopping power, and electron range," "Backscattering," "X-ray absorption," and "Fluorescence" are the chapter headings, and it is within these 90 pages that much of the earlier deficiency in coverage of X-ray physics is amended. But these are inordinately difficult to plow through, and there is much detail that might better have been omitted. In his chapter on "Practical correction procedures," Reed ultimately does pass cautious judgement on which of the multitude of approximate correction factors are acceptable. He works through a simple (too simple?) example of analysis of an Fe–Ni alloy using the metals as standards. This is pedagogically useful, especially for the student of microprobe anal-

ysis who is fortunate enough to have on-line computer reduction of X-ray pulse data to oxide weight percentages and normalized formulas; somewhere, somehow, everyone should see a real-life data reduction. Chapter 19 is an expanded treatment of "Light element analysis" and Chapter 20 concludes with a broad survey of "Applications" of electron microprobe analysis.

In toto, this book is a valuable ($34.50) addition to the microprober's library, especially because it is uniquely suited for use as a reference text in a graduate-level course. I intend to use it—I have a complimentary copy, but my students will no doubt be reading from the copy on reserve in the library.

PAUL H. RIBBE
Virginia Polytechnic Institute and State University

MINERALOGY OF ALKALIC MASSIFS AND THEIR OCCURRENCES. by E. I. Semenov, E. M. Eskova, Yu. L. Kapustin and A. P. Khomyakov. Moscow, The Nauka Press, 1974. 248 p., 49 tables, 57 figures, 367 references. [In Russian] Price 2R 47K (approximately $2.75 US).

This book is a product of IMGRE and the authors' fulfillment of 20 years work on alkalic rocks. At the outset, alkalic rocks are located with respect to world-wide geological features on two maps. Of the 96 massifs considered (59 in the USSR) the vast majority lie on the edge of ancient platforms, some (Langesunds fiord, Sternoy and several in the Sayan region) are in Caledonian fold belts, a few (Tamazert and some deposits in USSR) are in Hercynian fold belts, three (Poga, Koksharovka, Guli) are in areas of Mesozoic folding, and one (Tezhsar) is in the Alpine belt.

The book is divided into two parts. Part I (p. 4–170) involves alkalic massifs and their occurrences and is divided into 5 chapters according to the main rock types: (1) aegirinic nepheline syenite and an agpaite subtype (Semenov), (2) biotitic leucite–nepheline syenite (Khomyakov), (3) biotitic nepheline syenite (Eskova), (4) augitic theralite (Semenov and Eskiva), and (5) diopsidic ijolite (Kapustin). Examples of each of these types are described. In addition to the portion on massifs, each chapter contains a section on mineralogical occurrences, normally from restricted areas within individual massifs, and a concluding section. The emphasis is on economic possibilities, alkalic massifs of different types being potential sources of U, Th, REE, Be, Zn, Nb, Ta, Pt, Tl, V, Ti, Zr, Cl, F, apatite and diamond. Unusual mineral concentrations in alkalic rocks of the USSR include thorianite (in dolomitic carbonatite at Guli), uraninite (in pegmatites and albitites of Korgeredaba and from a hydrothermal-pneumatolytic zone in an unspecified locality in Siberia), and eschynite (in a metasomatic zone from an unspecified locality and from alkalic pegmatite, intrusive albitite and fenite at Vishnev Gor).

Part II (p. 171–234; Semenov) reconsiders and reemphasizes mineralogical peculiarities and rock associations in the massifs. The 1000 known massifs are distributed in 36 main regions. The largest alkalic province is situated in the southern part of the Siberian Platform and contains 100 alkalic massifs, mainly miaskitic. Alkalic provinces of the Urals and Turkestan are quasilinear and miaskitic. Agpaitic and many aegirinic massifs are restricted to the North Atlantic Province. Another province involves the Mediterranean-Alpine Geosyncline and includes alkalic massifs in Spain, Italy, Armenia, and Pamir.

The large alkalic massifs on the marginal parts of platforms, shields, and resistant blocks are connected with epiplatformal reactivation, but some (as those of the Kola Peninsula) with the development of adjacent geosynclines. Agpaites are associated with raised blocks in anticlinoria and are formed in the upper part of the crust, whereas theralite, ijolite, and augitic syenites are formed in synclinoria in the lower parts of the crust.

Ijolitic massifs are connected to ultrabasic-alkalic formations, theralites to gabbroic rocks, but nepheline syenites show a variety of affinities. Agpaites may have formed by advanced differentiation of peridotite and gabbroid magmas.

The largest alkalic massifs are Khibina (1400 km²) and the poorly exposed Guli massif (perhaps 2000 km²). Khibina and Priazov probably connect with their neighboring alkalic massifs at depth.

Elongated massifs commonly are unzoned and characterized by Fe-rich amphiboles and micas, whereas the equant massifs are more magnesian and zoned. Zoned massifs tend to be less alkalic in their cores and melanocratic-alkalic on their borders, but this may be complicated by late injection.

Minerals are also genetically classified into magmatic, pegmatitic, hydrothermal, hypogene, sedimentary, and exogenic. Elemental associations can also be classified according to lithophile and chalcophile associations and be subdivided with respect to low-melting and sublimation temperatures (Na, F, Li, Hg, Sb, *etc.*), early crystallites (Ca, Mg, Cr, Cu, Pt, *etc.*), and an intermediate group (K, Sr, B, Au, Zn, *etc.*).

The book brings together, in one volume, a wealth of new and difficultly obtainable data from the USSR and is therefore a welcome compendium. Shortcomings lie mainly with reviews of Western literature which are, understandably, somewhat dated. No attempt was made to relate the disposition of occurrences to plate tectonism.

D. D. HOGARTH
University of Ottawa

PHYLLOSILICATES AND CLAY MINERALS. A Laboratory Handbook for Their X-ray Diffraction Analysis. By Jacques Thorez. Editions G. Lelotte, B4820 Dison, Belgium, 1975. xix + 579 pages. [Text in English and French] 3600 Belgian francs (approximately $90.00 U.S.).

This book is a compilation of the X-ray diffraction data for some of the phyllosilicate minerals. It is comprehensive in coverage and abounds in details. Investigators will find in this volume most of the information that they need to identify the phyllosilicates herein described. Thorez uses a graphical portrayal of the data to facilitate rapid identification. It is necessary for the investigator to master Thorez's scheme—a descriptive code of symbolism—to use this book effectively. A fanlike spread, called a hemicyclogram, contains an evaluation of the effects of a particular physical or chemical treatment on the *d*-spacings of several phyllosilicates. A color scheme is used for the selection ranges of *d*-spacings. Yellow is used for the range of 11.8 to 9Å where the basal specimens of micas, *etc.*, are found; red for the range of 13.3 to 11.9Å corresponding to the intermediate *d*-spacings; green for the range 14.3 to 13.5Å where the basal spacings of the chlorites, *etc.*, are found; and blue for the range 18 to 14.6Å. The commonly used set of 5 letters designates the intensity of the reflections. The shape of the reflections is characterized by a selection from 10 geometrical figures. There is a compartment at the base of a sector within a hemicyclogram where further types of tests, size data, and source of the

samples may be given. The principal tests on natural air-dried material are: treatment with ethylene glycol; glycerol; attack by boiling HCl; sodium citrate; cation saturation with K, Na, Ca, Mg, Li; heating at 13 different temperatures, ranging from 100°C to 620°C, and exposure to selected relative humidities.

The effect of sample preparation is also covered for such variants as conventional mounting of specimens on glass slides versus the paste method; length of grinding periods, dispersion with calgon and sodium carbonate, and methods of iron removal.

The hemicyclograms are treated in great detail in chapters 2 and 3, and a scheme for the recognition of clay minerals proper and the mixed layer structures under a wide variety of associations is formulated.

The data are also presented as 190 monograms ("stylized diffractogram patterns") in Chapter 4 and in tabular form as "*(hkl)* tables" which contain the *d*-spacings in Chapter 5. The sources of the data for Chapter 5 are as follows: 297 from the original literature or quoted by others in the original literature; 59 from the Powder Diffraction Files of the Joint Committee on Powder Diffraction Standards, 41 from Brown (1961). Seven tables of data have no reference at all, and there are 19 vacant tables, some with names assigned such as No. 163, siderophyllite. About 80 percent of the data are pre-1970.

Some of the nomenclature in this volume will not be accepted by mineralogists. The title of this book is confusing—"Phyllosilicates *and* clay minerals." Clay minerals are phyllosilicates!! The hydromica group, the montmorillonite–saponite group, the kaolinite group, and the halloysite series are respectively groups 7, 8, 10, and 11 in the phyllosilicate division of the classification of silicates by Strunz (1970, p. 362). There is no clear-cut identification of varieties and names such as aquacreptite, chloritic montmorillonite, and ghassoulite, which are not accepted nomenclature and are used here presumably as species names.

Thorez has spared no pains in preparing this work, and it should prove very useful in laboratories engaged in the rapid identification of large numbers of samples.

The reviewer can readily appreciate the value of a French or German original on the same page or an opposite page with the English translation for such a work as a classic of an earlier era—for the idiom and terminology of language do change with time. It is difficult to understand why a bilingual edition of a modern compilation, such as the volume under review, was deemed necessary. Today, English is considered the scientific language for much of the world. The price of this book is very high, $90.00 (approximately), and the inclusion of the text in French contributes significantly to this cost. The price will be a factor for many users, for they will have to decide if it is justified when they have at hand the Powder Diffraction Files of the Joint Committee on Powder Diffraction Standards, the three volumes of the clay mineralogy published by the British Mineralogical Society, and such books as those of Grim (1968), Jasmund (1955), Carroll (1970), and others.

The book carries a foreword by Professor Joe L. White of the Department of Agronomy at Purdue University, who endorses both the scheme of identification and the tabular treatment.

References

Brown, George, Ed. (1961) *The X-ray identification and crystal structures of clay minerals,* 2d ed. London, Mineralogical Society of Great Britain, 544 p.

Carroll, Dorothy (1970) Clay minerals: a guide to their X-ray identification. *Geol. Soc. Am. Spec. Pap.* **126,** 80 p.

Grim, R. E. (1968) *Clay Mineralogy,* 2d ed. New York, McGraw-Hill, 596 p.

Jasmind, Karl (1955) *Die silicatischen Tonminerale,* 2d ed. Weinheim, Germany, Verlag Chemie GmbH, 192 p.

Strunz, Hugo (1970) *Mineralogische Tabellen.* Leipzig, Akademische Verlagesellschaft, 621 p.

George T. Faust
U.S. Geological Survey

GEOCHEMISTRY OF BORON. Edited by C. T. Walker. *Benchmark Papers in Geology,* Vol. 23. Dowden, Hutchinson, and Ross, Inc. (Halstead Press), 1976. xviii, 414 pages. $35.00.

Editor Walker has gathered together 34 selected papers on the geochemistry of boron, which he has divided into nine sections: I. Early Work; II. Boron in Igneous Rocks; III. Boron in Metamorphic Rocks; IV. Boron in Sedimentary Rocks; V. Boron in the Hydrosphere; VI. Laboratory Investigations of Boron in Silicate Structures; VII. Boron as an Environmental Indicator; VIII. Isotope Geochemistry of Boron; IX. Geochemical Cycle of Boron. Also included is an Author Citation Index and a Subject Index. Of the 34 papers, 10 were especially translated for this work from the original language of publication, principally German and French, thus making them available to those with limited foreign language training. Some of the papers are complete as originally published, but most are excerpts, condensations, or condensed translations. Many pertinent data are omitted. One article appears in the original French, with an English summary. The editor comments on the papers and their authors, in groups of from 1 to 4; these comments serve to tie together the papers in each group, giving background information on the authors and pointing out differences in interpretation. Each paper has its own reference list. Notably absent are any works of Soviet workers in the field.

The title is unfortunate, as it should more properly be something such as *Geochemistry of Boron, with Special Emphasis on the Relationship between Boron and Paleosalinity.* Of the 34 papers, partial papers, and condensations, not less than 21 deal primarily with boron in sediments and its paleosalinity implications, the field of specialization of the editor. While this is a very important field, in which there has been much activity in the last few decades, a work with the general title of *Geochemistry of Boron* should not ignore the numerous other aspects of the subject, such as boron in the atmosphere, volcanic exhalations, soils, groundwater (fresh, brines, and oilfield brines), coal, petroleum, metallic ore deposits (especially iron), carbonate sediments, lunar materials, *etc.* Concentrations of boron are treated too briefly, in only one paper. Boron in the hydrosphere, while the title of one section of three papers, is actually limited to one paper on the boron content of several western U.S. closed-basin lakes and their tributaries. All of the remaining fresh-water streams and groundwaters of all kinds throughout the world are ignored. The boron content of sea water is treated briefly in several papers.

Some papers seem to be misplaced. For instance, Paper No. 15, "Boron in Holocene Illites of the Dovey Estuary, Wales, and its Relationship to Paleosalinity in Cyclothems" would fit better under the section entitled "Boron as an Environmental Indicator" than under "Boron in the Hydrosphere," where it is placed. There are others.

The papers not concerned with boron in sediments are mostly well-chosen, but limited in number and scope. There are instances where another work would have been more informative. Such is

the case with paper No. 30, "Boron in Meteorites" by M. Shima, which could have been replaced profitably with the one entitled "Determination of Boron, Lithium, and Chlorine in Meteorites," (M. Quijano-Rico and H. Wänke, in, *Meteorite Research* (P. M. Milman, Ed.) D. Reidel Publishing Company, Dordrecht, 1969, p. 132–145). The latter paper gives data for 57 meteorites of seven types, as compared to six meteorites of three types (plus 5 analyses from Goldschmidt) in Shima's paper. Most of the data in Shima's paper are repeated in his paper No. 28, "Geochemical study of Boron Isotopes."

No significant paper concerning the isotope ratio $^{10}B/^{11}B$ in borate minerals is included in this volume, and several are available (Agyei, E. K. and C. C. McMullen (1968) *Can. J. Earth Sci.* **5,** No. 4 (pt. 1), 921–927; Finley, H. D., A. R. Eberle and C. J. Rodden (1962) *Geochem. Cosmochem. Acta,* **26,** 911–914; Thode, H. G., J. McNamara, F. P. Lossing and C. B. Collins (1948) *J. Am. Chem. Soc.* **70,** 3008–3001.

Editor Walker states (p. 215): "The chemical data presented in paper 14 are important because they indicate that continental deposits of interior basins are probably unsuitable for fundamental studies on the geochemistry of boron." This statement seems to be a little broad, unless the "fundamental studies" were to be limited to paleosalinity and related studies.

Some of the papers were included primarily for their bibliography, as stated by the editor; some have been too severely con densed, leaving out significant data. This volume represents a substantial contribution to the *Benchmark* series; perhaps a second similar volume on Boron Geochemistry would be in order, presenting the important aspects of the subject which were excluded from the present volume.

VINCENT MORGAN
Boron, California

GEMS: THEIR SOURCES, DESCRIPTIONS AND IDENTIFICATION. By Robert Webster. Archon Books, Hamden, Connecticut, 1975. 931 pages. $50.00.

This weighty (5 lb.) compendium of gemmology contains within its 931 pages a comprehensive treatment of gemstones (both natural and synthetic) and other important ornamental materials. It is a very practical book, but not tediously written as many such catalogic works are. Apart from a score of delightful color plates, it is only moderately illustrated, suffering from a notable lack of updating, especially in the area of scientific instrumentation.

The first chapter on "The Origin and Recovery of Gemstones" is weak, but how much can be said about the structure of the earth, the origins, compositions and textures of igneous, metamorphic and sedimentary rocks, ground water, "gem belts," and mining methods in less than twelve pages? In fact the fifteen chapters that follow very adequately and interestingly speak to the details of origin and recovery of the gem minerals, glasses, and rocks by locality, as well as describing their unique chemical and physical properties. Special attention is accorded the characteristic differences between natural stones and synthetics. These chapters describe diamond, ruby and sapphire, emerald, aquamarine and other beryls, chrysoberyl and spinel, topaz and tourmaline, zircon, peridot and spodumene, the garnets, moonstone and other feldspar gemstones, gems of the silica group including amethyst, agate and opal, turquoise and lapis-lazuli, the jades, marcasite and hematite, the natural glasses, marble, and lesser known ornamental and gem materials. They are filled with interesting historical tidbits and much practical wisdom, flowing smoothly from the pen of a widely traveled and experienced gemmologist. The professional mineralogist is likely to be disappointed with the lack of scientific depth and occasional errors (staurolite formula: $2Al_2SiO_5Fe(OH)_2$; twinning as a cause of iridescent colors in labradorite). But although it of necessity traverses much the same territory covered in a mineralogy text, *Gems* is not written for the mineralogist. It is intended for the gemmologist, the jeweler, and the gem collector. [In that respect, it is priced (at $50) well within reach of those who can afford gemstones on today's market.]

Following these descriptive chapters are more than one hundred pages of discussion of synthetic and imitation gemstones, composite and artificially colored stones, and gem cutting and polishing. These make for excellent reading and might well save even a "professional" mineralogist from eventual embarrassment when purchasing a bauble for his lady.

Pearls—their cultivation and imitation; corals, shells, and opercula; amber and jet; and ivory and tortoise-shells are the subjects of chapters 21 through 24. A mineralogist may find these particularly fascinating, as I did, because he comes to them unspoiled by the prejudice bred of professionalism.

My only serious criticism of this book is reserved for the next 250 pages which cover the subjects of crystallography and crystal structure, physical properties, and the techniques of examining and identifying gemstones (including optical microscopy, X-ray and electron diffraction, luminescence, and optical spectroscopy). The revisions attempted since the first edition of 1962 are at once both obvious and trivial. It is clear that even the 1962 edition was badly outdated, and it is unfortunate that this comprehensive work has not been modernized to keep apace of routinely available technology. "Lauegrams" receive more attention than powder diffractometry; other single crystal methods are unmentioned. X-ray fluorescence and microprobe analysis together get less space than the Coolidge tube.

The appendices include a plethora of identification tables—fifty pages of them. The bibliography is scanty (5 pages), but the glossary of unusual names is exhaustive. The volume is very well indexed.

In summary, this is the best and most complete English-language book on gemmology that I am aware of. Its short-comings are likely to be of far less importance to the professional gemmologist or jeweler than they are to the mineralogist, who should not have to read many of the latter chapters in any case. *Gems: Their Sources, Description and Identification* is an especially valuable book in those sections which deal with the sources, description and identification of gems. I recommend it for that reason, and if a geology library can afford only one book on gemstones, I suggest that this one be seriously considered.

PAUL H. RIBBE
Virginia Polytechnic Institute and State University

List of Books Received

LAND USE IN ADVANCING AGRICULTURE. By A. P. A. Vink. Advanced Series in Agricultural Sciences, Volume 1. Springer-Verlag, New York, 1975. x + 394 pages, 94 figures, 115 tables. $25.80.

MINERAL SCIENCES INVESTIGATIONS, 1972–1973. Edited by George S. Switzer. Smithsonian Contributions to the Earth Sciences, No. 14. Washington, D.C., 1975. iv + 88 pages, 1 color plate. $2.50.

MULTIVARIATE STATISTICAL METHODS: AMONG-GROUPS COVARIATION. Edited by William R. Atchley and Edwin H. Bryant. In the series Benchmark Papers in Systematic and Evolutionary Biology/I. Series Editor, Howell V. Daly. Dowden, Hutchison and Ross, Inc., Stroudsburg, Pennsylvania, 1975. xv + 464 pages. $27.00

OIL FROM COAL. By Francis W. Richardson. Noyes Data Corporation, Park Ridge, New Jersey, 1975. xi + 387 pages. $36.00.

OIL FROM SHALE AND TAR SANDS. By Edward M. Perrini. Noyes Data Corporation, Park Ridge, New Jersey, 1975. x + 307 pages. $36.00.

ONTOGENIYA MINERALOV (Ontogeny of Minerals). By D. P. Grigoriev and A. G. Zhabin. Publishing House Nauka, Moscow, 1975. 339 pages, 236 figures. 2.23 rubles (approximately $3.00).

PLANATION SURFACES. Peneplains, Pediplains, and Etchplains. Edited by George F. Adams. Vol. 22 in the series Benchmark Papers in Geology. Series Editor, Rhodes W. Fairbridge. Dowden, Hutchison and Ross, Inc., Stroudsburg, Pennsylvania, 1975. xv + 476 pages. $28.00.

PRINCIPLES OF ROCK CLASSIFICATION. By Karl A. Riggs. Carlton Press, Inc., 1975. 31 pages. $3.00 + 30¢ handling from Carlton Press, Inc., 84 Fifth Avenue, New York, New York 10011.

SURTSEY. By Sturla Fridriksson. Halsted Press, John Wiley and Sons, New York and Toronto, 1975. vi + 198 pages. $14.95.