BOOK REVIEWS

KLOCKMANNS LEHRBUCH DER MINERALOGIE, by Paul Ramdohr and Hugo Strunz. 15th ed. xi+820 p., Ferdinand Enke Verlag, Stuttgart, Price DM 168. 1967.

The first edition of Klockmann's textbook appeared in 1891. The 11th to 14th editions, 1936 to 1954, were revisions by Professor Ramdohr (see review in *Amer. Mineral.* **40,** 134–5, 1955). The scope of this new edition by Ramdohr and Strunz is unchanged. All phases of mineralogy are treated and in the descriptive part all valid mineral species are supposed to be included. Only one American textbook has had a similar scope, namely the 4th edition of Dana's Textbook of Mineralogy by W. E. Ford, 1932. This also has a comprehensive descriptive section. The two books are closely comparable in size and coverage: Dana-Ford, 1932, total pages 851, descriptive section 486 pages or 57%, Klockmann-Ramdohr-Strunz, 1967, total pages 820, descriptive section 383 pages or 47%.

The new edition of Klockmann has been greatly expanded chiefly in the general text which has been enlarged by 39% whereas the descriptive part has grown but 12%. Unfortunately the the price per page is nearly double that of the previous edition.

The book has been largely rewritten and fully modernized. In the preface the authors indicate that a thorough revision of the sections on crystal optics and on geochemistry is planned for the next edition but even these sections have been greatly changed and improved over the previous edition. The subject matter has been extensively rearranged and strictly separated into *Kristallkunde* (part I) which comprises crystal geometry, crystal chemistry and crystal physics and *Mineralkunde* (part II) which comprises geochemistry, systematic mineralogy and use of minerals.

Crystal geometry is first presented for "the crystal as a continuum" (67 pages) but there are several structure diagrams even in this section. All crystal classes are treated. This is followed by a section on "the crystal as a discontinuum" (17 pages), a discussion of space groups with an excellent tabulation giving alternative settings for space groups and giving some suggestion of their derivation. Figures 154 and 155 in this section show ten symmetry diagrams for different space groups side by side with projections of structures in each of the groups drawn to the same scale.

Sixty pages are devoted to crystal chemistry, not just of minerals. New features in this section include 18 tables listing compounds belonging to important structure types and Figure 200 which shows not only the two best-known types of silicate chains but six types that are known in minerals. Modernization of the section on crystal physics is shown by the expansion of the treatment of electrical and magnetic properties of crystals from 3 to 9 pages. This section includes a 20 pages on X-ray crystallography with a brief outline of the methods of crystal structure determination. Part I is concluded with 8 pages of historical notes and references to other works.

In the second part, devoted to mineralogy, the systematic section is preceded by 42 pages of geochemistry, mineral genesis and mineral deposits, but slightly changed from the preceding edition. Though the descriptive section has not been greatly expanded many changes have been made. Whereas only Schoenflies symbols were used formerly, Hermann-Mauguin symbols are now also given in most cases. The number of crystal structure diagrams has been increased from 15 to 55 and over 30 excellent photomicrographs of polished surfaces of ores, in part taken from Ramdohr's "Die Erzmineralien und ihre Verwachsungen" (1960), have been added. This has been accomplished without reducing the number of line drawings of mineral crystals of which there are nearly 400, about 20% more than formerly. Moreover, most of these drawings are new and superior to those of earlier editions.

The descriptive section is followed by a section in which famous mineral localities are briefly described. The number of these localities has been increased from 93 to 106, 24 have

been added and a few deleted. Fifteen of those now listed are in North America and the rest are scattered over all of the continents so that a European bias has been avoided. Nothing of this sort is included in Dana-Ford, but the 6th edition of Dana's System of Mineralogy, 1892, carried a somewhat similar but more extended listing of North American localities. The second part is followed by another classified list of references to other works.

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MINERALOGISCHE TABELLEN, BY HUGO STRUNZ. 4th ed., vii+560 pp., 94 figures and one inserted table. Akademische Verlagsgesellschaft Geest & Portig K.-G., Leipzig, 1966. Price DM 42.50.

Previous editions of these tables were reviewed here by Rogers (1st ed., 1941; *Amer. Mineral.* **33,** 95–96), Pabst (2nd ed., 1949: *Amer. Mineral.* **35,** 608) and McConnell (3rd ed., 1957: *Amer. Mineral.* **43,** 619). The latest edition continues the format of the preceding edition and carries the same subtitle, "A classification of minerals on a crystallochemical basis with an introduction to crystal chemistry."

The revision was accomplished with the assistance of Dr. Christel Tennyson. The book has been expanded just 25%, the increase being mostly in the tables. The tables include all valid species and some related synthetic phases whose place in a structural classification is established or can be conjectured. Formula, cell dimensions, cell content and space group are given for each when known. For others axial elements or some other characterization must suffice. The year of naming and the namer are given with each mineral listed in the tables. Many varieties or species whose systematic position is uncertain are mentioned briefly in paragraphs inserted between the tables.

The comprehensive literature references, introduced in the 3rd edition, remain a most valuable part of this book, making it a guide to the literature on mineral species. The sources of all X-ray or structural data are given. Many references are annotated and where possible they are arranged to show the development of understanding of a species. In all cases in which the structure is known the appropriate references are indicated. The index again contains not only the names of valid species and varieties included in the tables but also thousands of synonyms and obsolete names for each of which an explanation of a few words is given. This book should be in the hands of every mineralogist. A knowledge of German is not needed for its use.

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CRYSTALLOCHEMICAL CLASSIFICATION OF MINERALOGICAL SPECIES, BY A. S. POVARENNYKH. 548 pages, 298 figs. Akad Nauk Ukr. SSR Kiev, 1966, 2r. 83 k.

This book is in Russian, but it has a 2-page English abstract, and the index lists the mineral names in English. Chemical compositions as well as unit cell and other data are in Latin (English) characters; thus it is handy for one to practice his Russian.

Inevitably this book will be compared with *Mineralogische Tabellen* (1966, 560 pages) by Hugo Strunz and Ch. Tennyson. Each one assigns 50 to 60 pages to crystallochemical principles, but Povarennykh devotes the first 100 pages (as contrasted to the first 30 pages in Strunz) to basic crystallography, the most important portion dealing with the definition of a mineral species and a method of rational nomenclature and classification. The mineral tables have 347 pages in Povarennykh, 358 in Strunz. Both books have good indexes; Strunz includes discredited names, synonyms, etc. in his one index (but omitting page references); Povarennykh lists these in a separate index (also without page numbers). The Povarennykh tables give the same unit cell and space group data as are present in the

Strunz tables; but also include facts not found in Strunz such as specific gravity, hardness, and cleavage, as well as remarks on physical and chemical properties; in addition the structure (if known) is described, commonly with coordination numbers, interatomic distances, and a figure. The Strunz tables list 1630 well-defined minerals, plus about 300 less well characterized, plus some 400 varieties and mixed crystals. The Povarennykh tables contain 1692 species (as shown in the accompanying table) with in general (except in the special index) no attention paid to poorly defined material and synonyms, although mixed crystals are covered by discussion under chemical properties. The paper and printing in both books are of good quality, but the binding is less satisfactory.

Many mineralogists will not like what Povarennykh has done with nomenclature and definition of mineral species. The reviewer however considers that Povarennykh has made a real though controversial contribution here. In essence he has dropped a great many mineral names, and as a rule for well-defined series involving but two end members only one mineral name is used. If he had stopped here, I could wholeheartedly support him (see *Am. Mineral.*, 1958, 183–189). But he has gone further, and even assigned new names in many cases. These are not likely to cause confusion since the relevant data are given, but such names based on chemical composition as manferalsilite, magferalsilite, and calcmanalsilite assigned to the garnets (p. 304), omitting oldtimers like pyrope, almandine, spessartite, and andradite, although perhaps praiseworthy seem to me to have little chance of general acceptance.

As is obvious from table 1, Povarennykh divides all minerals into four *types* (homatomic, sulfurous, oxygen salts, and haloids), and 22 *classes* dependent on chemical composition. Each class carries up to 6 *subclasses* based on structure type (across the top of the table). Subclasses are made up of *divisions* according to chemical composition, whether simple or complex. Among some classes (such as silicates) further refinement to *subdivisions* (also based on chemical composition) is necessary. These are broken into groups (in some cases also *subgroups*) that contain one or more species, all presumably having similar structures or other characteristics. Thus one group contains plagioclase (a single species) and the barium feldspars, another one has all the potash feldspars.

Mineralogists being what they are, no one will approve everything in Strunz or Povarennykh. However the latter book is sure to raise more hackles since it contains more controversial concepts. Clearly every working mineralogist will want to own a copy of each of these works.

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TABLE 1. CLASSIFICATION OF MINERALOGICAL SPECIES ACCORDING TO POVARENNYKH

Type	Class	Page	Class Name	Structure												Totals
				Coordination		Framework		Cyclic		Islands		Chains		Layers		
				Simple	Complex	S[1]	C[1]	S	C	S	C	S	C	S	C	
Homatomic I	I	169	Elements	14	5			3				2		4	1	29
	II	175	Carbides, etc.	4	1	1	2									8
Sulfurous II	I	177	Arsenides, etc.	20	1					10						31
	II	182	Tellurides	9	3					2	1			5	4	24
	III	188	Sulfides	23	73	3	1	2		11	12	9	38	10	17	199
Oxygen Salts III	I	222	Oxides	21	64	11	10			2		12	25	7	5	157
	II	257	Hydroxides			3	1					6	5	21	33	69
	III	271	Silicates			63	31	3	23	35	78	17	43	75	41	409
	IV	361	Borates			7	2			36	14	12	3	10	2	86
	V	384	Vanadates							8	7	9	8	7	1	40
	VI	393	Arsenates			3				25	30	7	5	22	4	96
	VII	408	Phosphates			8	12			32	64	6	3	29	11	165
	VIII	437	Tellurates Selenates							6	2			2	1	11
	IX	441	Tungstates Molybdates							7	2			3	2	14
	X	445	Chromates							8	3					11
	XI	448	Sulfates					4		64	72	6	2	5	2	155
	XII	470	Carbonates							25	33	2	5	9	6	80
	XIII	485	Iodates							4				1		5
	XIV	487	Nitrates							9						9
Haloids IV	I	490	Haloids	15	3					5	1	2		4	1	31
	II	498	Oxyhaloids	5	12	1						1	3	9	9	40
	III	507	Fluorides	3	1	3	1			4	4	1	1	3	2	23
Totals				114	163	103	60	12	23	293	323	92	141	226	142	1692

[1] S, simple; C, complex.