BOOK REVIEWS AND NOTICES

ONTOGENY OF MINERALS, D. P. GRIGOR'EV, IPST, Jerusalem, 1965, 250 pp., $11.50 U.S.

This book is a translation of "Ontogenya Mineralov" which had first been published, in Russian, by Izdatel'stvo L'vovskogo Universiteta in 1961. The translation was carried out by the staff of the Israel Program for Scientific Translations, IPST, under the supervision of Y. Brenner.

The book gives a new approach to an old problem: the study of the formation of individual minerals and mineral aggregates within the more general field of genetic mineralogy.

Grigor'ev deals first with the formation, the growth and the alteration of individual minerals (Page 13–185). The second part of the book deals with the formation of mineral aggregates (Page 186–221). There is obviously some difficulty in distinguishing in a clear way between the formation of an individual mineral and of mineral aggregates, as there is practically always some interaction with the surrounding material. What is of interest here is that the problem of the formation of minerals is discussed in an original way and secondly, that much detailed observational data are given which otherwise are widely scattered in the literature. Much of this observational data comes from Grigor'ev's own work or from other Russian sources.

Grigor'ev's approach is largely based on minutely detailed observations. He does not stop at the chemical interpretation nor at crystallographic aspects. His aim is to show that minerals are in a process of continuous formation and transformation. Experimental techniques are not covered.

In the discussion of zoning in pyrite (Page 45), two different types are distinguished. One is connected with variations in the physico-chemical conditions of the solutions from which the crystallization occurred. A second type is attributed to a "layer growth" mechanism, that is, oscillation of orientation in one individual. Thirdly, oriented intergrowth of two different substances during crystallization may occur (syntaxis). The term "sectorality" does not appear to be too well chosen.

The external factors which influence mineral formation are listed as concentration, supersaturation, temperature, pressure, and volume. But not only these factors as such but also a change of these factors and the rate of change will be of importance.

On Page 59, "habit" is meant in the overall discussion but the term "form" is indiscriminately used for both habit and form. The discussion of the variation of the habit is well illustrated with the example of barite from Tyuya-Muyun Mine, Ferghana.

There are only scanty indications on the actual rate of growth. However, some information is given on gypsum, halite, aragonite and organogenetic calcite (in belemnites) and from hematite (pneumatolytic), from Vesuvius. The determination of seasonal variations in the rate of crystallization based on O^{18} content is merely mentioned from the investigations in the U.S. It would appear that this paleothermometric approach is not being made extensive use of in the USSR.

The relative rate of growth is more accessible to investigation than the absolute rate of growth. Detailed indications, largely taken from the author's own experience, are given on the relative velocity of growth in different crystallographic directions. The association with minor crystallites may also bring out successive formations, so-called generations.

On Page 92 the term "rasshteplenie" is translated with "split" which, in a way, is correct. But this term conveys the notion of disruption suffered by the crystal while we have, rather, a growth phenomenon: something in the way of mosaic structure, lineage or lamellar growth.

The entrapment of inclusions may be preferential along the faces of one crystallographic form. This is how the "hour glass" structure widely occurring in pyroxenes and a number of other minerals is interpreted. But this is probably not the only, or even the most likely, formation. Selective absorption of impurities during growth and influence of the crystallization are mentioned in another context.

The rotation during growth is exemplified by the well-known case of garnet porphyroblasts from Val Piora (from L. J. Krige, without reference). The minute crystallites in the garnet porphyroblasts termed in the Russian text as paragenetic inclusions are consistently designated in the present English version as "pyrogenetic minerals."

On Page 102, "prisypki of pyrogenetic minerals" should have been rendered by "fine mineral dust of paragenetic minerals."

It is rightly stated that in many textbooks physical deformations are not receiving the coverage they deserve. In the references cited we miss here publications by H. Tertsch (for instance "Festigkeitserscheinungen der Kristalle, 1949). Translation gliding and twin gliding are discussed, based preponderantly on the Russian literature. The term "block formation" is used to designate a number of different phenomena resulting in the formation of various forms and sizes of blocks during the crystal growth, thus giving a block or mosaic structure governed by a set of definite laws (Page 122).

Block formation can, however, either be due to primary growth irregularities or to plastic deformation. Examples of such "polygonization" are given for kyanite and for galena.

There is of course no attempt at anything like completeness in the coverage of metamorphic processes but some interrelations between

deformations and the behaviour of the individual grain in the natural association of geological objects such as batholiths, dikes, veins, etc. are briefly discussed.

A few indications point to the great importance of deformation processes in the formation of minerals.

Chemical changes occur widely in minerals. But it is stressed that the chemical approach in itself is not sufficient. The actual process is generally not observed but pseudomorphs and replacement textures will frequently reveal such changes.

The transport of the reagent is accomplished through the liquid medium. Cavities in the crystal are important in this context: they may range from megascopic fractures and fissures to ultra-micropores. Investigations on magnetites from several localities in the Urals (by L. N. Ovchinnikov and others) and on pyrite from Magnitnaya Gora have ascertained the radii of macro- and micropores to be in the order of 0 to 500×10^{-7} cm and from 0 to 300×10^{-7} cm respectively. It was found that in the magnetite the porosity at the centre of the crystal is almost twice as large as that at the periphery (centre 0.92 per cent, periphery from 0.53 to 0.55 per cent). Evidently, quantitative observations of this kind are needed and their evaluation should be attempted with a cautious correlation to probable conditions of formation.

In the paragraph on recrystallization, the last sentence on Page 170 should read: "The rate of decrease of the number of crystals N per unit volume τ, that is dN/dt, decreases with time and tends towards zero"; the formulation adopted by the translators fails to convey what the author wants to say.

On Page 196, the edge formed in quartz between neighbouring faces of the positive and negative rhombohedra is given—in accordance with the Russian text, but erroneously—as $[12\bar{1}3]$; it should read $[\bar{1}\bar{1}23]$.

The book makes stimulating reading for the advanced student.

The typographical appearance and in particular the reproduction of illustrations is distinctly better than that of the original. Unfortunately, there are more than the inevitable inadequacies in the translation. Some passages are just clumsy while others are not clear or not in agreement with the Russian text. In addition, there are a number of spelling irregularities, specially on authors' names, due to phonetic transliteration from the cyrillic back to our alphabet. (For instance, H. Tertsch is spelled G. Terch, F. Becke is spelled Bekke, Sohncke is spelled Zonke.) This diminishes the readability of the book to some extent but it does not affect its overall value too heavily. It may be hoped that a future edition will be rid of these flaws.

C. G. I. FRIEDLANDER

X-RAY DIFFRACTION TABLES, J. H. FANG and F. DONALD BLOSS, Southern Illinois University Press, Carbondale and Edwardsville, Illinois, USA, September 5, 1966, 364 pp., $8\frac{1}{2}$ in. × 11 in. bound on short side. $12.75 (US).

These tables include a one-page introduction on the "Use of the Tables," Table 1 (one page) of wavelengths (λÅ) and $(4/\lambda^2)$ for fifteen characteristic radiations: the average $K\alpha$, $K\alpha_1$ and $K\alpha_2$ for Cu, Fe, Mo, Cr and Co. Table 2, comprising 360 pages (not numbered), presents in 19 columns on each page the values 2θ, $\sin^2\theta$, and d for 17 wavelengths $K\alpha_1$ $K\alpha_2$ $K\alpha$ $K\beta$ for Cu, Fe, Mo, Cr and $L\alpha_1$ for W. Page 1 covers one half degree 2θ (0.11° to 0.50° in increments of 0.01° each page thereafter covers one half degree 2θ (0.51–1.00°, 1.01–1.51°, etc.) to $2\theta = 180°$. The tables are clearly printed on good paper and well bound along the short edge in a book about one inch thick.

The tables are of most value in that they combine the values of 2θ $\sin^2\theta$ and d for several wavelengths which enables the ready identification of a reflection due to $K\beta$ wavelength if filtering is inadequate or of other lines due to unsuspected impurities in the x-ray tube target. $Q_{hkl} = \dfrac{1}{d^2_{hkl}} = \dfrac{4 \sin^2\theta_{hkl}}{\lambda^2}$ may readily be obtained by multiplying a given value of $\sin^2\theta$ by the appropriate value $4/\lambda^2$ given in Table 1. The size of the volume offsets, to a considerable extent, the convenience resulting from combining the d values for 17 wavelengths in one extended table.

L. G. BERRY

A GUIDE TO THE MINERALS OF SWITZERLAND, by M. WEIBEL, Interscience Publishers, a division of John Wiley & Sons, London, New York, Sydney, 1966, 123 pp. December 14, 1966, $6.50.

This book is the first in a proposed series of regional mineralogical guides. It presents mineralogical and geological data on new (as recent as 1965), lesser known and classic Swiss mineral localities, and is designed for readers with at least an elementary mineralogical background. The emphasis is on crystal specimens of which there are 71 excellent colour plates and 2 black and white photographs.

The first chapter (13 pages) describes the types of Swiss mineral deposits (Alpine-cleft, metamorphic, ore, pegmatite and gypsum deposits) and includes a list of minerals and localities characteristic of each type. The second chapter (41 pages) presents mineralogical descriptions of 162 minerals of which 28 are cited as being "the most remarkable minerals of Switzerland." The more important localities with characteristic mineral

features are given for each species. Chapter 3 (28 pages) provides a regional description of Swiss occurrences. For each region, the principal rock formations and outstanding mineral localities are described, and up-to-date information on the quality and availability of specimens is given. Fifteen large-scale regional maps supplement the text, but are unfortunately placed at the back of the book rather than in appropriate places in the text. In the last chapter (8 pages), the author provides the reader with valuable information on mineral collecting in Switzerland, mineral prices and official regulations. Addresses for mineral dealers, museums, and mineral organizations are also listed. Itineraries to a few easily accessible localities are given, but even these require a walk of 1 to 4 hours. A glossary of foreign terms, and mineral and locality indices complete the book.

The book is recommended to both amateur and professional mineralogists and collectors interested in Swiss minerals.

ANN P. SABINA

MORAVSKÉ NEROSTY A JEJICH LITERATURA 1940–1965 (Moravian Minerals and their Literature 1940–1965), TOMÁŠ KRUŤA, published by the Moravske Museum, Brno, Czechoslovakia, 1966, 379 pp., 30 pp. of black and white photographs, and 6 outline maps in pocket.

A volume with the same title and written by Dr. E. Burkart was published by the Czechoslovak Academy of Sciences in 1953. Burkart's volume (reviewed by E. Nickel, *Canadian Mineralogist, 6*, 408 (1959)) covered the years up to 1940. Dr. Kruťa now has assembled the data from 1940 to 1965. The book consists of five parts:

I. Bibliography of Moravian minerals 1940–1965
II. List of Moravian mineral localities and descriptions of their minerals
III. List of Moravian minerals and the localities at which they are found
IV. List of abandoned and exploited Moravian mines
V. Indexes of minerals and localities

Preceding Part I is an introduction (in Czech, Russian, English, German, and French) and a brief history (in Czech) of the development of Moravian mineralogy. The bulk of the book is in Czech.

Dr. Kruťa is to be congratulated for bringing the data on Moravian minerals and localities up to date. His book will be extremely useful to anyone interested in the mineralogy of Moravia.

J. A. MANDARINO