Acta Mineralogica-Petrographica, Szeged XX/1, 169 – 176, 1971

BOOK REVIEWS

I. KUBOVICS, GY. PANTÓ:

Vulkanológiai vizsgálatok a Mátrában és a Börzsönyben
(Volcanological Investigations in the Mátra and Börzsöny Mountains)
Akadémiai Kiadó, Budapest, 1970, 302 pages, 189 figures, 40 tables, 20 plates.

In the book the results of the geological-volcanological investigations of the Mátra and Börzsöny, two volcanic mountains of Hungary, are portrayed. Within the above subjects it is the chapters devoted to mineralogy and petrography that are elaborated in fullest detail. In other words, whereas the geology, geomorphology and magmatectonics of the two mountains are discussed in general terms, mainly on the basis of data from the literature in respect of the mineralogy and petrography of the Tertiary igneous rocks the authors report exhaustively on the large-scale investigations of their own which, however, did not encompass the two mountains as a whole.

Although the book has had to be split up into two main parts because of the presence of two separate mountain bodies, the two papers are nevertheless characterized by several common features which do not only justify their being published in one book, but do really forge them into one organic entity as well. Features of this kind can are: the means and methods of processing; adopting up-to-date volcanological principles; uniform terminology and usage of volcanological terms. Although being just a matter of form, the fact that the introduction is followed in both parts by a chapter on the history of investigations should be considered nevertheless to be a common feature. The afore-mentioned chapter is a rich summary of the major phases and results of investigations conducted prior to, or parallel with, the present author's research work by single specialists or groups of geologists. Similar accuracy and completeness characterize the list of references in geology and geography appended to each of the papers.

Part I. Mineralogical and Petrographical Investigations of the Northwestern and Western Mátra Mountains (by IMRE KUBOVICS). After an outline of the mountain's stratigraphy the Helveto-Tortonian volcanic complex is discussed in detail. The mainly andesitic effusive rocks as well as the andesitic, dacitic, rhyodacitic and rhyolitic pyroclastics are discussed in the order of succession of the eruptions forming two major units; the lower and upper volcanic complexes. Smallest units of discussion in the book are single formations, each being characterized by the identity of petrographic characteristics. As examples, let us quote the bronzitic pyroxene andesite or the andesitogenic potash trachyte or the dacitic tuff. The description of each formation of this kind includes data on the geographic situation and structural conditions of occurrence, its macroscopic and microscopic descriptions and, finally, the volcanological conclusions deduceable therefrom. These data are documented by photomicrographs, granulometric diagrams, mineralogical composition in volume

percentages, complete chemical analyses, eventual DTA-graphs, X-ray analyses, and summarizing tabulations. Petrography is followed by a separate chapter („Helveto-Tortonian Volcanism") summarizing the results of the author's petrological investigations in subchapter entitled *i „Orthomagmatic Paragenesis and Rock Texture"* and *ii „Hypo-Metamagmatic Paragenesis and Responsible Mineralogical-Petrographic Processes"*. As for the first group of questions (*i*), let us point out the series of alterations: orthopyroxene → pigeonite → augite → orthopyroxene; as for the second group (*ii*) including mineralizations (alterations) due to transvaporization, we should like to recall the process orthopyroxene → vermiculite → saponite; the formation of celadonite and glauconite; the production of potash trachyte from andesite and rhyodacitic tuffs by potash-metasomatism.

A short chapter portrays the collapse structure of the calderas of the volcanic mountains and the causes responsible for the development of the „periclinal" structure observable in the Mátra. With a view to the well known sedimentary basement of the mountains, the author considers the Mátra's caldera structure to be due to the combined effect of strata compaction (as verified by calculations) and of transvaporization.

The final chapter „Tectonic Conditions" given a summary of the data known from the literature and of the author's field observations in the light of the relationships between volcanism and tectonic processes.

Par II. „Tertiary Volcanism of the Northern Börzsöny Mountains" (by GYÖRGY PANTÓ). A general characterization of the geology of the mountains is followed by the main part discussing the petrographic conditions of the territory. In this part the volcanic formations are described in detail in two main groups: stratovolcanic complex and rocks connected with caldera formation.

The stratovolcanic complex is constituted essentially by andesites, andesitic tuffs with agglomerates, and andesitic agglomerates. Further subdivisions have been made on the basis of the mineralogical composition, with due consideration of the structural conditions. The same principle has been adopted in discussing, and making order among, the caldera formations characterizable by striking petrographic variability due to hypo- and endomagmatic influences. As a result of the author's investigations it has become possible to recognize such a zonal arrangement in which five major rock groups can be distinguished: *1.* intra-caldera stratovolcanics, *2—5.* subvolcanics connected with the caldera (sulphidic, iddingsitic-chloritic, calcareous-argillaceous-limonitic and, finally, oxyandesitic groups). The divergencies of the zones having close genetic connections indicate properly differences in the intensity of the metamagmatic effects to which they were subject. Descriptions of additional rocks occurring in the investigated — but not yet discussed — are to be found under the heading „Dike and Stock Formations at the Margin of the Caldera and on the West Mountain Border". Determinations of minerals and rocks were made by the use of optical instruments, chemical and spectral analyses, electron probe measurements, the author's special domain of activities, and, finally, with the aid of DTA and X-ray analyses. The results are illustrated with plates, tables, text-figures and photomicrograms. Beside the above investigations the author has aimed at characterizing the external habits of the individual rock variants, paying special attention to give their macroscopic descriptions and indicate exactly the sampling points.

As for the next chapter devoted to petrographic and geochemical evaluations, for lack of space, we cannot afford, unfortunately enough, to dwell on its valuable

content and logical construction. We must, however, quote those results which the author arrived at in elucidating and solving petrogenetical problems during his work. For the representation of the petrochemical conditions he has used the *AFM* diagram, confirming herewith the rightness of distinguishing three complexes for the Börzsöny Mountains volcanic formations. In the rest of the chapter the relationship between mineralogical composition, chemism, and textural characteristics are reviewed. A separate part is devoted to the description and interpretation of rock alteration phenomena due to hypo- and metamagmatic effects opacitization, uralitization, chloritization, „iddingsitization", carbonatization).

The final chapter is a short geohistorical review illustrated with a comparatively large—scale geological map and a geochemical map (representing the results of prospecting for trace elements) and geological profiles.

The two papers of the book are worthy continuations of the series fruitful of investigations into Hungary's Tertiary volcanism, looking back to great traditions. And we consider that they will fit well in and form material contributions to the geological monographs on the Mátra and Börzsöny Mountains which are to be completed soon.

DR. CS. RAVASZ

R. SEIM: *Minerale*

Neumann Verlag, Radebeul, 1970, 443 pages, 370 figures, 304 photos, 28 tables.

The ever-increasing circle of mineral collectors has gained powerful help by Professor SEIM's work. The book gives useful guidance to all friends of minerals who are not satisfied with the popular form of the recognition and loose systematization of the minerals but, striving at a deeper knowledge of the world of minerals, also search for answers to the questions „why" and „how".

In detail: the book can be both used as general mineralogy and for the recognition of minerals, i. e. the practical part is sufficiently supported by theory. This precept is determining in the arrangement of the subject, too.

The *first part* begins with the determination of the concept of mineral, and ends with the delineation of the main processes of the formation of minerals. Between these two end points, we get a picture of the habit and structure of crystals, their major types and laws, and the close relation between them.

The arrangement of the subject here — crystal morphology, mineral physics, mineral chemistry — is classic in its form, but shows the latest results as to its contents. This is followed by the petrological chapter leading on to the genetic part, which describes the major rocks within the framework of the nomenclature and systematization of the German-speaking countries. The last chapter gives a brief survey of the more and more firmly established rules of mineral collection, comprising the most important elements of field- and collection-work.

The *second part* of the book can be considered a key for determination as well as systematics. Minerals can be classified on the basis of four easily determinable characteristics: luster, colour, streak, and hardness. By the variation of these the author arranges the 282 minerals described in three main groups:

I. Minerals of metallic luster (the five sub-groups according to colour).

II. Minerals of submetallic and nonmetallic luster showing characteristic streak (the six sub-groups according to streak).

III. Minerals of nonmetallic luster the streak of which is grey, white, or which have no streak (the five sub-groups according to hardness).

The description of each mineral includes (according to sense) the following data: chemical composition, crystal system, hardness, density, the per cent quantity of its utilizable element, colour-streak, luster, transparency, habit (usually with the addition of one or several crystal drawings), the character of the crystal aggregate, cleavage, fracture and locality, similar minerals, further characteristics and accessory minerals, reference to photos in the book. This arrangement is really brilliant, also supported by the fact that one third of the more than three hundred photos are coloured.

The chapter "*The utilization of Mineral Raw Materials*" also provides a number of valuable data in a concise form, listed according to the alphabetic order of the name of each element: the finder of the element and the year of discovery, the volume of world production, the clark of the element, its crust average, the field its utilization, its important minerals with formulas indicating the type of formation.

An extra chapter deals with the industrial raw materials, and finally the precious- and semi-precious stones are summarized in a professional manner.

We hope that the present review is in itself sufficient to prove the utility, many-sidedness and still conciseness of the book. However, we want to call special attention to the excellent figures, being an organic supplement to textual parts seeming lexical or difficult to understand because of their nature: and, at the same time, insureing good entertainment to the *homo aestheticus.*

On summarizing we can say that the book fulfils our expectations we had when reading the subtitle (Enstehung, Vorkommen, Bestimmung, Verwertung), which are greatly helped by the easy-flowing style, clarity, and the high level of the technological design of the book.

DR. CS. RAVASZ

K. I. SZTRÓKAY, GY. GRASSELLY, E. NEMECZ, J. KISS:
Ásványtani praktikum I. (Mineralogical Practice. Volume I.)

Tankönyvkiadó, Budapest, 1971, 402 pages, 273 figures, 38 tables and 4 coloured plates.

The purpose, structure and applications of the book are the same as those of the second volume published in the previous year (and reviewed by us, too). That is why there is no need to repeat its evaluation and review here. As for the content of the volume, however, let us emphasize that is primarily characterized by the predominance of the conventional methods of determinations of minerals — declared, very often, to be simple — which largely increases the value of the book. At the same time, the present volume gives information providing a sound basis for making the most useful choise among of the research facilities listed in Volume II and, consequently, for undertaking further measures.

Before entering into details in respect of the investigational method, in the individual chapters of the book the authors first review the applications of the particular techniques, and then proceed to a regular description of the instruments, devices and reagents and to give some practical advices and instructions on the rules to be adopted. According to the didactical principle, the understanding of the problems is facilitated exercises expounded fully, and in many cases the method is demonstrated by the direct solution of quite a number of tasks.

The individual chapters embrace the following subjects.

The chapter entitled "*Crystallographic Measurements, Calculating and Constructing Operations*" is a very detailed treatise accounting for almost one-third of the total volume of the book. It has been split up into four subchapters: in the first one, "The External Form of Crystal" the fundamental conceptions and laws of crystal morphology as well as goniometric measurements are discussed and afterwards the measured data are represented in projections as exemplified by the individual crystal systems. The second subchapter includes calculations of crystal elements and the relevant calculations of spherical trigonometry. Next to follow is a subchapter on the construction of the projectional (gnomonic) crystal-drawing. The final subchapter is devoted to a discussion of the principles and operations for direct crystal drawing method — the method of plane intersection.

The second chapter, "*Investigations in the Domain of Physical Properties*", gives a description of the main operations of routine work on determining minerals — operations that can be carried out with the aid of a rather simple equipment, paying due attention to explain and define the basic, theoretical, relationships of the physical properties of the minerals and the causes responsible for them. In this chapter information is given about measuring of the density, cleavage, hardness, glinding (translation), and carrying out spectral analyses and scratch tests and finally, about the application of blow-pipe.

"*Simple Chemical Reactions*" is the title of the chapter discussing the traditional determination operations in mineral chemistry, where express methods for detecting of the most important cations and anions are described in the following groups: tests with borax and phosphate beads; production of coatings, sublimates and metallic globules; simple chemical reactions (hepar sulphuris); staining techniques (carbonate minerals, feldspars, etc.).

"*Microchemical Reactions*". In this chapter the techniques for producing drop reactions are summarized and then their applications are discussed. First the operations with the most usual reagent solutions (Montequi solution, CsCl, KI, $TlNO_3$, etc.) and then the reactions of the individual elements (groups of elements) are discussed. The photomicrographs of the reaction products (crystallites) totalling 96 in number are a great advantage of this chapter.

"*Colour Reactions, Semi-Microanalyses*". A discussion of the main points and instruments of this method, still of restricted use in Hungary, is followed by a detailed description of qualitative microanalytical operations. The elements considered to be important for geology (from the geological point of view) are listed according to a classification in siderophile, chalcophile and lithophile groups. The discussion of the reactions for detecting the individual elements is preceded by a short geochemical summary in which the frequencies and characteristic minerals of the respective elements in the individual geophases are reviewed. Illustrations to the chapter coloured plates on four pages, have been appended to the book.

"*Paper Chromatography*". Like in the two previous chapters, such a method is described here which would be very useful to propagate more widely in the practice of mineral determinations. Therefore, the comparatively long introduction is to be welcomed here. The author has made efforts to demonstrate chromatography based on separation, relying mainly on H. Agrinier's data. The part devoted to methodology cannot be reviewed here, but we should like to point out that the small tabulations compiled for ease and clearness in the qualitative and semi-quantitative (quantitative) determinations of single groups of elements (elements, RF value, colour reactions) are well-suited to the purpose.

"*Mineralogical Calculations from Chemical Analyses.*" Even though small in volume, this chapter is very significant, for it gives a selection of the most important methods for coordinating and comparing the results of mineralogical, petrographical and chemical investigations. Thus the reader can get acquainted with the operations for calculating mineral formulae from the chemical analyses of relatively homogenous minerals and for determining the ratios of the constituents of mixed crystals. The next subchapter describes the ways in which volume percentages, weight ratios and weight percentages can be calculated from linear measurements on thin- and polished sections of rocks and ores. We cannot agree, however, with its title: "Determination of the Volume Ratios and Weight Percentages of Mineral Components in Ore and Rock Texture" because of the improper use of the term texture. Very timely is the subject of the correlation calculations discussed in the following chapter. In addition, the outlining of the characteristics of isomorphous substitutions and coordination numbers which can be expressed in terms of the chemical (stoichiometric) formulae of the minerals, is greatly appreciated. Finally, examples are given to illustrate calculations for developing formulae in crystal chemistry calculations gradually gaining in importance nowadays.

At the end of each chapter there is a list of references, and the book itself ends with an exhaustive index of names and subjects.

Summarizing the appraisment of the book, let us state that is provides very useful informations in a form easily intelligible. The selection of its contents is very lucky, as authors have managed to couple the commonest research methods with the majority of techniques which would deserve to be disseminated more widely.

The editing and the typographical execution of both volumes have hit high standards. Thus, with a view to both content and form, it is hoped with good reason that the book may become one of the most popular representatives of the Hungarian-language publications in mineralogy.

DR. CS. RAVASZ

SZÉKY—FUX V.:

Ore Formation of Telkibánya and its Connections to the Carpathians.

Publishing House of the Hungarian Academy of Sciences, 1970, 266 pages, 60 figures, 79 tables, 15 supplements, (in Hungarian, with an English resumé)

A new book of nice get-up was published on the ore formation and its farther connections of Telkibánya belonging to the Tokaj Mountains and which had been more famous in previous centuries. The former researchers dealt with the investigation of the vein-containing formations and of the qualitative and quantitative relations of the ore paragenese; insignificant attention was focussed on rock metamorphism accompanying the ore formations, this was considered as accessory phenomenon. It is well-known, however, that between the formation and evolution of the ore-transporting and ore-admitting rocks and the development of the ore formation there is for the most part a strong connection. On this basis each of the endogeneous ore formations amounts to each petrogenetic evolution phase of the igneous rocks. Consequently, between the igneous rocks and the ore formations of them there is a close connection, the one develops with gradual transition from the other, i. e. these are petro-metallogenetic series. These petrogenetic series and their evolution were investigated by the author.

On the basis of the intention the book is divided into four chapters.

The first chapter deals with local geological fundamentals, magma-genetic and tectogenetic conditions determining the ore formation. In this chapter informations are given on the place of occurrence within the Alp-Carpathian metallogenetic province, on the history of the area's geological knowledge and, on the basis of the results of the latest investigations, on the geological structure of the ore-containing area of Telki-bánya. These statements are based for the most part on the investigation results of E. Scherf and author.

The second chapter discusses the petro—metallogenesis of the ore formation. The detailed petrological investigations, from the hypo- and meta-transformations to the mineral and trace element parageneses of the veins resulted in the recognition of those processes which played singificant role in leaching the floor of the volcanites, in mobilizing the ore substance, in developing the veins and in forming the volcanites themselves. These processes and the factors activating them, respectively, are separated into ascendent and descendent processes, according to their direction and character. On this basis author distinguishes the processes which precede (pre-metallogenetic), accompany (syn-metallogenetic) and follow (post-metallogenetic) the ore formation, and proves the originated parageneses.

In the course of the discussion of the pre-metallogenetic processes author introduces particularly the mineral and chemical composition of the Sarmatian pyroxene-andesite. Discussing the petrogenetic development she describes the rock alteration of the single mine adits and galleries. A lot of data relating to alkali and SiO_2 content of the rocks are published, and the newly developed mineral assemblages are also described. In every cases she establishes the petro-metallogenetic series and the mobile components, respectively.

Discussing the syn- and post-metallogenetic processes author describes the genesis of the andesitogenetic potash-metasomatites and determines the petro-metallogenetic series, the mineral composition of the rocks as well as the mobile components. Results are supplemented by data of X-ray investigations and chemical analyses. The hydrothermal processes accompanying or following the potash-metasomatism result in the subsequent endo-meta-transformations and petro-metallogenetic evolution of the rock. The petro-metallogenetic series of carbonation, silification, pyritization, sericitization and their mobile components, appearing under such conditions, are proved by concrete precedents supplemented by DTA and X-ray investigation results. The investigation results of the oxidation zone and clay mineralization terminate this chapter.

The third chapter deals with the metallogenesis and characterizes the veins and ore-zones. The veins of the Gyepü and Kánya Mountains as well as the general characterization of the local ore formations are discussed separately.

From the point of view of the geological development of ore-content, the veins of the Gyepü Mountain can be divided into four groups. The gaping fissures of silicic-clayey formations with pyrite-marcasite bands and abundant silica-content may be assigned to the first group. The silicic-pyritic, silicic-ochre-containing, pyritic-clay mineral-containing veins belong to the second group. These are not characteristic fissure-filling substances but originated in the fracture zones of the subsequent movements. The pyritic-ochre-containing bands with noble metal content, being of parallel strike with the second group's members, constitute the third type, while the fourth assemblage contains sphalerite with carbonaceous-clayes filling substance.

On the basis of the formation and filling—up the veins of the Kánya Mountain can be assigned to three types. The veins which can be separated from the associated

rock by a determined plane, belong to the first type. Their filling substance is of pyrite which is accompanied by other coloured sulphides as well as by silicic and often clay minerals. More considerable noble metal content can be observed only in the pyrite-rich part of the veins. The veins constituting the second group cannot be sharply separated from the associated rock, they are not vein fissures but are silicic zones grey coloured by colloid pyrite. These veins are characterized by considerable pyrite and noble metal content. The veins belonging to the third type are of quartz-ocher rarely of clay-ocher and are characterized by determined separating planes.

The description of the veins of both the Gyepü and the Kánya Mountains is supplemented by numerous chemical analyses as well as by trace element and DTA investigations.

The third part of this chapter gives a general review of the ore formation. Both the geochemical interpretation of the trace element investigations and the temperature of the ore formation of Telkibánya, as well as the ore formation of the deeper-lying Tortonian andesites are described. Finally, on the basis of the leaden-isotop investigations concerning the age and genesis of the ore formation, author states that in the area of Telkibánya two phases of ore formation can be distinguished: epi-mesothermal ore formation containing noble metals and pyrite lying in a higher level, on the one hand; and an older mesothermal one of Pb-Zn-Cu formation lying in a deeper level, on the other.

The fourth chapter deals with the petro-metallogenesis of the hydrothermal ore formation of the Inner Carpathian Neogene Ore Province. The ores of the Dunazug, Börzsöny, Mátra and Selmec Mountains and those of the Hilly Country of Beregszász are characterized in general. In the part entitled "Metallogenesis of the Transylvanian ore deposits" the general features of the ore formations of the Gutin and Hargita Mountains, the Transylvanian Ore Range, as well as of the Kelemen and Görgény Alps are described.

This work is worthy of note because from the metasomatic point of view author summarizes at first the ore formation of Hungary's one mining districts on the basis of the mineralogical-petrological, geological, geochemical and metallo-geological data and this initiative may promote the further ore researches in the future.

DOC. DR. J. MEZŐSI