BOOK REVIEW

HANDBUCH DER MIKROSKOPIE IN DER TECHNIK. Volume IV, Mikroskopie der Silikate. Part 1. Mikroskopie der Gesteine. Edited by HUGO FREUND with the collaboration of C. W. CORRENS, D. HOENES, S. MATTHES, H. VON PHILLIPSBORN, H. PILLER, AND W. E. TRÖGER. 796 + LIV pp., 490 photomicrographs, drawings, and tables, 2 colored photomicrographs. Umschau Verlag, Frankfurt am Main, Germany. 1955(?) Price 98 DM.

This is just one book of an encyclopedic series in which there are eight volumes, several with two or even three parts. The series, called *A Manual of Microscopy in Technology* is intended to be all-embracing, dealing with all major fields of industrial technology to which the microscope has specific application. It is typical, of course, that the German editors should entitle such an enormous series a "Handbuch," i.e., a handbook or manual. In size and weight the series apparently will be nothing approaching a work that can be transported in toto with facility by hand. The entire series, when completed, will consist of the following volumes (all in German, titles in translation):

Vol. I. Optical principles, instruments, and accessories for microscopy in technology. Two parts, one on the transmitting, the other on the reflecting microscope.

Vol. II. Microscopy of economic mineral deposits. Three parts: 1) Coal, coke, lignite; 2) Ores, concentrated ores, slag; 3) Petroleum and potash salts.

Vol. III. Microscopy of colored metal alloys, light metal alloys, and iron-carbon alloys.

Vol. IV. Microscopy of silicates. Two parts: 1) Rocks (here reviewed); 2) Ceramic raw materials.

Vol. V. Microscopy of wood and paper. Two parts: 1) Anatomy of wood; 2) Microscopy of paper and technology of wood preparation.

Vol. VI. Microscopy of textile fibers, textiles, and leather.

Vol. VII. Microscopy of chemical technology.

Vol. VIII. Microscopy of human nourishment and luxury materials as well as animal food and fertilizer material.

Vol. IV, Part 1, has five sections, following an introduction by Freund: Section 1, by Phillipsborn, is entitled "The historical development of microscopic methods in mineralogy and their significance to general microscopy and technology"; Section 2, by Tröger, "Optical properties and determination of the most important rock-forming minerals"; Section 3, by Hoenes, "Fundamentals of microscopy in rock technology"; Section 4, by Correns and Piller, "Microscopy of the fine-grained silicate minerals"; and Section 5, by Matthes, "Microscopy of technologically useable asbestos."

The first part, dealing with the history of mineralogical and petrographical microscopy, is one of the most complete syntheses of this subject that the reviewer has ever encountered. It has the added virtue of containing 47 figures (2 in color) of micro-drawings and photomicrographs of historical significance, including pictures of crystals and rocks by such pioneers of microscopy as Hooke (1665), Leeuwenhoek (1684–1688), Capeller (1723), Brewster (1823), Sorby (1858), Zirkel (1863) and many others. Pictures of many of these individuals also are included. It is interesting to recall that, although thin sections of fossil wood were prepared by Nicol in 1831, it was not until 1849 that Sorby made the first rock thin sections (of calcareous sandstone). This section also has an outstanding bibliography.

Section 2, on optical determination of minerals, begins with a brief general treatment of techniques; i.e., immersion mounts and thin sections, followed by descriptions of individual species, series or groups, about 60 in all. The choice of minerals important as rock-

forming species is judicious, but their arrangement is by three "genetic" groups, namely those of magmatic paragenesis, those of sedimentary paragenesis, and those of metamorphic paragenesis. Obviously, as Tröger also recognizes, this would lead to considerable repetition if carried to completion, and thus many species or groups are placed arbitrarily. The listing of topaz as a metamorphic mineral certainly is dubious. For determinative purposes is provided a chart (in a rear pocket) which is essentially a plot of birefringence against γ index with (+) minerals in the top half separated from (−) minerals of the lower half by a central band of isotropic species. By itself the diagram is hardly adequate as a substitute for a series of tables that would include many of the other optical properties. This section is well illustrated with photomicrographs, variation diagrams, and optical orientation diagrams. Many of the last two types stem from Tröger's book, Tabellen zur optischen Bestimmung der gesteinsbildenden Minerale (reviewed in *Am. Mineral.*, **38**, 114–45, 1953). Unfortunately the section still retains a mishmash of mineral varietal names of which many European mineralogists seem so pedantically fond: anomite, grothite, mesitinspar, pistomesite, oligonspar, quarzine, and pseudozoisite, among others.

The largest section (ca. 350 pp.) treats the relations between the microscopic characteristics of rocks and their technological employment. This is practically an independent volume, dealing with the mineralogy of rocks and quantitative mineralogical measurements; rock textures, their precise delineation, including petrofabric methods and interpretations, and their significance in the quarrying or mining of rocks and in the structural employment of rock; the weathering and weather resistivity of rocks; the relations between petrographic and technological characteristics of rocks, and finally an exhaustive description of examples—igneous (plutonic, dike, and flow rock), sedimentary and metamorphic. Some first-class photomicrographs of special features of rocks adorn this section. One cannot help but wonder to what extent technologists of the stone industry or tunnel engineers will concern themselves with such concepts as the "geneity" (Genität) and "tropy" (Tropie) of textures, or R-tectonites. Doubtless rocks as structural materials remain more widely used in Europe than in the United States, but it is to be hoped that Part 2 of Volume IV deals in at least equal detail with the petrography of concrete, brick, synthetic lightweight aggregate, and other fabricated structural materials of far greater quantitative importance today.

The descriptions of the properties of the fine-grained silicate minerals and the special problems attendant upon their determination are excellently presented by Correns and Piller. Minerals included are the clays, hydromicas, chlorites, and aluminum hydroxide minerals. The final short section on asbestos is concerned with microscopic determinations of types of asbestos, their special microscopic characteristics, microscopic control of quality, and microscopic characteristics of synthetic asbestos.

The book is difficult to evaluate as a whole; in fact it hardly is a whole but is just a collection of parts. Each section contains material of value to specialists in those particular subfields of mineralogy and petrography, but its jolting price tag of nearly $25 makes it impossible to recommend its purchase to students and other threadbare cohabitants of universities. Thus, doubtless it will be acquired chiefly by foundation libraries, petroleum geologists, and book reviewers.

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