Book Reviews

Works intended for notice in this column should be sent direct to the Editor (A. J. C. Wilson, Department of Physics, University College, Cathays Park, Cardiff, Great Britain). As far as practicable books will be reviewed in a country different from that of publication.

Mineralogy: Concepts, Descriptions, Determinations. By L. G. Berry and Brian Mason. Pp. 612+xi, with 265 figures and 34 tables (excluding 26 pp. of determinative tables). San Francisco: W. H. Freeman. 1959. $8·75.

As indicated by the title this book has three parts. In the first section on concepts, there are seven chapters devoted to introductory material, crystallography, the physics, chemistry and genesis of minerals, determinative methods and the systematics of mineralogy. In the next section on mineral description, about two hundred common species are considered in some detail in eight chapters arranged according to an adaptation of the Berzelius system. Finally, the last section contains determinative tables with some notes upon their use. The book is well-produced with clear diagrams and half-tone plates to illustrate the text; there is a good index, and the book has very few misprints or other small errors.

In the first part, the elementary concepts of crystallography are approached from the ideas of space lattices rather than from a morphological viewpoint, an innovation which is to be highly commended. In the same chapter there is an excellent summary of the effects and causes of twinning in crystals, a subject rather neglected in some other undergraduate text-books. Indeed the seven chapters of this part are, in the main, very well developed; special mention must be made of the chemical approach, particularly in the section on the genesis of minerals. For each of the mineral species described in the second part, the crystal system and class, axial elements, lattice type, cell dimensions and content, hardness, density, colour, streak, lustre, cleavage, *etc.*, are listed, together with brief comments upon habit, occurrence and alteration. The most striking feature of these descriptions is the omission of any mention of optical properties. Some comment upon this omission is made by the authors in the preface in which they suggest that the inclusion of optical properties is unnecessary because 'most colleges special courses in optical mineralogy follow the course in general mineralogy and that the average field geologist seldom has access to a petrographic microscope'. Leaving aside the question of the order in which courses shall be arranged, the serious student of mineralogy must become familiar with thin-section and crushed-fragment optical determination. In order to do this, he must supplement the present book with other texts containing optical descriptions; these books will already contain many of the more useful properties described in the present volume, which will, so far as this section is concerned, become superfluous. Further, if the present descriptions are designed to help the average field geologist, it is difficult to see what justification there can be for the inclusion of structural data with each description. The determinative tables of the third part are based on lustre and hardness with the minerals in each category listed in order of increasing density; they are laid out for convenient use with a page reference to the full description of the mineral given in the second part.

Although the book is designed to satisfy the requirements of an undergraduate course in mineralogy, it is difficult to feel that it will do so except within a limited field. The many excellent features do not compensate for the disappointment that the descriptive sections are unbalanced by the decision that the important optical properties are to be omitted. It is most strongly to be urged that at the earliest possible opportunity this should be rectified by a revision of the text of the second part. Then it will be possible to recommend this book as suitable in all ways for undergraduate courses, and it will occupy the high place it at present almost achieves in the esteem of teachers of mineralogy.

P. Gay

Department of Mineralogy and Petrology
University of Cambridge
England

Optical Mineralogy. By Paul F. Kerr. 3rd ed. (Previous editions by Austin F. Rogers and Paul F. Kerr). P. xiv+442. New York, London, Toronto: McGraw-Hill. 1959. Price 66*s*.

'Rogers & Kerr' has been widely accepted for many years as a standard text on the optical properties of minerals and their study under the polarizing microscope. Owing to the death of the senior author in 1957, the preparation of this new edition has been undertaken by Prof. Kerr alone. Its appearance—seventeen years after its predecessor—will be warmly welcomed.

The general character of the book has not been changed, and its length has not been much increased. The mineral descriptions, illustrated by photomicrographs of typical specimens and by drawings showing optic orientations, are in the same clear and concise form, but they have all been reviewed and brought up to date, and some new ones added. Descriptions of opaque minerals have been reduced in order to make room for other material. A number of new references have been added, thereby extending the scope of the work without adding appreciably to its length.

New features in the first part of the book, which deals as before with principles and methods, include a short section on phase-contrast illumination and a chapter on the universal stage. The chapter on the polarizing microscope contains descriptions and plates of typical modern American and German instruments and ancillary equipment.

There are, however, a few errors and rather prominent omissions, and some sections on which the treatment could, it is felt, have been made a little clearer. In dealing with the compensator for measuring small retardations, which is shown in Fig. 2–20, it is stated that the $\lambda/30$ mica plate is *tilted*, like the calcite plate in a Berek compensator. In fact the instrument figured is the so-

called elliptic compensator, in which the plate is rotated in its own plane above the specimen (in the 45° position) until the position of minimum intensity of the transmitted light has been found. In the chapter on the universal stage there is no direct mention of the need to correct measured angles of rotation about horizontal axes for the difference between the refractive index of the hemispheres and the mean refractive index of the mineral. A somewhat oblique reference to this point is made on p. 121 in describing the measurement of $2V$ on muscovite, but even here it is envisaged that the refractive index of the hemispheres might not be known. In the reviewer's experience this information is always engraved by the makers on the hemisphere mounts, and accurate work with the universal stage would be impossible without it. In the same chapter, glycerine is recommended as a liquid for making contacts between the hemispheres and the preparation. Glycerine has an undesirably low refractive index for this purpose, and, particularly if it were used with hemispheres of high index, would cause total reflection to occur at angles of tilt smaller than the maximum allowed by the geometry of the apparatus.

The fundamental difference between orthoscopic and conoscopic observations is not made very clear. Fig. 2–7, which aims to show the ray paths in the two cases, is unaccompanied by any explanation which would help the reader to trace the rays. In any event it is hardly possible to do so with the naked eye, since the drawings are on far too small a scale, and much inferior for their purpose to Figs. 7 and 8 in the second edition, which they have replaced. One seeks in vain for a simple and direct statement such as that, from the standpoint of geometrical optics, each point in the orthoscopic image is formed by the focusing of rays which have emanated from a point in the object, whereas each point in the conoscopic image is formed by the focusing of rays which have passed through the object in a particular direction.

The conditions of correct illumination are outlined on pp. 15–17, but no practical instructions are given as to how these conditions are in fact established with any of the microscopes and lamps which are described. The fact that the conditions of illumination needed for the maximum resolution of object detail conflict with those required for the study of optical properties in 'parallel' light is not emphasized. Finally, the recommended use of the concave side of the mirror in *high-power* work would not find favour with many microscopists. The concave mirror introduces astigmatism into the image of the light source formed by the condenser, and thus defeats the object of using a highly corrected condenser in work in which the resolution of object detail is important. Its use is best confined to low-power work, either for increasing the size of the image of the light source cast by the condenser so that the field may be filled, or for giving a weakly convergent illuminating beam in the absence of a condenser.

These criticisms are not offered in any carping spirit, but in the hope that future editions of this work, which is a mine of useful information on mineral optics, may be free from these less felicitous passages. Although their enumeration has occupied some space in this review, they constitute only a small fraction of the content of the book, and are not such as seriously to detract from its value.

The production of the book is of the high standard which we have learnt to expect from the firm of McGraw-Hill. The reproduction of the photomicrographs in particular merits commendation; they are almost as clear as originals.

N. H. HARTSHORNE

School of Chemistry
The University
Leeds, 2
England

Books Received

The undermentioned works have been received by the Editors. Mention here does not preclude review at a later date.

Elektronenmikroskopische Untersuchungs- und Präparationsmethoden. By L. REIMER. Pp. viii+300 with many figs. Berlin: Springer Verlag. 1959. Price 58 DM.

Structure and Change. An Introduction to the Science of Matter. By G. S. CHRISTIANSEN and PAUL H. GARRETT. Pp. xvi+487 figs. San Francisco and London: Freeman and Co. Ltd. 1960. Price 63*sh.*

X-ray Powder Photography in Inorganic Chemistry. By R. W. M. D'EYE and E. WAIT. Pp. viii+222. London: Butterworths Scientific Publications. 1960. Price 45*sh.*

Les Traceurs Radioactifs en Métallurgie Physique. By C. LEYMONIE. Pp. 240 with 43 figs. Paris: Dunod. 1960. Price 32 NF.

Cours de Cristallographie. Livre II. Cristallographie Physico-Chimique. By R. GAY. Pp. 232 with 151 figs. Paris: Gauthier-Villars. 1959. Price $6·17.

Crystal Chemistry of Simple Compounds of Uranium, Thorium, Plutonium and Neptunium. By E. S. MAKAROV. Pp. 145. New York: Consultants Bureau, Inc. 1959. Price 42*sh.*

Crystals and Crystal Growing. By ALLAN HOLDEN and PHYLLIS SINGER. Pp. 320+137 figs. and 49 plates (7 in colour). New York: Doubleday and Co., Inc. 1960. Price $1·45.