

this little book is useful so far as it goes, the authoritative synthesis of blowpipe reactions, micro-crystal reactions, and spot-tests that its title suggests remains only a hope for the future.

M. H. H.

WERNER (A. G.). *On the External Characters of Minerals*. A translation by CAROZZI (A. V.). Urbana (University of Illinois Press), 1962. xxxii+118 pp. \$4.50.

This book is a new English translation of A. G. Werner's treatise on descriptive mineralogy (oryctognosy) entitled 'Von den äusserlichen Kennzeichen der Fossilien' and published in 1774. It is the third English translation, the first being Thomas Weaver's in 1805, and the second that of the Wernerian Club in 1849-50. Werner's book consists of 5 chapters (217 sections) and deals first with the characters of minerals in general, the history of the external characters, and the accuracy with which these characters can be described. This is followed by an explanation of each of these characters, e.g. colour, cohesion, smell, taste (166 sections), and finally by three general rules for recording the characters determined. The value of the new translation lies in the fact that it is really the second Wernerian edition, made possible by the purchase by the Library of the University of Illinois of Werner's personal copy, which incorporated those changes and additions he would presumably have made if he had had the time and inclination to prepare the second edition.

In contrast to the previous English translations, that of Mr. Carozzi follows faithfully the original; the sections are given the same numbers, and Werner's page numbers are given in parenthesis in the text. Mr. Carozzi has carried out his task in a most scholarly manner.

A. A. Moss

CAMERON (Eugene N.). *Ore Microscopy*. New York and London (John Wiley & Sons, Inc.), 1961. 293 pp., 79s.

This volume fills one of the most deplorable gaps in geologic literature, and it will be appreciated by everyone interested in ore minerals and ore deposits. There are nine main chapters: (1) Introduction. (2) The ore microscope. This provides a concise and objective survey of various makes of ore microscopes. Special emphasis is put on accessory equipment required for quantitative work. (3) The preparation of polished surfaces. The detailed addresses of manufacturers of various items will

be valued by many readers. (4) The physical properties of ore minerals in polished sections. Appearance and significance of crystal habit, zoning, cleavage, twinning, &c., are outlined briefly and illustrated by excellent microphotographs. The author deals especially with the diagnostic use of microhardness and discusses the microhardness measuring equipment available. (5) The optical properties of ore minerals. Every reader and especially the beginner will welcome the clear and critical survey of colour, bireflectance, anisotropism, and reflectivity. The arrangements used by Bowie and Taylor and by the author for reflectivity measurements are discussed in sufficient detail to serve as practical working instructions. As final commentary on this section, however, Folinsbee's remarks are quoted '... the reflectivity values given can be used only to bracket an unknown into a small group of minerals having approximately the same reflecting power.' The Berek and the Hallimond methods for measuring rotation angles and phase difference are discussed in detail. (6) The theory of reflected light. This chapter may well be called the centrepiece of the book. Some of the general principles of optics are summarized; special attention is paid to the generation of elliptically polarized light. The author then gives a clear survey of rotation properties, polarization figures, and of the reflection of plane-polarized light from transparent and absorbing minerals of different symmetry. Theoretically, it is possible to distinguish isotropic, uniaxial positive, uniaxial negative, monoclinic, and triclinic ore minerals by optical methods in polished sections. The author points out, however, that it is too early to say whether the theoretical possibilities can be realized in practice. (7) Microchemical techniques. Various types of etching and the most important microchemical tests are briefly surveyed. (8) Systems of mineral identification. (9) Applications of ore microscopy. Outlines the significance of microscopic methods for the examination of ores and mill products, illustrated by excellent photomicrographs. The appendix contains tables of ore minerals arranged according to Vickers hardness, polishing hardness, reflectivity, rotation properties and tables of microchemical tests for specific elements.

The fact that chapters 5 and 6 together occupy some 120 pages, while chapter 7 has only 14, is symbolic and indicates the complete change in emphasis that during recent years has taken place in ore-microscopic research in the United States. This change becomes even clearer if one considers the extensive treatment of microchemical tests in the well-known publication by Short (U.S.G.D. Bull. 914, 1940). Professor

Cameron sums up the present situation by saying that 'these methods (microchemical tests) were never satisfactory as a main basis for ore mineral identification'. Quantitative optical methods, on the other hand, have a great future. Professor Cameron's book is not merely the only comprehensive and concise introduction to ore microscopy available in English, but it contains much information on reflected light optics that so far has been published in scientific journals only. It will now be extremely difficult to maintain the prejudice that ore microscopy is a subjective technique, based on the observer's ability to distinguish light apple green from light grass green reflection colours. Students, university teachers, research workers, ore geologists, and ore dressing specialists will soon realize that this book is indispensable for their work.

E. F. STUMPFL

BÖRNER (Rudolf). *Minerals, Rocks and Gemstones*. [English translation by W. Mykura of *Welcher Stein ist das?* (1938).] Edinburgh and London (Oliver & Boyd), 1962. xi+250 pp., 14 colour plates. Price 25s.

This inexpensive reference work is a welcome addition to the small number of good books that can be recommended for use by the amateur mineralogist and petrologist. Divided into three parts according to the title, there is a wealth of determinative tables and lists of definitions of terms, together with admirably brief and informative introductory sections. Misprints are few, and deficiencies in the quality of the line drawings are readily forgiven in a book of this character.

P. G. E.