

neighbouring areas) are of distinct value to the field geologist wherever he may be working.

K. F. G. HOSKING

WILSON (A. J. C.). *X-ray Optics*. Second edition. London (Methuen's Monographs on Physical Subjects), 1961. 141 pp. Price 21s.

The subtitle of this book was, and is, 'The Diffraction of X-rays by Finite and Imperfect Crystals'. On its first appearance in 1946 it was a classic in its field and a new edition is to be welcomed. The new edition has been revised throughout to incorporate work of the last fifteen years, without any great expansion and without changing the simplicity and clarity of the approach. A full modern bibliography is given with each chapter.

R. J. DAVIS

FISCHER (W.). *Gesteins- und Lagerstättenbildung im Wandel der wissenschaftlichen Anschauung*. Stuttgart (E. Schweizerbartsche Verlagsbuchhandlung), 1961. viii+592 pp., 12 plates, 12 figs., 24 tables. Price DM 84.

This book provides a clear and concise survey of the development of petrology and economic geology from the earliest beginnings in the sixteenth century up to the present day. Russian, German, and French sources are used to a large extent.

An introductory chapter deals with the first attempts of petrographic classification (Agricola, 1546; Werner, 1787), and its further development until about 1850. The neptunist-plutonist controversy receives a lucid and comprehensive treatment in the following section. The chapter on igneous rocks (51 pp.) begins with a survey of petrographic techniques. The various systems of petrographic classifications from Loewinson-Lessing to CIPW, Niggli, and Tröger are explained in simple terms. The same applies to the section on 'The origin of igneous rocks', which devotes special attention to problems of magmatic differentiation and to the history of the granite controversy.

The chapter on sedimentary rocks (135 pp.) incorporates sections on weathering, clastic sediments, sulphate- and chloride-rocks, carbonate rocks, phosphate rocks, and siliceous sediments. Nearly thirty pages are devoted to coal petrology; the most recent results obtained in this field are reported. A special section deals with the historic development of views on oil genesis.

The specific character of metamorphic rocks was not fully recognized until the introduction of the petrological microscope in the 1860's

(chapter on 'The metamorphic rocks and their formation', 32 pp.). The history of metamorphic petrology is discussed up to Eskola's facies concept; results obtained in this field during the last two decades are, however, not mentioned.

About 40 pages are devoted to geochemistry, with special emphasis on the work of Clarke, Fersman, Vernadsky, and Goldschmidt. In contrast to the excellent treatment of some energetic problems, the recent progress in trace-element determination of rocks and minerals and its genetic significance receives but little attention.

The second main part of the book deals with economic geology. A scientific approach towards problems in this field dates back to about 1500, when the alchemists' theories of the planets' influence on ore formation were still prevalent. Agricola rejected these ideas and gave the first mineralogical description of an ore deposit (St. Joachimsthal) in his *De re metallica* (1530). Various old theories regarding the origin of metalliferous lodes are mentioned. Werner's views and the growing understanding of hydrothermal ore deposition during the first half of the nineteenth century are dealt with in detail.

A final chapter is devoted to problems of systematics in economic geology. The author discusses the systems of von Groddeck, Stelzner-Bergeat, and an early survey by Schneiderhöhn as well as recent results and new techniques in economic geology research. He presents a 132-page summary of the modern state of economic geology systematics, on the lines of Schneiderhöhn's well-known *Kurzvorlesungen* (short lectures on ore deposits). Subdivision is into deposits of the magmatic, sedimentary, and metamorphic sequences, the first group being constituted by liquidmagmatic, pegmatitic-pneumatolytic, hydrothermal, and exhalative occurrences. Deposits of kaolin, bauxite, nickel-silicates, phosphates, oolitic iron ores, sulphur, sedimentary pyrite, and members of the Red-Bed-type are the most important items in the section on sedimentary deposits. The fact, finally, that many of the world's most important metalliferous mines range under the headline 'complex poly-metamorphic ore deposits' indicates the large amount of work still to be done before the formation of these occurrences can be understood.

This excellent book guides the reader from the early beginnings of geological thinking to a comprehensive survey of what has been achieved today. The author wants to focus attention on the historic development of petrology and economic geology and thus increase understanding of present-day problems and results. He has succeeded in doing so most brilliantly, and minor omissions of the recent progress in certain fields

do not diminish the value of the book. A wealth of information that is inaccessible to most geologists has been carefully selected and clearly arranged. All this makes the book a valuable addition to the library of anyone interested in the geo-sciences.

E. F. STUMPF

OSTROUMOV (E. A.) [ОСТРОУМОВ (Э.А.)]. *The application of organic bases in analytical chemistry*; translated from the Russian by D. A. PATERSON. London (Pergamon Press), 1962. xxvi+159 pp. Price 50s.

This book runs to six chapters, a long introduction (26 pp.), and a conclusion. The organic bases referred to in the title are pyridine, α -picoline, and hexamethylene tetramine, the use of which makes possible the formation of compact or crystalline precipitates of low adsorptive power, notably the hydroxides of the group III metals and the sulphides of nickel, cobalt, and manganese. In consequence many troublesome separations are made simple. The book is free from all but minor errors, but reads like a thesis; much is repetitive and the eighty tables of results are more than adequate.

A. A. MOSS

GRAY (G. W.). *Molecular structure and the properties of liquid crystals*. London and New York (Academic Press), 1962. vii+314 pp. Price 63s.

The mesomorphic state (commonly called a liquid crystal) is almost, if not quite, confined to organic compounds of some complexity, and its interest to mineralogists and crystallographers lies essentially in the fact that it is a state intermediate between the three-dimensional order of a crystal and the disorder of a liquid. Some inorganic compounds and minerals with layer-lattices can reach a state of complete stacking disorder that is in many respects similar to the smectic phase, though there does not appear to be any evidence of order within the layers of the latter.

In the present book the author gives a very useful review of the structure and properties of the mesomorphic state (or rather states, for there are at least two distinct states), and considers in detail the requirements for a substance to exist in a mesomorphic state. Particular attention is paid to regularities in homologous series of organic compounds.

M. H. HEY