

WAHLSTROM (E. E.). *Optical Crystallography*. New York (John Wiley & Sons, Inc.), 4th edn, 1969. x+489 pp., 332 figs. Price £6.6.

Since this is the fourth edition it must be a very successful textbook, but no previous edition appears to have been reviewed in this journal. In the preface the author states that in many cases the diagrams were prepared before the text material was written. Certainly the most distinctive feature of Wahlstrom's book at first glance is the three-dimensional representation used in many of the diagrams and the author has clearly put a lot of thought and skill into the drawing of these diagrams.

Chapter 1 deals with crystallography and crystal projections and, as is usual in a book of this type, the treatment has to be brief and in the reviewer's opinion could be omitted. The chapters on light and on optically isotropic substances form a useful introduction to the main part of the book. A chapter on the polarizing microscope is followed by one on calculation and measurement of refractive index. The treatment of uniaxial crystals is very clear and comprehensive, and covers two chapters, one for parallel light and the second for convergent light. The same procedure is adopted for biaxial crystals.

The reviewer has already indicated his admiration for the three-dimensional diagrams but feels that perhaps there is too much detail in them. For example, illustrations of the main types of dispersion in monoclinic crystals do not require the indicatrix for red light and the indicatrix for blue light to be shown within the crystal. The question must be asked—can one understand dispersion more easily with the aid of these three-dimensional diagrams than from the more conventional sections? In the reviewer's opinion the answer is no, but others may not accept this view.

Rotary polarization, optical activity, and crystal rotation methods are dealt with fully in separate chapters. The author states that 'the book is a mixture of theory and recipes and is not intended to be either a complete, elegant presentation of optical theory or simply a laboratory manual'. It seems to the reviewer that it is closer to the first of these two approaches since answers can be found in this book to most of the theory questions that the student might ask. However, some of the simple practical questions a student might ask are not treated in sufficient detail. For example, it is desirable to explain to students that extinction angles are useful for distinguishing the three low-symmetry crystal systems: where this is treated it tends to be somewhat obscured by the introduction of dispersion: in the section headed 'Extinction Angles in Biaxial Crystals', after a very brief introduction the reader is introduced to the Biot-Fresnel Law without any preliminary account of the practical aspects of measuring extinction angles in randomly oriented crystals in a thin section. On p. 309, an eight-line paragraph is all we are given under the heading of 'Interference Colours'. It is true that if the student has understood all that goes before in the book he should know quite a lot about the production of interference colours, since this is treated in Chapter 7 on 'Compositions and resolutions of light waves' but the reviewer would consider it useful to describe in some detail the practical problem of the effect of orientation on interference colours of random sections of a biaxial mineral in thin section.

Many topics are dealt with in more detail than the reviewer would consider necessary for a geology student but it is a very useful reference work for the student who is particularly interested in optical properties of crystalline materials and certainly this book should be in any Geology Department library. W. S. MACKENZIE

WOOLFSON (M. M.). *An Introduction to X-ray Crystallography*. London and New York (Cambridge University Press), 1970. ix + 380 pp. Price £4.25.

There are now a fair number of textbooks that deal in one way or another with the subject of X-ray crystallography, and among them this new one plays a distinctive and valuable role. The selection and treatment of subject matter shows it to be aimed very directly at those who are interested in crystal structure determination. The latter subject is treated in considerable detail, while other topics are developed, usually concisely, just to the extent to which they might be needed to lead on to, or to assist, structure determination.

Compared with other books on the determination of crystal structures, Woolfson's approach is more actively didactic: it starts at a more elementary level, and includes more 'background' material (e.g. some crystal optics and crystal physics). The style of writing and method of attack are consistent with an attempt to teach by example. This is shown not only in the inclusion of problems and answers with each chapter, but also in the text, where principles and methods are discussed and very frequently illustrated by examples. The examples in the text are well chosen, usually dealing with more simple special cases in order to illustrate more general and therefore more formidable-looking theorems.

The above features of the book lead me to view it as a practical manual rather than a definitive work, and I believe that this is what the author desired. The topics covered are indicated by the following headings for the nine, roughly equal length, chapters: 'The geometry of the crystalline state', 'The scattering of X-rays', 'Diffraction from a crystal', 'The Fourier transform', 'The experimental collection of diffraction data', 'The factors affecting X-ray intensities', 'The determination of space groups', 'The determination of crystal structures', 'Accuracy and refinement processes'.

The book is concluded with a useful list of references and a bibliography, a short list of physical constants, and two short tables, one of scattering factors and one of absorption coefficients for certain radiations. The latter tables are for twelve different atoms including H, C, N, O, but not Si or Mg. Here and elsewhere is an indication that the author's own experience has been more with organic compounds, although most of the book is equally valid for those determining inorganic and mineral structures.

The technical production of the book is good except for some figures where three-dimensional effects do not show too clearly, and some photographs where the contrast is not good and detail is lost. Minor errors are not very plentiful, and only two are worth mentioning. On p. 6, the effect of a vertical mirror plane in the stereogram in