

foretaste of the clear mathematical treatment Guinier maintains throughout the book although at his advanced standard it cannot always be simple. In some ways crystal classes and space-group theory might have been more fully dealt with, yet some aspects, such as the relation between hexagonal and trigonal lattices, have been better explained than in most other text-books. Experimental methods are described in a third part with a proper emphasis on powder methods. It is a special joy to read Guinier's account of focusing and monochromatizing procedures. These are fields in which his own contributions are paramount. Yet more information on experimental techniques is to be found in the fourth part, which deals principally with applications: crystal size, texture studies, qualitative and quantitative phase analysis, crystal strains and order-disorder phenomena. The fifth part, on X-ray diffraction by imperfect crystals, amorphous materials and on low-angle scattering, is the longest and most important because it contains most of the material that cannot be found in other text-books. Guinier's emphasis on diffraction by materials that do not obey the infinite and perfect lattice postulates is, furthermore, entirely in keeping with modern trends of research. This feature more than any other makes Guinier's new book a most important addition to crystallographic literature.

Author and subject indexes are inadequate. The reviewer does not object to the advertisements discreetly hidden at the end of the text. No doubt they helped in producing a great text-book at a not prohibitive cost.

The new book is too difficult for those only interested in the simplest technological applications. All other X-ray crystallographers will be profoundly grateful to Guinier for having undertaken the enormous task of writing a large text-book single-handed. There can be no doubt it will be referred to regularly in all progressive X-ray crystallographic laboratories.

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Elementary Crystallography. An Introduction to the Fundamental Geometrical Features of Crystals. By M. J. BUEGER, Pp. xxiii+528 with 618 figs. and 69 tables. New York: Wiley; London; Chapman and Hall. 1956. Price \$ 8.75; 70s.

'Crystallography' (in the opening phrase of chapter 9) 'is concerned with the geometry of arrangements of atoms in crystals, and the various consequences of such arrangements.' The first few chapters are devoted to repetition theory, translation periodicity and rotational symmetry, and enable the working out of the thirty-two crystallographic point groups (classes of permissible crystal symmetry) in chapter 5. The five plane lattices and fourteen space lattices are next derived, and in chapter 10 (of 57 pages) attention is paid to crystal morphology. The forms occurring in the individual crystal classes are listed and illustrated. Representative substances, grouped under the heads 'mineral', 'other inorganic', 'organic', are named, and examples of form development are figured

(the figures on p. 120 are the first illustrations of actual crystals to appear in the book). In this chapter open pyramidal forms are curiously figured with a negative intercept on the vertical axis. In the monoclinic system the 'first setting' of the *International Tables for X-ray Crystallography* is used, giving an orientation for substances such as hilgardite which strikes the older morphologist as unfamiliar. For each class the repetition of a point in a general position, and the special positions, are shown in a 'sphere diagram' (a device also used later when illustrating some of the isometric space groups). This is in effect an orthographic projection from a sphere, and it is not clear why mention of the stereographic projection is so studiously avoided—an understanding of it must surely rapidly become an essential to any crystallographer and its introduction at this stage would provide a better means of representation of inclined symmetry elements.

Consideration of point-group symmetry is rounded off by a chapter on the problem of its practical determination, including a useful discussion of the significance of form development, dissolution forms and etch figures, optical properties, pyro- and piezoelectric effects and diffraction symmetry.

The megascopically observable symmetry of crystals having thus been treated first (an order of arrangement which meets with the reviewer's emphatic approval), the remaining three-fifths of the book are devoted almost entirely to discussion of the internal symmetry. The space groups isogonal with axial point groups are derived in three stages: first parallel-axial space groups, then space groups with non-parallel axes other than isometric, and finally the isometric axial space groups. Then a further long chapter introduces 'operations of the second sort' to build up the remaining groups. This order of derivation, of course, divorces space groups within the various classes, and a chapter in *résumé* tabulates these, with page- and figure-references. The illustrations of space groups are in close accord with those of the *International Tables* (of which Prof. Buerger is a co-editor), and the summary uses the full international (Hermann-Mauguin) symbols. A few pages outlining the methods by which space groups may be determined conclude this section.

The three remaining chapters are of a more advanced mathematical standard, offering an introduction to group theory and its application to point symmetries and space symmetries. A rather brief index (there is only one page-entry for 'cubic (isometric)' and none at all for 'isometric') does not list any of the substances quoted as examples in chapter 10.

The make-up, as indeed one would expect, is excellent, with very clear printing on paper of good quality but not excessively heavy. Only a few minor printers' errors have been noted (the spellings 'wolfenite', 'guanadine', 'tetrahydrate'; the formula of tremolite; the number 160 on p. 474). As in the author's previous book, the seventeen plane patterns are used to decorate the end-papers, a bold scalene triangle motif now replacing the earlier rather insignificant comma.

The limitations imposed by the rigid definition of the content of 'crystallography' are carefully observed; thus, for example, whilst chapter 11 devotes several pages and some effective illustrations to the significance of etch figures the subject of twinning is dismissed in a six-line note because 'its explanation lies not in geometry but in

the physics of crystal growth'. The word 'elementary' in the title of the book refers especially to the absence (with the exception of the last three chapters) of complicated mathematical procedures; the mode of treatment throughout is elaborate and exhaustive. The subtitle perhaps conveys a truer picture of the scope and value of this work in its reference to the *fundamental* importance of the matter included.

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Structure Reports for 1940–1941. Edited by A. J. C. WILSON, N. C. BAENZIGER, J. M. BIJVOET and J. M. ROBERTSON. Pp. viii+384 with many figs. Published for the International Union of Crystallography. Utrecht: N. V. A. Oosthoek's Uitgevers Mij. 1956. Price 80 Dutch florins; \$21.50; £7.11s.0d.

When it was decided by the International Union of Crystallography to take up the work of reporting crystal-structure determinations, which had been so successfully started with the *Strukturbericht*, it was evident that the task would be formidable. The last volume of *Strukturbericht* was Vol. 7, covering the year 1939. The work on the *Structure Reports* began in 1949 and it was decided to give priority to a report on recent work, in order to avoid starting with a serious time lag. The interval was to be filled as soon as possible thereafter by working at the same time both backwards and forwards, but the magnitude of the gap and the very rapid increase of the number of structure determinations required a large effort of work. The first result was Vol. 11, which appeared in 1951 and covered the years 1947–1948. Then followed in order Vols. 12, 10, 13, 9 and now 8. With the last mentioned volume the gap is closed and the reports now cover the years 1940–1950.

In the present volume the standard of coverage and the clarity of description has been well maintained. As a consequence there is little to be said now that has not already been said about the preceding volumes. The Editors have again to be congratulated and thanked for their excellent work.

In the introduction it is stated that omissions noticed incidentally in the later issues of *Strukturbericht* have been remedied in this volume, but as no exhaustive search of the literature for 1939 and earlier years has been undertaken it is possible that these volumes may still contain some unnoticed errors and omissions.

Through generous support from different sources Vols. 10–13 could be published at prices substantially below the cost of production. The later volumes have been published without such support, and it may be remarked that the price of the present volume is considerable higher than that of its predecessor (Vol. 9), which contained a larger number of pages (but was thinner owing to a thinner kind of paper). The reviewer is convinced, however, that the present volume is well worth its price.

It is now intended to publish a cumulative index for 1940–1950, covering Vols. 8–13 inclusive. The usefulness of the *Structure Reports* will certainly be very much improved by such an index. One could perhaps add a wish that an index to *Strukturbericht* Vols. 5–7 could

also be prepared and published. There exists already an index to Vols. 1–4, incorporated in the index to Vols. 76–100 of the *Zeitschrift für Kristallographie*.

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Прецизионное Опредегение Парапетров Згеиентапной Ячейки Кристаллов Симметрическим Методом. By А. Ф. Иевинш и Я. К. Осол. [The Precision Determination of the Parameters of the Unit Cells of Crystals by the Asymmetrical Method. By A. F. Ievinš and J. K. Osol.] Pp. 150. Riga: Latvian Academy of Science. 1956. Price Rb. 7.90.

Precision determinations of cell constants from powder diagrams are nowadays generally made by the 'asymmetric method' which was developed by M. Straumanis and his co-worker A. F. Ievinš from 1933 onwards. It is characteristic for this method that the high-order and the low-order diffraction rings are recorded on an unbroken strip of film so as to eliminate many corrections which limit the accuracy of other methods where the ends of the film lie at the entrance or exit points of the primary ray.

The two originators of the method gave a detailed description of the instrumentation and of the methods of evaluation in a booklet of 104 pages, in German, which was published by J. Springer in Berlin in 1940. A reproduction of this book became available in 1948 as one of the war-time Edwards lithoprints.

The present book is essentially a translation of this book into Russian, although this is nowhere said and the name of Straumanis has been replaced on the title by that of Ievinš' present collaborator J. K. Osol. In fact, neither in the preface nor anywhere in the text does even the name of Straumanis appear. Only in the references can it be found, mainly in common authorship with Ievinš.

The discussion of the application of the method to powder diagrams, and its extension to rotation diagrams, using Weissenberg pictures for indexing purposes, follows closely the German edition. Most of the tables and figures are identical. Now and then paragraphs are slightly shortened and some papers by Russians are substituted for those of non-Russian authors. The geometry and algebra of the reciprocal lattice are discussed at greater length than before, and examples of precision determinations from rotation patterns of monoclinic and triclinic crystals have been added. The use of 'Neugrad' (i.e. $\frac{1}{2}\pi = 100^\circ$) has not been taken over from the German edition. However, the present book does not show any improvement in experimental techniques, which remain the same as those described twenty years ago in the German work.

Since the book by Ievinš & Osol follows so closely the German book by Straumanis & Ievinš, the two books together may be useful to those Western readers who want to improve their reading of technical Russian by comparing the texts.

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