Dr J. Kraut* (Department of Biochemistry, University of Washington, Seattle) has prepared a program which tabulates a normalized Lorentz-polarization factor for each reflection appearing on any Buerger precession photograph. It requires as input data the camera settings, the reciprocal-lattice parameters and the orientation of the reciprocal lattice with respect to the camera axis. Results are computed at the rate of 1 sec./reflection unless the lattice vectors are orthogonal, in which case 0·6 sec./reflection is required. The program may be used for precession angles up to 70° and reflection indices up to 999. It occupies drum locations 0000–0549; the instructions have been optimally located. Operation of the program has been checked against tables and charts published by M. Atoji and W. N. Lipscomb (*Acta Cryst.* (1954), **7**, 595).

The presentation of these papers was followed in the afternoon by two general discussions led by Mr William Kehl (University of Pittsburgh Computation and Data Processing Center). The first session was concerned mainly with programming and equipment. The advantages of certain auxiliary equipment for the basic, 2000-word storage, machine was discussed. There was interest in the possibility of plotting the data for electron-density maps directly from the punched cards, using an automatic graph plotter (e.g. commercially available equipment from Librascope Inc., Engineering Associates Inc., and others).

* Information received after the conference.

In the second session, the problems of the exchange and distribution of programs were discussed. It was agreed that it would be a great advantage to the users to have a central agency through which the programs could be shared. The function of this agency would be to distribute information and to facilitate the exchange of programs between crystallographic laboratories. Mr Kehl described the standardization procedure for program information drawn up for the computing centers of a group of the Mid-Western Universities.

It was agreed that the Computation and Data Processing Center of the University of Pittsburgh should try to provide the services of a central agency for the IBM 650 crystal structure analysis programs. The Center would (i) accept and distribute copies of programs submitted in the standard form; (ii) record the testing of these programs, either by the Center in collaboration with the Crystallographic Laboratory at the University of Pittsburgh or by the first crystallographic re-user; (iii) distribute information obtained relating to (i) and (ii) by newsletter at least biannually to the members of this conference and others who request this information.

DOROTHY BOOTH	M. E. SENKO
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L. MERRITT	W. KEHL

G. A. JEFFREY, Conference Chairman

Book Reviews

Works intended for notice in this column should be sent direct to the Editor (P. P. Ewald, Polytechnic Institute of Brooklyn, 99 Livingston Street, Brooklyn 2, N.Y., U.S.A.). As far as practicable books will be reviewed in a country different from that of publication.

Théorie et Technique de la Radiocristallographie. By A. GUINIER. Pp. xviii + 736 with 350 figs. and many tables. Paris: Dunod. 2nd ed. 1956. Price 9,500 fr.

It is a great pleasure to welcome this almost completely re-written text-book. Its author has evidently given much original thought to the teaching of a subject of which he is himself a widely acclaimed master, not only as a theoretician but, through the use of artistic fingers, also as an outstanding experimentalist.

Because of poor presentation, and hesitation by many scientists before turning to a French text, the first edition in 1945 was not as widely used as its merits warranted. When in 1952 an English translation by T. L. Tippell (*Acta Cryst.* (1953), **6**, 751) removed the original deficiencies it laid itself open to two other valid criticisms: a new text-book in an active field of science can afford neither to be seven years out of date nor to appear under a title that is liable to misinterpretation (*X-ray Crystallographic Technology* implied a far more practical and scientifically less erudite approach than that used by Guinier).

Fortunately we can now forget most of the past. The French language remains, but owing to an attractive simple style the reviewer became almost unconscious of reading an all too unfamiliar language. The material of the book is now well up to date and the production must be regarded as a triumph of French publishing. Only judged by the highest (mostly American) standards fault can be found, especially with several figures. Fig. IV–35, p. 209, for example, is unsuitable as a half-tone reproduction and should have been re-drawn paying regard to legibility of numbers; Fig. VI–13, p. 267, and many others deserve art paper and Fig. III–11, p. 88, has slight drawing inaccuracies to which the eye is sensitive. Careful attention to detail by a professional proof-reader might have avoided numerous minor inconsistencies such as the three different ways of writing '*Franç.*' in three adjacent lines in reference 22 of chapter 1, p. 48.

The book aims to include all aspects of X-ray crystallography other than the techniques of crystal-structure determination, but the principles and factors influencing the intensities of X-ray reflexions are fully dealt with throughout the volume. It logically excludes also any systematic treatment of known structures. This might have been clearly stated with a reference to such works on crystal chemistry as those by Evans and Wells. Instead the author includes two inadequate tables, one on the structures of the elements and a very meagre one on 'crystallographic data of some common substances'.

Guinier divides his book into five main parts:

The first, on properties and practical sources of X-rays, is a fine exposition with clear descriptions of the fundamental physical principles. The second part, on elementary crystallography and diffraction theory, gives a

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. BUERGER, Pp. xxiii+528 with 618 figs. and 69 tables. New York: Wiley; London; Chapman and Hall. 1956. Price $8·75; 70*s*.

'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', 'tetrahedrate'; 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