tory texts in this book. I believe that it would have been better either to have rewritten the introductory text to suit the level of reader expected or to have published just the space-group pages, together with the useful key on the inside covers (incidentally, the book could then have been even less expensive!). I wish I could be more positive about the *Teaching edition* but, frankly, I am not sure to whom it can be recommended.

A. M. GLAZER

Clarendon Laboratory
University of Oxford
Parks Road
Oxford OX1 3PU
England

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X-ray crystallography. By E. M. UYGUR. Pp. x+318. Published by METU, Ankara, Turkey, 1983 (available from the Metallurgical Engineering Department). Price US $5.00.

This book, which is based on 'class notes developed over many years of teaching of X-ray diffraction and crystallography courses' by the author, would be better titled *Elements of X-ray diffraction.* The rather general title of *X-ray crystallography* would demand a more comprehensive coverage, which the book lacks. I would particularly like to stress the fact that there is not even a cursory treatment of the determination of crystal structure and the phase problem, which is a vital area in X-ray crystallography.

The geometry of crystals, symmetry mapping and projections are routinely discussed in the first three chapters. This is followed by a treatment of generation and properties of X-rays in Chapter 4. Chapters 5 and 6 deal with X-ray diffraction proper and the experimental techniques.

Except for the drawback mentioned earlier the sections covered have been treated with clarity with good examples and illustrations. The book should find use as a supplement to standard texts in X-ray diffraction and crystallography.

R. SRINIVASAN

Department of Crystallography & Biophysics
University of Madras
Guindy Campus
Madras-600025
India

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Structure and statistics in crystallography. Edited by A. J. C. WILSON. Pp. vii+225. New York: Adenine Press, 1985. Price US $65.00.

This book describes the proceedings of the symposium on Crystallographic Statistics held in Hamburg, West Germany in August 1984 in the course of the Thirteenth International Congress of the International Union of Crystallography. It also includes a few papers presented in the main Congress but which were considered as closely linked with the symposium topic.

The first and last contributions in the book stand out on their own, the first by J. Karle on the statistical basis underpinning direct methods and the last on 'expert systems' of data acquisition. The direct-methods contribution does not contain any new material but it is a splendid review of the theoretical developments which led to direct methods having their present pre-eminence and in which Karle and Hauptman played such a leading role. The 'expert systems' paper by H. J. Milledge and her collaborators presents the principles by which the data-acquisition process by a diffractometer may be optimized by analysing the data during collection.

The remainder, the bulk, of the book divides into two roughly equal parts - the first concerned with intensity statistics and the second with refinement processes. A most interesting paper by Weiss *et al.* deals with the representation of probability density functions by Fourier series, which is much better than previous methods using the central-limit theorem or based on the Edgeworth or Gram–Charlier series. There follow three papers dealing respectively with the effects of heavy atoms, non-crystallographic centres of symmetry and non-crystallographic translational symmetry on the normal or cumulative intensity or $|E|$ distributions. Since many crystal structures contain heavy atoms or a great deal of symmetry to do with the chemistry of molecules rather than the requirements of space groups, it is clear that departures from idealized random distributions of almost-equal atoms must be common. The papers presented here show much success in predicting distributions from known structural features; it is not quite so clear that the inverse problem has been solved.

After a paper by Parthasarathy & Elango on the best way of testing for symmetry elements from intensity statistics the section is rounded off by a contribution from Wilson on fluctuations and errors in intensity distributions. He concludes, regretfully, that there is no obvious easy way of representing distributions modified by random or systematic errors.

The second section, on refinement, starts with a paper by Prince commenting on the precision and accuracy which may be obtained in structure refinement by the Rietveld method. He concludes that while the calculated standard deviations may give a general indication of the precision of the parameters found they are not an accurate assessment of the r.m.s. errors. Clearly this paper was controversial; the following paper by Rollett is a discussion of Prince's paper and he comes to a contrary conclusion.

The next two papers are concerned with the application of information theory to refinement. The first, by Collins, is on the very topical subject of parameter estimation by entropy maximization. This is a good paper to read; firstly it confirms that there is a certain arbitrariness in the entropy function which is maximized and secondly it demystifies a topic which for many crystallographers has taken on the characteristics of a deity - all powerful and incomprehensible. The following paper by Wilkins *et al.* is similarly to be commended especially in providing a practical procedure for incorporating prior knowledge into information-theory procedures.

The three papers which follow, on the modification of weights in least-squares analysis, variance of intensities in the Bond method and the use of maximum likelihood and