

these measurements are made by a manual device with digital counters; each measurement must be recorded by hand and combined to yield orientation parameters. This procedure is tedious and subject to human error at several stages.

We have devised a more efficient procedure using a system which is commonly employed for the measurement of contour lengths of DNA molecules photographed in the electron microscope. We illuminate the oscillation photograph from below or project it from above with a photographic enlarger. Each fiducial mark and reflection is located with the magnifying cursor of the digitizer and, upon command, its film coordinates are transmitted to the calculator. The resolution of each measurement is 250  $\mu\text{m}$ .

The calculator is programmed to list each pair of coordinates and to calculate the correction constants which describe the crystal orientation (Nyborg, Wonacott, Thierry & Champness, 1975). The reproducibility of these numbers is approximately 50  $\mu\text{m}$ . All of the measurements and calculations required to process a single film can be completed in less than four minutes.

Further details, including a listing of the program, are available from the authors.

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LAWRENCE I. GROSSMAN  
GREGORY A. PETSKO

Department of Biochemistry  
Wayne State University  
School of Medicine  
Detroit  
Michigan 48201  
U.S.A.

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## Crystallographers

*This section is intended to be a series of short paragraphs dealing with the activities of crystallographers, such as their changes of position, promotions, assumption of significant new duties, honours, etc. Items for inclusion, subject to the approval of the Editorial Board, should be sent to the Executive Secretary of the International Union of Crystallography (J. N. King, International Union of Crystallography, 13 White Friars, Chester CH1 1NZ, England).*

Dr **Carroll K. Johnson**, Oak Ridge National Laboratory, Tennessee, has been elected Vice-President of the American Crystallographic Association for 1976 and will succeed Dr **Isabella Karle** as President in 1977. Professor **D. K. Smith**, Department of Geochemistry and Mineralogy at the University of Pennsylvania, has been elected Secretary of the ACA for the next three years, until the end of 1978. Professor **C. N. Caughlan**, Chairman of the Department of Chemistry at Montana State University, continues as Treasurer of the ACA until the end of 1976.

Dr **Jerome Karle**, Chief Scientist, Laboratory for the Structure of Matter, Naval Research Laboratory, Washington, has been elected a member of the National Academy of Sciences.

Sir **Alan Cottrell**, Master of Jesus College, Cambridge, has been elected as one of the first six foreign associates of the U.S. National Academy of Engineering.

## International Union of Crystallography International Tables for X-ray Crystallography

Volume I of *International Tables for X-ray Crystallography* is out of print. The Executive Committee of the Union has decided not to reprint this volume because the new volumes on symmetry tables are well under way. The first volume in the new series, on direct space, will contain much more information than the old Volume I and is expected to be published in 1977. Further details of the availability and the price of the new volume on direct space will be announced nearer to the date of publication.

The remaining volumes in the present series continue to be available. Volume II (*Mathematical Tables*) and Volume III (*Physical and Chemical Tables*) cost £9.50 each whilst Volume IV (*Revised and Supplementary Tables for Volumes II and III*) costs £11.50. Copies may be obtained at the special reduced prices of £5.00 for Volume II or III and £7.00 for Volume IV by *bona fide* crystallographers, who must

give an undertaking when purchasing that the volume is for their personal use only. Orders may be placed direct with the publishers, The Kynoch Press, Wotton, Birmingham B6 7BA, England, or with Polycrystal Book Service, P.O. Box 11567, Pittsburgh, Pa. 15238, U.S.A., from whom prospectuses may also be obtained.

## *Symmetry Aspects of M. C. Escher's Periodic Drawings*

This extremely popular book by Professor Caroline MacGillavry has been reprinted for the Union and is now available from Bohn, Scheltema & Holkema, Scientific Publishers (formerly Oosthoek, Scheltema & Holkema), Emmalaan 27, Utrecht, The Netherlands, at a price of 40 Netherlands Guilders. The book contains 42 plates (30 black-and-white and 12 in colour) of periodic drawings by the Netherlands artist M. C. Escher. Their symmetry aspects are discussed by Professor MacGillavry. Apart from its artistic value, the book is of great use for teaching purposes. An identical edition, entitled *Fantasy and Symmetry* is being published simultaneously in North America by Harry Abrams, Inc. and copies may be ordered through Polycrystal Book Service, P.O. Box 11567, Pittsburgh, Pa. 15238, U.S.A., or any bookseller.

## Notes and News

*Announcements and other items of crystallographic interest will be published under this heading at the discretion of the Editorial Board. The notes (in duplicate) should be sent to the Executive Secretary of the International Union of Crystallography (J. N. King, International Union of Crystallography, 13 White Friars, Chester CH1 1NZ, England).*

### *Status and Future Potential of Crystallography*

An in-depth review of the above title has been produced by the U.S. National Research Council. The report has been prepared by the U.S. National Committee on Crystallography and is based on a two-day conference sponsored by the Committee in 1975 and the results of a mail survey conducted by the Committee. The Committee's work was supported by the National Science Foundation.

An objective of the report is to point out the vitality and extensive range of crystallographic studies. This is done by emphasizing the broad relationship of crystallography to numerous other scientific disciplines, by describing its inherent diversity of subject matter for experimental and theoretical investigation, and by outlining numerous promising areas for future research. Recent advances in

analytical capabilities have cleared the way for more effective and far-reaching applications.

The areas considered in the report are biological macromolecules, chemical crystallography, diffraction physics, earth sciences, and materials research. In addition, there are parts devoted to the results of the chemical crystallography questionnaires, the teaching of crystallography, and a brief discussion of crystallographic computing.

A limited number of copies of *Status and Future Potential of Crystallography* are available from the Office of Chemistry and Chemical Technology, National Research Council, 2101 Constitution Avenue, N.W., Washington, D.C. 20418, U.S.A.

## Book Reviews

*Works intended for notice in this column should be sent direct to the Book-Review Editor (J. H. Robertson, School of Chemistry, University of Leeds, Leeds LS2 9JT, England). As far as practicable books will be reviewed in a country different from that of publication.*

**Practical electron microscopy in materials science**, Tomes I, II et III. Par J. W. Edington. Londres: Macmillan, 1975 (Philips Technical Library). Prix £9.00 par tome.

Les trois fascicules 21×29 cm de la monographie de J. W. Edington ont respectivement 34, 122 et 112 pages. Ils sont remarquablement illustrés par d'excellentes photographies qui seront très utiles aux enseignants recherchant de bons exemples des phénomènes rencontrés dans la microscopie électronique des solides cristallisés. Au cours de la lecture de cette monographie, on se pose la question suivante: est-ce un aide-mémoire pour le spécialiste ou un ouvrage accessible aux débutants? Malheureusement, on ne peut pas répondre en disant: les deux. Réaliser ce double but aurait été admirable mais aurait demandé autant de rigueur scientifique que des démonstrations simples et pédagogiques. Or, la rigueur est parfois en défaut dans le texte ainsi que dans certains schémas: le spécialiste s'arrêtera parfois sur des ambiguïtés qui, si elles avaient été évitées, n'auraient certainement pas rendu le texte plus ardu pour le débutant. Cer-

tains spécialistes de la métallurgie se réjouiront de voir la monographie entièrement consacrée à cette discipline, mais les autres seront déçus de ne pas y trouver traité le cas des cristaux minces (< 100 Å) où la théorie cinématique peut être utilisée.

Cet ouvrage apporte une très vaste documentation photographique et bibliographique qui peut venir compléter très positivement d'excellents ouvrages existants et encore inégalés sur la microscopie électronique des cristaux minces.

A. OBERLIN

*Laboratoire Marcel Mathieu  
Faculté des Sciences  
45 Orléans-La Source  
France*

**Applications of liquid crystals.** By G. Meier, E. Sackmann and J. G. Grabmaier. Pp. iii + 164. Springer-Verlag, 1975. Price \$23.00.

This is a timely book. The last few years have seen an increased interest in the technological exploitation of the unique properties of liquid crystals. In particular, the electro-optic properties have promised display devices operating at such a low power that it was impossible for them to be commercially ignored. Now with the advent of suitable mesogenic compounds giving stable, colourless, room-temperature liquid-crystal phases, these have become feasible and the day of the digital wrist-watch is here. But as this volume shows, liquid crystals have far more to offer than wrist-watch displays and trivial iridescent plastic toys.

The first part of the book, by Meier, gives an introduction to the relevant physical properties of liquid crystals. Since the nematic phase features largely in subsequent chapters, it is naturally given prominence here. This section, like the rest of the book, is concise and to the point. There is no historical introduction and no attempt at a comprehensive survey of mesophase types; smectic phases appear at the top of page three and are dismissed 16 lines later.

The second section, by Sackmann, outlines the scientific (as opposed to the

technological) applications. He describes the use of liquid crystals as anisotropic solvents for spectroscopic studies and for gas-liquid chromatography.

The final section, by Grabmaier, deals with medical and technological applications. He describes the utilization of the temperature-sensitive colouration of the cholesteric phase. A range of applications of thermography is outlined, including cancer diagnosis and the localization of the placenta. Less obvious perhaps are the uses of this technique for studies of flow patterns in wind-tunnel experiments and in the direct visualization of microwave fields. The remainder of this section will be for many readers the most valuable part of the book. It is a comprehensive survey of electro-optic devices, their principles, construction and operating characteristics.

This volume is well illustrated with line drawings and black and white photographs. The omission of colour prints, presumably for reasons of economy, is unfortunate in view of the colour phenomena described. One could quibble about the written styles of the authors. In places the text shows the unmistakable evidence of having been written by someone to whom English is not the native tongue. Here and there a curious construction or an inappropriate preposition intrudes and words like 'chiralic' and 'etheric' appear. But in fairness it should be pointed out that this scarcely detracts from the value of the book. The only instance which could possibly lead to any confusion is the reference to a kaleidoscope (on page 109) but from the context it should be clear that allusion is to a type of pre-cinematograph moving-picture machine rather than the children's toy employing angled mirrors.

In the preface the authors of this book make the claim that it will appeal 'not only to physicists and chemists (especially spectroscopists) but equally to those in the manufacturing and processing industries (including electrical engineers)'. And they are right.

J. E. LYDON

*Astbury Department of Biophysics  
University of Leeds  
Leeds LS2 9JT  
England*