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 General Secretary of the International Union of Crystallography (D. W. Smits, Rekencentrum der Rijksuniversiteit, Grote Appelstraat 11, Groningen, The Netherlands). Publication of an item in a particular issue cannot be guaranteed unless the draft is received 8 weeks before the date of publication.

Colloque sur les Calculs Cristallographiques

Grenoble, 7–8 Octobre 1965

Les 7 et 8 Octobre 1965 s'est tenu au Centre d'Études Nucléaires de Grenoble, un colloque sur les Calculs Cristallographiques, sous les auspices de l'Association Française de Cristallographie.

Dans une première partie ont été présentés des exposés sur des méthodes éventuellement applicables aux machines à calculer électroniques, et susceptibles d'apporter une aide, tant au travail de corrections systématiques des mesures, qu'à la recherche des structures cristallines.

La seconde partie a été consacrée à une discussion générale, sous forme de 'table ronde', organisée afin de tenter de normaliser les publications des programmes et algorithmes en France, et, d'autre part, d'harmoniser les relations entre les chercheurs désireux de faire exécuter des calculs cristallographiques classiques et les centres de calculs non spécialisés.

Les voeux émis à la suite des discussions, et les textes des exposés ont été réunis dans un ouvrage maintenant disponible. Pour l'obtenir, il suffit d'écrire au secrétaire du Colloque: Mr. G. Bassi, Centre d'Études Nucléaires de Grenoble, Laboratoire de Diffraction Neutronique, B.P. 269, 38 Grenoble, France.

Book Reviews

Works intended for notice in this column should be sent direct to the Editor (A. J. C. Wilson, Department of Physics, The University, Birmingham 15, England). As far as practicable books will be reviewed in a country different from that of publication.

Optical transforms, their preparation and application to X-ray diffraction problems. By C. A. Taylor and H. Lipson. Pp. x + 182. London: G. Bell and Sons, 1964. 45*s*.

The utilization of Fourier synthesis in building up the electron density from diffraction data began a dozen years after the discovery of X-ray diffraction. Its routine use in crystal-structure analysis was initiated by Zachariasen, who used it in determining the structure of potassium chlorate in 1929. The trend in applying Fourier synthesis in crystal-structure analysis was reinforced by the discovery of the Patterson function in 1934 and the discovery of its Harker sections in 1936, both expressed in the form of Fourier syntheses. The trend was implemented by the invention of the Beevers–Lipson method of Fourier summation in 1934, and the Patterson–Tunell method in 1942.

Fourier synthesis was in the air in the late 1930's. While it had been appreciated by physicists that the production of a diffraction image at the back focal plane of a lens was a physical analog of Fourier synthesis, it appears that the first suggestion for using this method for producing a picture of the electron density by diffraction of visible light with a grating having the geometrical features of the reciprocal lattice of a crystal was made by H. Boersch in October, 1938. His inspiration came from observing the lattice-like diffraction patterns which were produced in the back focal plane of a microscope when its objective was focused on various regular patterns of holes in opaque sheets. Boersch was keenly aware of the requirement that to build up an electron-density map by such a method the phases must be controlled.

The April 22, 1939 issue of *Nature* contained the basic note by W. L. Bragg upon which subsequent technical developments were based. Bragg used as a diffraction grating a brass plate in which were drilled holes at points of a zero level of the reciprocal lattice of diopside, $CaMg(SiO_3)_2$, the hole areas being proportional to the $F(h0l)$'s of the reciprocal-lattice points. In this projection of this crystal structure, the superposed Ca and Mg atoms at the origin dominated the scattering, so that the phases of all $F(h0l)$'s were zero; consequently the phases required no special control. When the diffraction from this grating was focused by a lens at its back focal plane, a crude representation of a few cells of the electron-density projection $\varrho(xz)$ of diopside appeared. The tricky requirements for controlling phase had not been solved, so that the method unfortunately could not be extended to other structures.

This reviewer was entranced by Bragg's 'X-ray microscope', as it was called, and immediately (July, 1939) pointed out that (*a*) there were several ways of controlling phases (one of which later became the basis of the method used by the authors of this book), (*b*) that Patterson and some Harker syntheses could be performed without phase control, and (*c*) that by utilizing positive prints made by the Dawton process from de Jong–Bouman photographs, from which the Lorentz and polarization factors had been removed by an appropriate shutter, this print suspended in oil between plane-parallel glass flats could be substituted for a grating, and that this procedure was especially direct for Patterson projections. Equipment for doing all this in a well-engineered way was designed, built and operated before the war intervened. After the war the new developments in interpretation of Patterson functions at M.I.T. required numerical values of the function, so that photographic analog synthesis gradually fell into disuse.

Although the inverse Fourier synthesis (that is, the computation of the characteristics of the X-ray diffraction by the structure) was simulated during and just succeeding the war by a grating used with visible light in connection with an apparatus called the 'fly's eye', there were no further European developments of the 'Bragg X-ray microscope' until about 1951, when Lipson and his co-workers began extensive use of the tool. From their laboratory flowed dozens of papers, dealing mainly with the use of optically synthesized molecular transforms and how they could be used in deriving the structures of organic crystals. The book, *Optical Transforms* by Taylor and Lipson is written by the chief protagonists of this method, and represents an effective integration of all their earlier contributions.

This book, dedicated to Sir Lawrence Bragg, is divided into ten chapters and two appendices, as follows: 1. *Historical survey*, 2. *Basic postulates*, 3. *Optical apparatus*, 4. *Preparation of masks*, 5. *Optical Transforms*, 6. *Symmetry and related topics*, 7. *Practical procedures in structure determination*, 8. *Direct interpretation of weighted reciprocal lattices*, 9. *Image reconstruction*, 10. *Miscellaneous applications*, Appendix I: *Auxiliary instruments*, and Appendix II: *Auxiliary techniques*.

The first thing to strike the reader as he picks up this book is the set of 54 plates which are bound together in the center section. These are photographs of various optical transforms, mostly taken with the Manchester apparatus, which serve to illustrate the text. These plates have complete legends and provide an interesting study in themselves.

The subject matter of the book centers in the Manchester application of optical Fourier transforms. This consists chiefly of a description of their apparatus, how they use it, and how they apply it to studying organic crystals by the means of Fourier transforms as produced by the optical method. Although optical Fourier syntheses have been used in Chile, Germany, India, Japan, Russia, Spain and the United States, the book generally omits or deprecates non-Manchester developments. One might properly expect to find in a book entitled *Optical Transforms* a good treatment of holography and holograms, which were introduced by D. Gabor even before the first Manchester publication appeared. These subjects, however, do not appear in the index, and Gabor's name does not appear in the bibliography. Were holography included, this book could well merit a wide sale, since this subject is receiving increasing attention from physicists at the present time. Without it, the book treats a technique chiefly of historical interest, since its use has declined in those countries having adequate high-speed computing facilities.

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Physics of high pressures and the condensed phase. Edited by A. van Itterbeek. Pp. xv + 598. Amsterdam: North-Holland Publishing Company, 1965. Price $ 20.00.

This book consists of fourteen chapters on various aspects of high-pressure research. Most of these emphasize research at cryogenic temperatures, *i.e.* at liquid-nitrogen temperature or below. It would perhaps have been desirable to have indicated this emphasis in the title.

The first two chapters concern techniques and mechanical properties of metals for high-pressure construction. The emphasis is on the ten-kilobar region and below. The references here are useful, but there is not a great deal of information not reviewed elsewhere.

There are eight chapters which concern themselves with gases and liquids including equations of state, optical properties, transport phenomena and related topics. Of these, a chapter on the theory of the liquid state and one on liquid helium under pressure offer material of interest and not covered thoroughly in other books. The discussion of optical properties of gases under pressure is extensive and well done.

There are four chapters on properties of solids at high pressure which would be of most interest to readers of *Acta Crystallographica*. These include a discussion of solidified rare gases, a section on solid helium, a discussion of pressure effects on superconductors and a chapter on electrical properties of metals and semiconductors.

The chapter on solid helium under pressure is particularly well done. The discussion of superconductivity is specially welcome, as pressure effects in superconductivity have not been frequently reviewed in the past. The final chapter on electrical properties gives a very nice review of a very extensive field, and provides a good starting point for anyone interested in an introduction to a number of active problems. In a book with heavy cryogenic emphasis it is surprising that there is not more extensive discussion of Swenson's experiments on alkali metals as well as condensed rare gases.

It is perhaps desirable to compare this book with other recent high-pressure reviews. *High Pressure Physics and Chemistry*, edited by R. S. Bradley, is a somewhat more extensive discussion of the field. *Solids under Pressure*, edited by Paul and Warschauer, has considerably more emphasis on solid-state properties. The present book should certainly be consulted if one is considering research at high pressure and cryogenic temperatures. Most technical libraries will want to purchase it. In view of the relatively high price ($20) and the relatively small emphasis on solids, it is doubtful if many people doing solid-state work at high pressure will want to invest in a personal copy.

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Growth of crystals. Vol 3. Herausgegeben von A. V. Schubnikov und N. N. Scheftal. Referate der zweiten Tagung über Kristall wachstum in Moskau vom 23.3.–1.4. 1959. Autorisierte Übersetzung aus dem Russischen ins Englische: New York: Consultants Bureau, 1962, Preis $25. Russischer Originaltext: Moskau, Verlag der Akademie der Wissenschaften der USSR, 1961.

Das Werk umfasst 77 Beiträge von Autoren aus der USSR und einigen weiteren Ostblockländern. Es ist wie folgt aufgeteilt: I. Allgemeine Probleme; theoretische und experimentelle Untersuchungen über Keimbildung und Wachstum. II. Züchtungen von Einkristallen und damit verbundene Studien.