Crystallographers

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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, 5 Abbey Square, Chester CH1 2HU, England).

Ivar Waller 1898–1991

Professor Ivar Waller, Uppsala, passed away on April 12 1991 almost 93 years old. In his autobiography in the Swedish equivalent of Who's Who, Waller laconically states that he has published articles concerning problems within theoretical physics. This is a characteristically modest understatement by a scientist who was active all his long life as a devoted researcher and a pioneer in many areas of modern physics.

Among crystallographers, Waller is primarily remembered for work presented in his doctoral thesis in 1925 concerning what has become known as the Debye–Waller factor. The thesis treated the scattering of X-rays by the lattice vibrations in a crystal. The basic theory of lattice vibrations had recently been developed by Born and von Karman and the influence of thermal vibrations had been discussed by Debye. Waller gave a complete treatment of the problem, which even today stands out as the definitive work in the area. Max Born stated this in the following way: 'Waller's paper contains the complete formulae for the most general types of lattices; nothing essential has been added to these formulae by later theoretical research apart from improvements in the presentation and practical application'.

S. LUNDQVIST
A. MAGNÉLI

Professor **J. Wyart**, Laboratoire de Minéralogie et Cristallographie, Université Pierre et Marie Curie, Paris, a former President of the International Union of Crystallography, died recently. A full obituary will be published in *Acta Crystallographica* Section A.

Professor **A. Howie**, Professor of physics and Head of the Cavendish Laboratory at Cambridge University, England, has been awarded the Guthrie Medal and Prize of the Institute of Physics for his contributions to the development of electron microscopy and its application to a wide range of problems in physical science.

Book Reviews

Works intended for notice in this column should be sent direct to the Book-Review Editor (R. F. Bryan, Department of Chemistry, University of Virginia, McCormick Road, Charlottesville, VA 22901, USA). As far as practicable books will be reviewed in a country different from that of publication.

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High-resolution transmission electron microscopy. Edited by *Peter Buseck, John Cowley and Leroy Eyring.* Pp. xxii+645. Oxford and New York: Oxford University Press, 1988. Price £50.00. ISBN 0-19-504275-1.

This book results from a joint effort of several electron microscopists, mainly from Arizona State University. It has been published as an outgrowth of the ASU Centennial Celebration. This University houses one of the most important centres for electron microscopy in the world. Most of the ideas that form the basis of the interpretation of high-resolution transmission electron microscopy (HRTEM) originate from the centre and this book, edited by its foremost researchers, is most welcome.

The book is a comprehensive review of both the theoretical aspects and the practical applications of HRTEM and associated techniques. In addition, it has several other features which render it valuable to a large audience. Its general chapters make it accessible to the non-specialist, while it has more detailed parts, including some previously unpublished work, for the specialist.

In the first chapters, elastic and inelastic scattering of electrons are considered in detail. In particular, both the Bloch-wave formulation and the multislice approach are clearly presented. Imaging theory at high resolution is then examined and a formulation implementable on a computer is demonstrated. The effect of inelastically scattered electrons on HRTEM is examined in a special chapter which is an up-to-date clarification of a complicated subject.

An attractive chapter on high-resolution-related techniques describes a variety of ways of obtaining spatially resolved chemical information from inelastic and/or eleastic scattering. There is an increasing tendency for modern instruments to make several techniques available and the potential user should be aware of these. This chapter demonstrates the power of electrons in exploring the structure and composition of matter at high resolution.

A noteworthy chapter deals with the calculation of the diffraction pattern and images: it is a good introduction to the practice of multislice programs which originated from the ASU group and are now widely distributed around the world. The specialist will find interesting contributions on the limitations of the envelope function.

The second half of the book is devoted to the applications of HRTEM in different fields. For such a widely used technique, a review of different applications must be somewhat out of date by the time it is published. During the last decade, the HRTEM technique has had a major impact on our knowledge of many materials, particularly in mineralogy and solid-state chemistry. This impact is thoroughly investigated and it provides the reader with a clear understanding of the results, particularly for such phenomena as intergrowth, reaction mechanisms or the role of defects. In contrast, the coverage of materials science is less comprehensive. The field is so vast and has been expanding so rapidly in the last three years that a good synthesis would have been difficult to prepare at the time of publication. This section should be improved in a second edition.

The impact of HRTEM on studies of surfaces and highly disordered materials is examined in further chapters. That on surfaces demonstrates the importance played by electron microscopy before the advent of tunnelling microscopy. Since the tunnelling microscope has attracted most of the attention in this field, it is worthwhile recognizing the potential of electron microscopy for *in situ* experiments, particularly at low energy. Up to now, the study of disordered materials has not given very significant results, but several ideas are proposed for feasible advances.

The practice of HRTEM is described with useful advice on how to avoid the usual pitfalls due to common artifacts. Nothing is said on electron optics *per se.* Although these are usually designed only by manufacturers and there is little academic research related to instrumentation itself, this omission could be unfortunate for those who want to extract the most from their instruments. Beginners should read other publications on the subject.

Finally, there is a strong recommendation to use crystallographic conventions. This is to be applauded, as it would help to unify the set of sign conventions employed by electron microscopists and to clarify the confusion which exists in the literature.

The goal of this book, to provide a comprehensive review of HRTEM and related techniques, has largely been fulfilled. The book should become an