modern life of Whewell, "this Victorian giant," would be worth having.

As to the later years, primary attention goes, of course, to the impressive story of the Cavendish: of Rutherford, J. J. Thompson, Wilson, and their friends and collaborators. Egon Larson's splendid monograph of 1962 can supply further information. We are also informed about the astronomers and mathematicians in and around the Society, Milne, Forsythe, Hardy, Hobson, Baker. Stress is laid on the papers by these men that appeared in the late *Transactions* and the still very much alive *Proceedings* of the Society.

Personally I wish that the book had twice its size; it would have given the author more room for information on the many outstanding personalities who figured in the life of the Society and whose combined work encompasses a significant part of modern natural science itself. We would also have tasted, I am sure, more pretty anecdotes, such as that saying of Sydney Smith on Whewell, "science was his strength, omniscience his foible," or the reported story of J. B. S. Haldane demonstrating at a Society's dinner how to split walnuts by means of the table as anvil and his forehead as hammer.

Not the least of the book's merits are the many pictures of men who were members of the Society.

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Kinematic Diffraction

Theory of X-Ray and Thermal-Neutron Scattering by Real Crystals. MIKHAIL A. KRIVOGLAZ. Translated from the Russian edition (Moscow, 1967). Simon C. Moss, Transl. Ed. Plenum, New York, 1969. xx + 412 pp., illus. $25.

The words "thermal neutron" in the title of this book kindle the hope that we have here a definitive text updating Bacon's 15-year-old classic primer on neutron diffraction. A glance through the book itself dashes this hope.

Are we left then with just another book on x-ray diffraction devoted to recapitulating the fundamentals of this half-century-old field and offering a few interesting chapters on the author's own specialties within it that might best have been included in a review paper? The answer is a most emphatic no. The book is a thoroughly original and current treatment of kinematic diffraction in imperfect crystals as well as an introduction to fluctuation theory and critical phenomena. Krivoglaz has unified in one volume his prolific research efforts over the last 13 years. What is remarkable to me is the rapidity with which this translation from the original 1967 Russian text has been published.

The first three chapters (about one-third of the main text) barely mention scattering. This portion stands by itself as a good introduction to macro- and microscopic fluctuation theory as applied to periodic structures. Fluctuation theory is developed on a very broad base with Fourier representation (Bloch waves in essence) used to describe the microscopic (atomistic) nature of one or more specific effects that cause a crystal to depart from a perfect three-dimensional arrangement. These effects include compositional ordering (long- and short-range atomic ordering), concentration fluctuations (such as precipitation, or spinodal decomposition), static distortions (from random point strains or atomic size variations), and in general all the usual cooperative phenomena associated with magnetism and ferroelectrics. The macroscopic treatment relates the fluctuation waves to thermodynamic quantities and discusses this in the vicinity of the critical point of second-order phase transformations. The study of cooperative phenomena near these critical points is a highly active field. Krivoglaz's exposition, although it discusses experimental and theoretical work up to 1968, of necessity does not include the recent important advances in this area. Nevertheless, we have a fundamental treatment, establishing a basis for the diffraction theory comprising the last two-thirds of the book.

The treatment of standard kinematic diffraction, a highly individual one, is set up in a mathematical framework similar to that used in the treatment of fluctuation theory. I found it a very interesting and refreshing approach. The bulk of the diffraction theory is concerned with the diffuse scattering arising from structural defects. The approach, which is original with the author, is to associate the diffuse scattering not with single scattering centers but with the static displacements resulting from fluctuations (considered as waves) of concentration and other internal parameters. In this way one can relate the diffuse scattering directly to thermodynamic parameters of the crystal structure. As an example, the short-range order diffuse scattering as a function of position in reciprocal space is expressed directly in terms of the ordering energy for the successive coordination shells.

Elastic neutron diffraction is summarily disposed of by neglecting those properties of neutron scattering (polarization and magnetic scattering) which are different from x-ray interactions and merely advising the reader to replace all x-ray atomic scattering factors by neutron scattering lengths. A brief chapter is devoted to inelastic phonon scattering with neutrons. It is followed by a chapter on anharmonic effects on phonon lifetimes and the energy widths of single phonon neutron widths.

This important book is not written for the beginner in diffraction. It is directed to theorists and experimentalists actively engaged in kinematic diffraction studies of imperfect crystals. The focal point is the theoretical description of the diffuse scattering resulting from the simultaneous appearance of different structural defects. The fallout from the theory should keep experimentalists busy for a number of years.

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Gene Regulation

Nuclear Physiology and Differentiation. Proceedings of a symposium, Belo Horizonte, Brazil, Dec. 1968. ROBERT P. WAGNER and ESTHER A. EAKIN, Eds. Genetics Society of America, Austin, Texas, 1969. xvi + 472 pp., illus. Paper, $5. Supplement to *Genetics*, Vol. 61, No. 1.

This compilation of papers was given at one of a series of symposia in basic biology cosponsored and organized by Latin American biologists and the Oak Ridge National Laboratory. The volume is dedicated affectionately to Alexander Hollaender, who has contributed so much to biology at Oak Ridge and throughout Latin America. Hollaender should be especially proud of this symposium, in which many of his colleagues figure prominently and have contributed some of the most interesting papers.

The articles deal with the complexities of the genome in higher organisms. Problems of DNA redundancy, polyploidy, polyteny, heterochromatin, and amplification within the genome are discussed, and some attempts are made to relate them. These ideas are coming to the fore as additional variables to be considered in our understanding of

gene regulation in higher organisms. The papers are refreshing for their lack of emphasis on the role of circulating regulators and histones in this regulation. Although there are momentary lapses into studies on protokaryotes, the strength in this volume is unqualifiedly with the eukaryotes. This should give pleasure to all frustrated biologists who have attended symposia and bought volumes with titles involving the words "nuclei" and "differentiation" only to discover that they dealt primarily with phage and bacteria.

The book is divided into seven sections, within which papers have more or less cohesion. This book is not a comprehensive account of nuclear "physiology and differentiation" suitable for biology students but rather a group of generally provocative research accounts with a few brief reviews. It will be most useful for researchers intimately concerned with more recent advances in this area of cell biology.

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Summary of Immunology

Antibodies and Immunity. G. J. V. NOSSAL. Basic Books, New York, 1969. x + 238 pp., illus. $5.95.

Antibodies and Immunity is a discussion of the history and particularly the current state of the field of immunology, written by an immunologist for the lay audience. Nossal has succeeded in his task admirably well, presenting his case clearly and fluidly and rendering a view of the field that is comprehensive and exciting. The book is timely, for academic interest in the biology of the immune response is finally appearing outside of the medical school, and because of the impact of organ transplantation there has been much popular discussion of the subject.

Nossal is comprehensive in his coverage. The emphasis is on the cell and organ systems involved in the immune response. The book necessarily contains a great deal of descriptive material, but Nossal holds the reader's attention and interest by combining an account of the historical development of a concept with the modern experimental analysis of it. The book should give a reader with little or no background in the subject a basic knowledge of the structure of antigens and antibodies, and of the concepts of antigenicity and immunogenicity. The cellular systems involved in the initiation and progression of the immune response and immune memory are discussed in detail. The introduction to immune tolerance and the discussion of its implications for development and for tissue transplantation are lucid. The reader is introduced to "cellular" immunity and is brought into the controversy regarding theories of antibody formation. Finally, with this background, he is led in the last chapters into allergy and hypersensitivity, organ transplantation, and cancer and irradiation research. Clinical implications of the subject, however, are discussed throughout. The book will thus serve two audiences well: the person interested primarily in clinical developments, as well as the beginning science student interested from a more academic point of view.

To say that the book is clear is not to say that it will be easy going for the lay reader. Nossal does not choose to simplify by presenting only the well-understood or simple aspects of the field. For example, at one point he introduces the concept of "allogeneic inhibition," and later he uses it in a discussion of tumor progression. These are meaty ideas even for the immunologist to grasp, let alone the layman.

Especially for the more serious student it is unfortunate that more attention is not paid to the molecular biology of immunity. Immunogenetics is not mentioned, and the entire discussion of the impact of immunoglobulin sequence studies, which for the last decade has amounted to what can only be considered a revolution in the field, takes up less than two pages. Nossal argues that all of this is too much in a state of flux to permit the expression of meaningful views (a consideration which does not inhibit him in other areas), and elsewhere that the "vast bulk of observable events . . . are as yet too multifactoral to yield to a precise chemical approach" (p. 231). This defense must be considered weak, for it is equally valid for the biochemist to argue that, although the system he is studying is indeed complex, his questions are directed at an aspect of it which can yield precise information and which may or may not as yet be relevant to what goes on at another level. Nossal's views can only serve to maintain or increase the gap existing between investigators studying at different levels of biological organization.

The book does have an extensive index, but would be much improved for the student if it were referenced, or at least included a list of suggested readings. This is particularly true because of the general ignorance of the field which still prevails in most life science departments in our colleges and universities.

A final important aspect of the book is that Nossal is not reluctant to express views on other than the scientific aspects of the study of immunity. This is to be praised, for, though Nossal argues that scientists have the ear of the public and of those in political power, opportunities to discuss the broader implications of research are all too infrequent and are all too often not realized.

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Vectors and Diseases

The Biology of Mosquito-Borne Disease. P. F. MATTINGLY. Allen and Unwin, London, and Elsevier, New York, 1969. 184 pp. + plates. $6.50. Science of Biology Series, No. 1.

This book was written by a man whose interests have expanded from those of a museum taxonomist to conditions in the field. The author has traveled to many parts of the world and has based this book on activities he has seen. The subject matter is largely the ecology of vertebrate pathogens that cycle through mosquitoes, mostly in tropical situations. The book is divided into 13 chapters on subjects ranging from diseases as ecological systems, to bionomics of human pathogens and associated mosquitoes, to complications in populations of mosquitoes. It consists of thumbnail sketches of chosen examples, and because of its brevity leaves much to be desired for persons away from large libraries. The author skips about through the parasitic relations in a manner that is informative but not burdensome to the casual observer in biology, and because it consists of bits and pieces interestingly presented the book has a useful place in making biology more understandable to the lay public.

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