statement of the process by which the conclusion was reached.

Not the least contribution of these books is stimulating discussion in a field too often neglected by scholars in this country. That much more research needs to be done on many levels is evident; this is indicated, for example, by the surprisingly few points of contact in these two presentations or, for that matter, between either of them and D. Westermann's *Geschichte Afrikas.*

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Principles of Optics. Electromagnetic theory of propagation, interference and diffraction of light. Max Born, Emil Wolf *et al.* Pergamon Press, New York, 1959. xxvi + 803 pp. Illus. $17.50.

It is gratifying to have Max Born's *Optik* now translated and revised. *Optik* and its successor, by Born and Wolf differ enough, with some topics enlarged and others restricted or omitted, that the authors can claim they have written "a substantially new book." It is not my intention to repeat the table of contents here, but to give some reasons why I think the new book will become a great book. In addition to Born and Wolf, A. B. Bhatia, P. C. Clemmow, D. Gabor (holograms), A. R. Stokes, A. M. Taylor, P. A. Wayman, and W. L. Wilcock contributed to the volume. Their contributions may be identified by reading the preface.

The sections on dispersion, the geometrical theory of image formation and aberrations, the physical theory of diffraction and aberrations, and the treatments of interference and diffraction with monochromatic and partially coherent light are all excellent.

The treatment of periodic film structures (to which F. Abeles and B. H. Billings contributed) will be helpful to the inventors who have yet to create the new applications of stratified media that the future holds (such as reflection filters for use in the far infrared).

The coverage of topics of current interest, such as diffraction and partially coherent light, will please the reader interested in theory; the chapters on image-forming instruments and on interference and interferometers will be approved by those who apply optics.

And yet there are, inevitably, some disappointments, such as the inadequate treatment of Savart's plate and the absence of a discussion of apodizing. I missed items such as the Lyot polarization filter. Topics in which the atomic and molecular nature of matter play a decisive role are treated in the "new book" in terms of Maxwell's phenomenological theory. Thus, much of the original text, especially spectroscopy, is omitted in this volume. Planck's celebrated formula appears only as $K(\nu,T)$.

The writing, generally good, is sometimes incomplete—on page 24 the authors do not explicitly define the problem they solve so beautifully. The book has a good balance between examples and word pictures, on the one hand, and esoteric analysis, on the other. It is embellished by two dozen handsome halftones and an abundance of conventional line drawings. In the areas covered, the book treats the right subjects at the right level (for reference use).

Finally, the authors have retained the flavor and inherent stimulation of the original sources in their treatment of many topics, and the citations to those sources will afford an excellent bibliography for the scholar who is expanding his knowledge.

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Nicholas Biddle. Nationalist and public banker, 1786–1844. Thomas Payne Govan. University of Chicago Press, Chicago, Ill., 1959. xii + 429 pp. $7.50.

As its author points out, this is not a full biography of Nicholas Biddle: "It is in biographical form, but it is not a full story of Biddle's life. I have written of him as nationalist and public banker, for it is here, in my opinion, that his significance lies. I could not write of him as son, husband, parent, private citizen, or even as a man without having these remarks appear as irrelevant intrusions into the already too complex narrative" (page ix). There are brief discussions of other aspects of Biddle's life: his boyhood; his brilliant record as a student at Princeton; his literary interests and activities, including his editing of the Lewis and Clark journals; his experience as secretary to the American ambassador to France and as a traveler in Europe and the Near East; his courtship and happy marriage; his brief career as a lawyer; and his term as a member of the Pennsylvania legislature. But the central interest of the book is in Biddle's role as head of the great Second Bank of the United States, the political controversies centering on the bank and its policies, and the dramatic conflict between Biddle and Andrew Jackson.

In preparing this volume, Govan has drawn not only on published materials but also on masses of official papers and Biddle's copious correspondence. The result is an interesting and important book which sheds much new light on Biddle, the Bank, and the controversies surrounding them. It now becomes even clearer than it was before that Biddle recognized fully the powers of the Bank and was highly sophisticated in his use of those powers. He was, of course, interested in the commercial activities of the Bank and in promoting its profitability. But his deeper interest was in the Bank as an instrument of national policy, and he deliberately used its central banking powers to promote the national interests as he, and many others, saw them. Some of the actions that he took deliberately to influence the state of the credit markets, the behavior of business activity, and the nation's balance of international payments evidenced both boldness and an understanding of central banking principles quite rare in his time.

This book is destined to be highly controversial, for its verdict is almost completely favorable to Biddle and wholly adverse to Jackson. Those who seek to reverse this verdict, and they will probably be numerous, will face formidable evidence.

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Soviet Research in Crystallography, 1956. English translation. Consultants Bureau, New York, 1959. 77 pp. Illus. $10.

This is the third volume in a series that was inaugurated two years ago [reviewed in *Science* **129**, 324 (1959)]. We are told in the preface that the volume contains English translations of papers selected from six Russian chemistry journals; evidently the contents of the previous volumes were also restricted to the same sources. These

journals, which have been completely translated into English, in a continuing project by Consultants Bureau, are the following: *Journal of General Chemistry of the U.S.S.R.*; *Journal of Applied Chemistry of the U.S.S.R.*; *Journal of Analytical Chemistry of the U.S.S.R.*; *Colloid Journal*; *Bulletin of the Academy of Sciences, U.S.S.R., Division of Chemical Science*; *Proceedings of the Academy of Sciences, U.S.S.R., Chemical Technology Section.*

The selections in this volume comprise 17 papers covering a wide variety of topics. Nevertheless, the range is more restricted than that of the first two volumes, and all of the papers incorporate some aspect of crystallographic or diffraction technique. The emphasis is still on inorganic chemistry, and there are no novel contributions to the field of crystallography itself. Nevertheless, within the restrictions set for this volume, the selection is fairly reasonable and fulfills the aim of providing a supplement to the main body of Soviet publications in crystallography, which is available in translation elsewhere.

The volume is printed in offset in the same form as the first two volumes, but the editing and composition have perhaps been somewhat improved.

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Progress in Industrial Microbiology. vol. 1. D. J. D. Hockenhull, Ed. Interscience, New York, 1959. 248 pp. Illus. + plates $8.

This is the first volume in yet another attempt to review, annually, the large amount of current and past literature on selected topics in industrial microbiology. The six subjects covered include several on antibiotics. Hockenhull briefly discusses penicillin formation by fermentation, including the role of corn steep liquor, salts of organic acids, lipids, and other nutrients. Most of the paper deals, however, with the biosynthesis of penicillin, and it is largely a speculative and interesting essay on the possible routes to penicillamine. The tetracyclines are discussed by DiMarco and Pennella under the misleading title "The fermentation of the tetracyclines," which implies decomposition rather than biosynthesis. Many of the details concerning the preparation of inoculum, the composition of fermentation media, and other cultural conditions could be obtained only from the patent literature which often lacks specificity and completeness. On the whole, however, the review contains much useful information on the historical background and current microbial methods of producing the various tetracyclines.

The microbiological assay of antibiotics, vitamins, and amino acids is reviewed by Sokolski and Carpenter. An introductory statement that "No form of life has completely unique metabolic or functional processes" is not entirely correct since chemoautotrophic bacteria are unique in their ability to utilize energy liberated from the oxidation of inorganic compounds. The microbial assays for vitamins and amino acids are covered in a superficial and incomplete manner. There is little or no discussion of specificity, free and bound forms of vitamins, methods for liberation of bound forms, and so forth. But antibiotic assays are dealt with in great detail, and there is an extensive treatment of the theory and statistical analysis of agar diffusion assays.

In a paper certain to be controversial because of the nature of the subject, Bisset presents his views on the taxonomy of the Actinomycetes, a group which includes the important producers of antibiotics, the *Streptomyces*. Bisset concludes that the classification of the Actinomycetes is still inadequate for purposes of recognition and identification, partly because potentially valuable morphological structures, such as the sporophores, have not been adequately studied.

Goodwin describes the various yeasts, molds, and bacteria which synthesize appreciable quantities of riboflavin and also the media and cultural conditions which affect riboflavin production. These aspects are followed by a good review of the present knowledge of the biosynthesis of riboflavin.

In the final paper of the series, Woodbine presents a very extensive review, somewhat overburdened by details, of fat production by microorganisms. The microorganisms involved, the effect of cultural conditions on fat yield, the chemical nature of the fats, biosynthetic pathways, and the possible use of microbial fat as food are discussed. Woodbine concludes that fat production by microorganisms is technologically feasible but that microbial fat cannot as yet compete economically with animal and vegetable fats.

The reviews should be of considerable value to microbiologists and to others working in related fields. It will be interesting to learn to what extent the present series will be complemented by a similar series *Advances in Applied Research*, published by Academic Press.

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New Books

Advances in Space Science. vol. 1. Frederick I. Ordway, III, Ed. Academic Press, New York, 1959. 424 pp. $12.

Mathematical Methods and Theory in Games, Programming, and Economics. vol. 1, *Matrix Games, Programming, and Mathematical Economics,* 443 pp.; vol. 2, *The Theory of Infinite Games,* 397 pp. Samuel Karlin. Addison-Wesley, Reading, Mass., 1959. $12.50 per volume.

Maya Hieroglyphic Writing. An introduction. J. Eric S. Thompson. Univ. of Oklahoma Press, Norman, 1960 (reproduced from ed. 1, Carnegie Institution of Washington, 1950). 370 pp. 64 plates. $10.

Paul Ehrenfest, Collected Scientific Papers. Martin J. Klein, Ed. North-Holland, Amsterdam; Interscience, New York, 1959. 169 pp. $13.75.

Physical Methods of Investigating Textiles. R. Meredity and J. W. S. Hearle. Textile Book Publishers (Interscience), New York, 1959. 420 pp. $13.

The Placenta and Fetal Membranes. Claude A. Villee, Ed. Williams and Wilkins, Baltimore, Md., 1960. 415 pp. $10.

Probability and Statistics. The Harald Cramer volume. Ulf Grenander, Ed. Almquist and Wiksell, Stockholm; Wiley, New York, 1959. 434 pp. $12.50.

Strahlenbiologie, Strahlentherapie, Nuklearmedizin, und Kresbforschung. 1952–1958. H. R. Schinz, H. Holthusen, H. Langendorff, B. Rajewsky, G. Schubert, Eds. Thieme, Stuttgart, Germany, 1959. 998 pp. $65.50.

Surveyor of the Sea. The life and voyages of Captain George Vancouver. Bern Anderson. Univ. of Washington Press, Seattle, 1960. 286 pp. $6.75.

The Survival Book. Paul H. Nesbitt, Alonzo W. Pond, William H. Allen. Van Nostrand, New York, 1959. 343 pp. $7.50.

Theory of Elasticity. L. D. Landau and E. M. Lifshitz. Translated from the Russian by J. B. Sykes and W. H. Reid. Pergamon, London; Addison-Wesley, Reading, Mass., 1959. 140 pp. $6.50.

The Theory of Optimum Noise Immunity. V. A. Kotel'nikov. Translated by R. A. Silverman. McGraw-Hill, New York, 1959. 140 pp. $7.50.