

ports of fundamental studies; while, in contrast, the pages of our proceedings are more heavily weighted with papers bordering on engineering. Except for Strong's *Concepts of Classical Optics*, recent textbooks treating fundamental optical problems largely have been prepared by European authors. Born and Wolf's *Principles of Optics* appears to be the text most highly considered in this area on both sides of the Atlantic.

This same situation prevails in the area of trade school or technical institute texts. On this side of the ocean we have a number of native texts; most of which, however, treat the whole range of optical applications or of optical instruments in a single book of two- or three-hundred pages. The European trend, in contrast, is to treat a single optical instrument in an extended text.

Françon's *Progress in Microscopy* is one of these special-field books. In nearly three-hundred pages the author discusses specialized techniques of microscopy developed during the past two decades and describes commercial apparatus which is available to implement these techniques. The only comparable texts prepared on this side of the Atlantic are those written for the training of technicians in several fields, of which electronics is typical. Françon's text, therefore, clearly demonstrates a fundamental difference between philosophies regarding the place of optics and the training of optical workers on the two sides of the Atlantic.

The first third of *Progress in Microscopy* contains a review of the limits set to image formation by the wave nature of light and of the principles of phase microscopy. The remainder of the text contains discussions of the several specialized applications of microscopy with descriptions of apparatus available for these applications.

The author's treatment is lucid and his topics well chosen. The one matter which disturbed this reviewer was an unfortunate tendency on the part of the author to mention investigator's names without including specific references to their publications. The text is concluded with a bibliography of 92 entries, but it is not keyed to the text and does not include all of the names to which reference is made.

Magnetohydrodynamics. Symp. Proc. (Evanston, Ill., Aug. 1961). Ali Bulent Cambel, Thomas P. Anderson, Milton M. Slawsky, eds. 393 pp. Northwestern Univ. Press, Evanston, Ill., 1962. \$15.00. *Reviewed by R. E. Street, University of Washington.*

INASMUCH as a collection of twenty-four papers given at the fourth biennial gas-dynamics symposium reflects the particular research interests of the authors, this volume will not give the reader an introduction to or a broad survey of the field. Most workers in the field of magnetohydrodynamics will probably find one or more of the papers of interest. The emphasis is primarily on problems of engineering interest rather than plasma physics, although the latter topic is embodied in some of the contributions.

Almost half of the papers are concerned with theoretical solutions of the macroscopic equations. These present fluid-dynamic solutions for inviscid and viscous flows, particularly for certain aerodynamic configurations. One, for example, obtains a solution of the highly rarefied plasma flow about a thin airfoil, solving a fluid-dynamic equation derived from the Boltzmann equation. The macroscopic point of view predominates except for two papers. One of these is an excellent review of moment methods in transport theory, although entirely concerned with a neutral gas. The other considers the Lorentz gas as an application of a new approximation analysis for linear Boltzmann-type equations.

There are several papers on MHD power generation and ion propulsion, including a good review paper on this development. Two papers give new calculations of the transport properties of high-temperature air and carbon dioxide. Another is a critical discussion of the theory of high-temperature radiative properties of hydrogen with some new results. Four papers are experimental and give new measurements on a blunt-nosed body of stagnation-point heat transfer in argon up to Mach 14, wave velocities of Alfvén waves in a hydrogen plasma, of ion densities in seeded hydrogen and ethylene flames, and the energy transfer to a plasma accelerated by Lorentz forces. Another paper discusses the design of a plasma accelerator to make use of the Lorentz force, concentrating upon the loss mechanisms to be expected.

Most of the papers are clear, well written, and present sufficient detail so the reader can follow the argument without too much effort. This is especially true of the review articles.

Molecular Biophysics. By Richard B. Setlow and Ernest C. Pollard. 545 pp. Addison-Wesley Publishing Co., Inc., Reading, Mass., 1962. \$11.75. *Reviewed by Joseph G. Hoffman, University of Buffalo.*

THE authors point out in the preface that this book is set at a level for seniors and first-year graduate students. The exposition is superb in that it describes the pertinent biological systems simply and clearly, and then gives the essential discussion in terms of basic physics and chemistry. The factual presentation is excellent. Even though it is a textbook, with problems assigned after each chapter except the first, it makes for easy and exciting reading. The language and approach to the topics are definitely those of the basic scientist in chemical physics. I am sure that most physicists advanced beyond the authors' specified level of the first-year graduate will be intrigued by the phenomena described and particularly the methods employed in the physical analysis.

The unusual nature of this textbook is shown, for example, in the discussion of the information content of a bacterial cell. The authors show how to calculate the physical entropy per cell for comparison with the information content. The principles are sound, but the figures used may be way off. The entropy content of a

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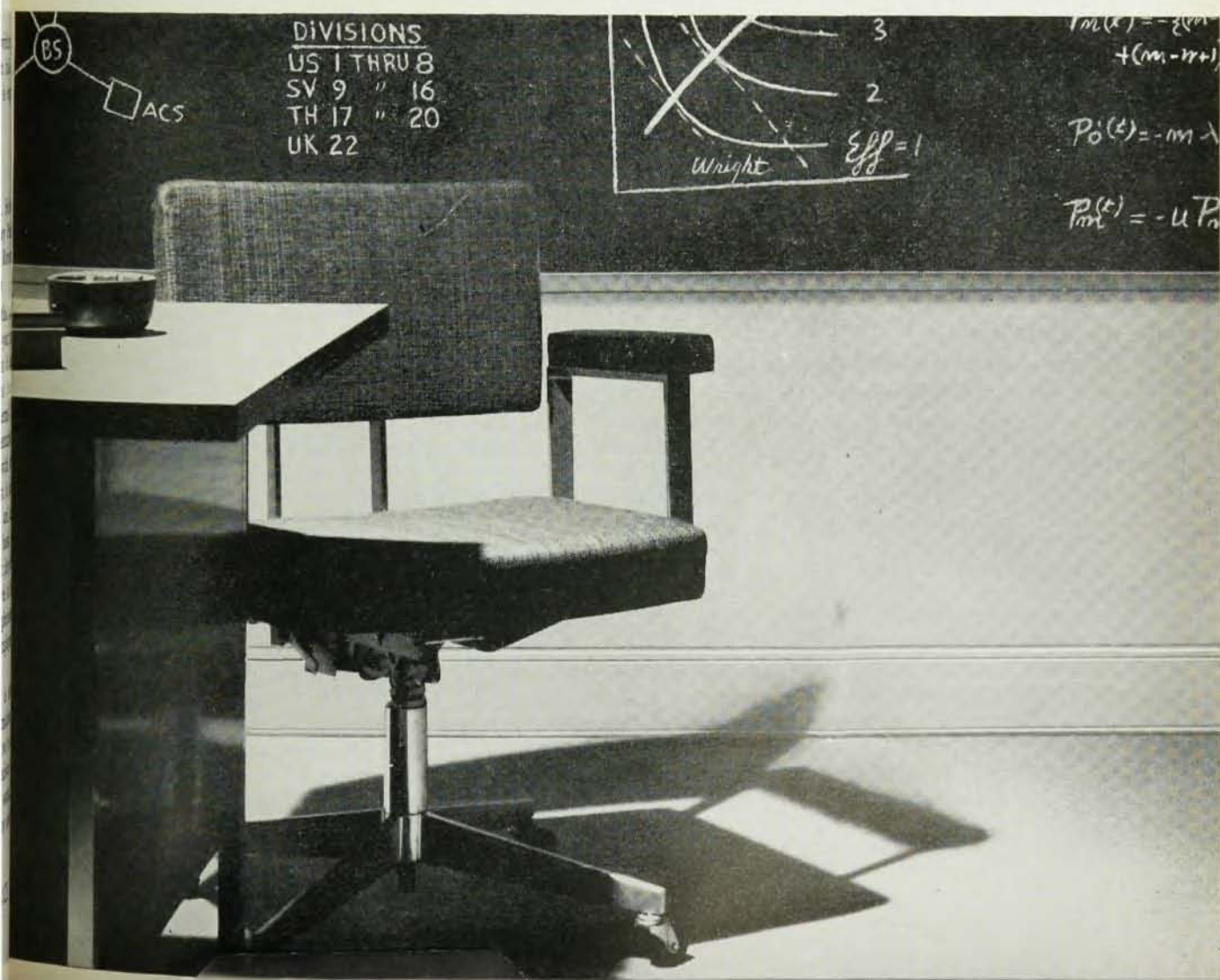
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cell has not been measured, and the figures quoted can only be considered as crude guesses not even correct as to order of magnitude. Another example in which research problems are discussed in the manner of textbook material is the description of fluctuations in a cell. Concentration fluctuations of ions, charges, and molecules are shown to cause large changes in other cell parameters. Discussions of this kind make for an unorthodox but nevertheless highly interesting textbook.

As the title indicates, and as the authors state carefully, the subject matter represents a selected area from the entire, large field of biophysics. It comprises a timely and also much needed survey of the molecular bases of biophysical processes. The fifteen chapters are generously illustrated and their materials made readily accessible by a table of contents, an author index, and a subject index. The book is not only highly commendable to students in the life sciences, it is required reading for biophysicists.

This Universe of Space. By Peter M. Millman. 117 pp. Schenkman Publishing Co., Inc., Cambridge, Mass., 1962. Paperbound \$1.95. *Reviewed by Alan G. Henney, Naval Ordnance Laboratory.*

A BRIEF account of what astronomers have learned about the universe is given by Dr. Millman, who takes the reader on a tour of outer space that ranges from the small bodies in the immediate neighborhood of the earth to the immense galaxies at the outermost limits of the universe. A number of concepts and theories, such as the oscillating- and steady-state universe, are briefly described. The style of writing is interesting and clear. The author has succeeded in presenting an account of modern astronomy that should be understandable to the person with limited scientific training.

Advances in Catalysis and Related Subjects, Volume 13. D. C. Eley, P. W. Selwood, Paul B. Weisz, eds. 458 pp. Academic Press Inc., New York, 1962. \$15.00. *Reviewed by H. Wise, Stanford Research Institute.*

TO measure scientific progress in terms of calendar units must impose a responsibility upon the editors of *Advances in Catalysis* matched only by the predicament faced by many scientists when preparing the infamous quarterly progress report. However, a quick glance at the contents of the volume makes it apparent that, similar to a progress report, the contributions describe the current state of the art of catalysis. Whether they represent scientific advances is a question left for the reader to decide.

Our knowledge (or lack thereof) of the mechanism of interaction of simple gases (CO , O_2 , H_2) with the surfaces of metallic oxides is summarized in the first article, "Chemisorption and Catalysis on Metallic Oxides" (Stone). The story goes back some forty years when the Bristol school began to investigate some of the fundamental properties of metallic oxides in terms of the kinetics of chemisorption and catalytic reaction.

Geometric considerations as well as electronic properties of the solid are discussed in an attempt to explain the complex and sometimes diverging experimental observations of the "simple" reactions studied. Although this article produces more questions than answers, it offers a stimulating review of the "versatile role of individual gases . . . in the chemisorbed state".

Two additional review papers deal with radiation catalysis (Coekelberg, Crucq, and Frennet) and catalytic effects in isocyanate reactions (Farkas and Mills). Both areas of scientific research are of fairly recent origin. The radiation effects are examined primarily on solids such as alumina, silica, and activated charcoal, in contact with gaseous reactants such as N_2O , C_2H_4 , and $\text{N}_2 + \text{O}_2$. Under such conditions, the solid is interpreted to be an energy-transfer agent for the reactants, in contrast to modification of catalytic activity by irradiation preceding the heterogeneous reaction. Because of its technical importance, the chemistry of organic isocyanates has been given considerable attention from both theoretical and experimental viewpoints. Specifically, the steric effect associated with such catalysts as tertiary amines is invaluable in interpreting reaction mechanisms in the liquid phase.

One of the major problems in the study of solid surfaces is the lack of experimental tools for their detailed examination. Germer, in his brief and concise description of the low-energy electron-diffraction technique applied to crystal surfaces, offers a new approach to an old problem, i.e., the visualization of a surface during the initial stages of gas adsorption. The author of this article considers the techniques "potentially applicable to research in catalysis". There is little doubt that the experimental procedure described has initiated an entirely new era of study of solid surfaces.

A chapter by Weisz on polyfunctional heterogeneous catalysis examines a process of considerable importance to catalyst technology. The quantity of "tailor-made" chemical products that has been achieved by empirical choice of catalysts in admixture is truly remarkable. The author elucidates the mechanism of poly-step catalytic reactions in terms of mass transport and chemical reactivity. Although the identity of the intermediates leading from reactant to product is missing, the analysis shows some of the physical requirements and general characteristics of these catalytic reactions.

The final contribution by Wei and Prater deals with the structure and analysis of complex reaction systems. It is a most formidable undertaking and is bound to include certain assumptions such as monomolecular, i.e., linear systems. Yet it offers a mathematical approach to the interpretation of experimental reaction kinetics in a system of coupled reactions. In their attempt towards generalization, the authors have introduced a considerable degree of mathematical formulation.

In conclusion, the thirteenth volume carries on the tradition of its predecessors and provides for the specialist a stimulating review of a complex and fascinating field of scientific endeavor.