

wherever it is necessary to integrate the effects of radiation over a period or to produce a permanent record, the photographic emulsion has remained supreme. Since 1945 there has been a spectacular rise in the available range of ionizing radiations and particles and in their applications in science and technology. This has called for new and more sophisticated measurement techniques and, alongside the developments of electronic and solid state methods, the photographic emulsion has surprisingly kept pace with the demands.

With most, if not all, of the post-war advances in the production of new photographic materials and their use with ionizing radiations, the name of Herz of Kodak has been associated. Now, in his "retirement", Dr Herz has brought together in this volume a remarkable résumé of a lifetime's activity in this field. This is not a single textbook but effectively several textbooks in one. The first five chapters give an elementary outline of radiation physics, photography and the photographic effects of ionizing radiations. They could well serve as an introductory text for any radiologist, radiographer or physicist entering the field. Chapter six, on photographic dosimetry, could be a valuable handbook for workers in radiation monitoring and so-called health physics. Chapters seven to ten represent a 220 page textbook of radiographic technique which many examination candidates would find useful. The final chapters on neutron radiography, autoradiography and microradiography summarize most impressively the more advanced fields in which the back-room work of Herz has been most effective. Throughout the book, although phenomena are well described and theories discussed, the emphasis is on the practicalities of techniques and operations. As might be expected from such a source, the diagrams and plates are excellent and, in particular, the microradiographs and autoradiographs would bring joy to photographer, scientist or artist.

In some ways it is a pity that this one volume covers so much ground, in that no single user could possibly become involved in all the sections. Nevertheless, it is a substantial monument to the work of a great pioneer in the field.

J. E. ROBERTS

PHYSICAL BIOCHEMISTRY

Theoretical Biochemistry

Physico-chemical Principles of Vital Processes. By Hans Netter. Translated and edited by J. H. Ottaway and F. M. Irvine. Pp. xx+928. (Oliver and Boyd: Edinburgh, 1969.) 300s.

THE design of courses on physico-chemical topics for biochemists presents many problems. The basic material with its formalisms can only be presented as physical chemistry. At that stage too many asides on biochemical applications, which are usually rather more complicated, only confuse the students. For a course of physical chemistry applied to biochemical systems one should accept as read a good first course in physical chemistry. Unfortunately this idealized situation, which would permit the presentation of sophisticated treatments of the analysis of biochemical systems, is not usually possible. Many students of biochemistry have a totally inadequate mathematical and physical background and are unable to cope with the complexities of the physical chemistry of biological problems. As a result most courses, including my own, have to revise basic physical chemistry and fit in applications where they can. The textbooks follow suit.

The text under review covers an enormous range of topics from atomic and molecular structure to biological organization by way of static and dynamic equilibria and kinetic control. Every chapter is interspersed with a certain amount of information about biological systems. One might expect the subject matter to be dealt with in some depth in 900 pages. Alas, this hope is frustrated by

heavy dilution with irrelevant historical material and a rather confused presentation of the results of out of date experiments. My overall impression was that, though the book is out of date, the problems it poses are still with us. It so happens that an old copy of Sir William Bayliss's *Principles of General Physiology* in the Kendal public library inspired me 30 years ago with an interest in the application of physical methods to the study of biological systems. The book under review has the same philosophy behind it. It is somewhat more molecular in its approach, but the molecules are still very rigid.

Major deficiencies of the translation are, first, out of date and inaccurate data and references and, second, the often quite painful English.

In spite of my many criticisms I find it very valuable to have this detailed account of Professor Netter's presentation of "Theoretical Biochemistry". It will certainly help me in the preparation of some lectures and it should be useful for advanced students. The book is, however, not a substitute for some of the texts on special topics in physical biochemistry. Several of these could be bought for the price of the text under review.

H. GUTFREUND

PROPERTIES OF MATTER

The Mechanical Properties of Matter

By M. T. Sprackling. (The Bridge Series.) Pp. xii+144. (English Universities Press: London, February 1970.) 26s.

THIS is a very nicely written and clearly illustrated book covering a selected set of properties of matter at a level suitable for sixth forms in schools and first year undergraduates in some universities. The topics covered in seven chapters are: elastic properties of matter, plastic deformation of solids (crystals), fracture (of crystals), liquid viscosity, viscosity of gases and surface effects. The whole contains a very clear exposition with apposite choice of experimental data to illustrate the theory, and with a carefully selected set of examples at the ends of the chapters.

In a book of this size it is difficult to include everything necessary for the student, so that some sections will remain obscure to the tyro: for example, the difference between total and free energy of a surface. As I read the book I felt myself continually urging the author to go further, with the same clear exposition. This is a measure of its quality: I am sure that the student will be inspired to do so himself.

A. KELLY

HIGH LEVEL FLOW

Flow Through Porous Media

Edited by Roger J. M. De Wiest. Pp. xiii+530. (Academic Press: New York and London, October 1969.) 210s.

THIS book consists of a collection of state-of-the-art reviews on a variety of topics connected with fluid flow through the upper layers of the Earth's crust. Its contents are derived from lectures presented at an institute in hydrology for college teachers sponsored by the National Science Foundation, held at Princeton University in the summer of 1965. The original material for each of the eleven chapters has been revised and brought up to date for publication.

An essential ingredient of a multi-author volume of this type is a comprehensive opening chapter, which lays the foundations for the succeeding material. The editor's chapter one ("Fundamental Principles of Ground-Water Flow") is disappointing in this respect. Too many topics are covered too briefly, giving the book the appearance of a collection of essays rather than a coherent whole.

With the exception of chapter two by S. N. Davis ("Porosity and Permeability of Natural Materials"),