Books

Biophysics

Progress in Biophysics and Biophysical Chemistry, Volume I. Edited by J. J. Randall and J. A. V. Butler. 279 pp. Academic Press, Inc., New York, 1950. $6.80.

This book might perhaps be characterized as a group of unrelated review articles on certain selected subjects of current interest in biophysics and what the editors call biophysical chemistry. No attempt is made to give a comprehensive coverage of the whole field. Each author has written a critical review of his own field, and has freely presented his own points of view.

The first chapter deals with properties of solutions of large molecules. It considers the experimental methods for studying large molecules, and gives a critical and mathematical evaluation of them. There is also an extensive review of the known molecular constants of proteins.

The second chapter on Fundamental Structures in Biological Systems deals almost exclusively with the results of x-ray diffraction studies of proteins and polysaccharides. It is an excellent review of the work of Astbury and his group.

The section on the scattering of visible light and x-rays by solutions of proteins is short but complete. Scattering measurements have given a good deal of information about the size, shape and behavior of proteins in solution and this is a good account of the accomplishments and limitations of the method, with just enough of the theoretical background to give the necessary cohesion to the account.

The section on bioelectric potentials covers only that part of the subject dealing with steady potentials which have been observed in and around biological systems of various kinds. It is a long and not very critical review of a very controversial subject. However, the reviewer does attempt to give a review of the underlying mechanisms responsible for the production of these potentials.

The next section is a short account of the potentialities of phase-contrast microscopy. The section on local refractometry is a theoretical treatment of certain phases of microscopy, and is of use more to people interested in designing new microscopes than as a guide to the intelligent use of existing ones. There is an excellent chapter on the use of soft x-rays in an assay of biological material. This technique allows the quantitative analysis of very small volumes under special conditions. It is a very interesting application of x-ray absorption methods, but would seem to have a rather limited usefulness in biology.

There is an excellent chapter on the tolerance of man for radioactive isotopes. This is a subject which has been extensively treated in a number of places, but usually with the result that the reader is filled with fear at the thought of working with radioactive isotopes. This treatment gives a sound basis for the currently accepted tolerance values, and tends to dispell fear rather than create it.

The last chapter, on the mechanical properties of fibers and muscles, approaches the subject from a very fundamental point of view. A thorough thermodynamic treatment of elastic strains is followed by a discussion of power cycles and heat engines as applied to elastic bodies. These ideas are then applied to muscle, using such pertinent data as exist on the mechanical and thermal properties of muscle.

The book is written for scientists having a solid grounding in physics and mathematics, as well as an active interest in current biological problems. It is the first of a series in this field, and has set high standards for succeeding volumes.

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Counters

Counting Tubes, Theory and Application. By S. C. Curran and J. D. Craggs. 238 pp. Academic Press, Inc., New York, 1949. $5.50.

Ionization Chambers and Counters. By D. H. Wilkinson. 266 pp. Cambridge University Press, London, 1950. $4.50.

The available literature on the important subject of counters, hitherto quite scanty, has been extended significantly with the publication of these books. Both of English origin, they supplement the previous works of Korff and of Rossi and Staub in this country and provide a fresh perspective with which to view the material.

The approach of the present authors is different in each case, with Wilkinson concentrating exclusively on the theory of the operation of ionization chambers and proportional and Geiger counters while Curran and Craggs give this aspect a more cursory treatment, considering in addition such topics as construction details, associated circuits, and the application of counters to specific uses. The two books thus complement one another in scope, with the former probably being most useful for workers in the field of counter research and the latter for those using counters in their work and hence primarily interested in their practical application.

After a brief introduction, Wilkinson discusses in some detail the ionization produced by the passage of various charged particles through matter. The characteristics of the ions produced and the phenomena of self-quenching action, gas multiplication, and ion recombination are then considered from the point of view of counter action, followed by a description of the mechanism of pulse formation and the theory of pulse differentiation. The ionization chamber, proportional

counters, and Geiger counters are treated extensively in separate chapters, followed by a brief mention of counting losses, the build-up of pulses during rapid counting and the statistics of ionization chambers.

The way in which the author treats the complex material he presents is admirably clear most of the time, although occasionally, especially in certain parts of the discussion of Geiger counters, his arguments seem a bit difficult to follow. On the whole, however, the detailed and organized analysis of counter phenomena given in this volume should be of great value to many readers.

Counting Tubes, by Curran and Craggs, does not attempt a rigorous study of counter theory, although a good deal of the well-established information is mentioned in the first few chapters. Detailed descriptions of such recent developments as scintillation, crystal, and spark counters are given, along with construction details for a number of more conventional types. Various circuits having application to counter use are discussed, with diagrams and component values included most of the time. However, the actual utility of this feature is doubtful for American readers because of certain differences in tube nomenclature between English usage and our own. The numerous applications of counters are gone into in some detail, including discussions of their use in cosmic-ray work, the inspection of materials, radioactivity monitoring, prospecting and radioactive tracers.

This book is certain to command a far greater audience than that of Wilkinson by virtue of its wider range of interests. For this very reason its coverage of specific points is sometimes lacking in thoroughness, but the liberal bibliography that is included should enable the reader desiring further information on a given topic to obtain it readily elsewhere. *Counting Tubes* can be recommended to all interested in counters, with specialists and nonspecialists alike certain to find much that will be of value to them.

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The Sea

The Sea Around Us. By Rachel L. Carson. 230 pp. Oxford University Press, New York, 1951. $3.50.

For those who were fortunate enough to follow Miss Carson's three-part profile of the sea which appeared during June in the *New Yorker,* little need be said of the author's skill in treating oceanography and its neighboring sciences in a completely entertaining fashion. Her book, *The Sea Around Us,* upon which the profile was based, moves as swiftly and with perhaps more convincing and absorbing action than most best-selling novels. More important, she brings to this book a fresh enthusiasm which is as often lacking as it is needed in contemporary popular science writing.

A graduate of the Pennsylvania College for Women, Miss Carson continued her graduate studies in biology at Johns Hopkins University (where she later taught) and at the Marine Biological Laboratory at Woods Hole, Massachusetts. For a time she served as an aquatic biologist on the staff of the United States Bureau of Fisheries, and she is at present editor-in-chief of the United States Fish and Wildlife Service. As these biographical facts would suggest, her central interest lies in biology. But while the story she tells is largely an account of the teeming life of the oceans, her book at the same time gives a carefully integrated picture of the complexly interrelated physical conditions under which marine life is maintained. It is precisely this artful blending of the accumulated knowledge of many sciences that makes the work extraordinary. The relatively few pages and Miss Carson's casually fluid writing style are misleading, for the book is tightly constructed and every line is packed with information.

The picture given of the great water masses of the earth shows the sea to be only vaguely understood after centuries of exploration and of charting its surface, for although most of its length and breadth is known, the task of probing its third dimension with the help of modern instruments of science has little more than begun. Knowledge of the topology of the ocean bottom, for instance, was based on about fifteen thousand depth measurements (or roughly one laboriously made sounding for an area of six thousand square miles) by the time workable sonic devices were first developed for echo sounding. During recent years echo sounding instruments have plotted continuous profiles of the bottom beneath moving ships and gradually a body of detailed information about the ocean floor is being accumulated.

The hydrodynamic picture of the sea (a region of extreme changes in temperature, pressure, volume, and rate of flow of currents) is not understood in any detail—although, as the author points out, most of the bewildering phenomena of the oceans are presumably direct consequences of events brought about by some combination or another of these factors. Atmospheric climates are also sensitively related to the behavior of the seas, a fact which has made oceanography a subject of considerable interest to the meteorologist. A wide variety of modern instruments have been applied to studies of the state of the sea and a growing mass of information is being compiled concerning ocean currents, wave action, and related matters. The greatest of the ocean's waves, seasick-prone readers will be happy to learn, are invisible and lie deep beneath the surface. The water masses of some of these submarine waves are extremely great and the waves themselves can be as much as three hundred feet high. Although their existence has been recognized for a number of years, it has only been recently that the development of adequate hydrographic instruments has made their study possible.

Miss Carson's conception of the sea as a challenge to scientists of widely separate disciplines is convincingly stated and the book is likely to be read with the greatest pleasure by anyone whose professional interest has ever touched upon one or more of the many problems of the ocean. It will just as likely be appreciated, however, by the nonprofessionals who simply like to wade in the