
Books

Principles of Quantum Electrodynamics. Vol. 3 of Pure & Applied Physics. By Walter E. Thirring. Translated from German by J. Bernstein. 234 pp. Academic Press Inc., New York, 1958. \$8.00. *Reviewed by J. C. Polkinghorne, University of Cambridge.*

The German edition of this book achieved the *ne plus ultra* of praise by being compared by Dyson in a review in this journal to Pauli's *Handbuch* article. Certainly it is a remarkable book. Its two hundred pages contain little that can be found in other treatments of the subject. The author's concern has been with the physics, rather than with the details of the formalism that expresses it. A mastery of both is required for an understanding of the subject but the complexity of the formalism has made such demands on students that the principles have sometimes seemed obscured by a flurry of graphs. An English edition of a book that discusses in detail the physical principles of such matters as localizability, measurability, vacuum fluctuations and renormalization, is therefore most welcome. In addition Thirring has taken advantage of this opportunity for revising his text and has, in particular, rewritten his treatment of renormalization in the spirit of recent developments using Heisenberg operators.

Although this is a rewarding book it is not an easy book to read. The author's style is condensed and suffers from some "Zwitterbewegung". He has a tendency to state results and then say why they are true rather than giving a smooth development of the subject. The average student will require some knowledge before he can read this book profitably but he will then find that knowledge greatly deepened by doing so.

The translation, though always perfectly understandable, too often betrays its origin.

The Physical Foundation of Biology: An Analytical Study. By Walter M. Elsasser. 219 pp. Pergamon Press, London & New York, 1958. \$4.75. *Reviewed by Joseph G. Hoffman, University of Buffalo.*

Difficult and profound matters are discussed here in new ways. The general tenor is set in the preface where it states that "biological theory has been the center of inquiry of many wise men over a long time." The text reviews and examines fundamental problems of biology from the viewpoint of a theoretical physicist. The result is a stimulating essay that makes the reader wish for more. The enigma of living processes is one of the central problems of science; and these delibera-

tions of a physicist about it are important. Dr. Elsasser discusses carefully the problem of information content. The analogy between classical and quantum mechanical of information content of living organisms cannot be adequately described in the usual mechanistic terms. The analogy between classical and quantum mechanical physics is evoked to describe the special physics of the living system which embodies *biotonic* relationships. To quote: "Any casual relationship which involves an increase of information content in the system investigated as time goes on will be designated as biotonic." This embodies the author's fundamental contribution which he develops in many directions. A notable example in support of the identity between physical and biotonic law is the limitation of sizes of classes of organisms. The *principle of finite classes* states: "A class of organisms is immensely small as compared to the number of microscopic configurations that the members of the class may assume." The author's estimates of the smallness of the numbers of organisms on earth is one of the book's excellent insights into the basic physics of life. The appraisal of old ideas and the formulation of the concept of biotonic law make this book a significant contribution. It is highly commendable for its clarity of presentation.

There is no index, but there is a summary in four and a half pages at the end of the text. This summary reviews the introduction and five chapters and lists the pages on which the topics (each described in one sentence) are to be found.

The Physics of Rubber Elasticity (2nd Revised Edition). By L. R. G. Treloar. 342 pp. Oxford U. Press, New York, 1958. \$6.40. *Reviewed by D. J. Montgomery, Michigan State University.*

A hundred years ago Joule measured the temperature rise when rubber stretches and the temperature fall when it retracts; Kelvin even earlier had demonstrated by thermodynamic reasoning the connection between thermal effects and elastic forces in rubber. Not until 1932 did this auspicious beginning come to fruition when Meyer, von Susich, and Valko, and independently Karrer, founded the currently accepted theory of elasticity. As many chemists and not so many physicists know, the model in this theory is a three-dimensional network of long-chain molecules consisting of freely rotating links. The interchain attraction is due to secondary valence forces, except at the small number of points where chains are tied together by primary valence bonds. Brownian motion causes the chains to take up variously contorted configurations unless a tensile force is applied to straighten them. This scheme constitutes a beautiful illustration of kinetic theory applied to the solid state.

Not all of Treloar's book is concerned with elasticity theory, but what is not uses the basic model of the theory as a point of departure. The author begins with a brief descriptive and historical account of rubber and follows with a chapter on its thermodynamics. Next