Books

Complex Variable Theory and Transform Calculus with Technical Applications (Second Edition). By N. W. McLachlan. 388 pp. Cambridge University Press, New York, 1953. $10.00. *Reviewed by Philip M. Morse, Massachusetts Institute of Technology.*

This is not a text on complex variable theory, it is a review of some of the useful techniques of contour integration and of the Laplace transform and a discussion of their application to engineering problems, written for the user of mathematics. Proofs of the basic theorems are not given, but numerous references are made to texts of fundamental theory and a large bibliography is appended. The examples of applications are drawn from engineering fields: electrical, acoustical and mechanical. A large number of illustrative problems are included and a short table of Laplace transforms is appended.

This book will be useful to engineering students, who have taken a course in advanced calculus, to acquaint them with the simpler aspects of modern transform methods of analysis. It will perhaps not be as useful to physicists as the recently published *Fourier Transforms* by Sneddon (McGraw-Hill Book Co., 1951), which includes examples from modern physics but even here it will be useful as an introduction to the field. The text is quite readable, there are plenty of figures for visual clarification and the index is adequate.

The Physics of Viruses. By Ernest C. Pollard. 230 pp. Academic Press Inc., New York, 1953. $5.50. *Reviewed by Joseph G. Hoffman, Roswell Park Memorial Institute.*

This is a unique book written by a nuclear physicist on the subject of viruses. An expert in a modern subject of physics has written expertly about one of the recent developments in biology. The result is most stimulating and welcome. Specialists in the two vastly different sciences of physics and biology, will each find here new insight into living processes.

Physicists especially will find a point of view with which they are familiar. The treatment is consistently carried out in the manner of a physics treatise. Quantitative descriptions are given in the form of graphs, tables and mathematical analyses. The wealth of experimental virus data amenable to analysis by the procedures of physics is surprising. The author has performed a good service by accumulating this pertinent data. But there is more than an accumulation of data: the material is organized in a systematic study of the properties of viruses and the physical theory of viruses.

There is brought together information based on many diverse physical techniques such as x-ray diffraction, electron microscopy, exposure to ultraviolet and ionizing particles, heating, and sonic irradiation. The author has examined all possible methods for obtaining knowledge about the physical entity of viruses. The resultant concise description of this smallest and perhaps elementary form of life is pleasing to the physicist.

Close scrutiny of the text shows that the unified effect achieved by the author depends on his brief summaries of the biological data. These summaries are nicely documented, as is the entire book, for those who need to pursue further the biological literature which in itself is massive. Examples of this simmering down to barest essentials are the sections on Virus Serology, and Hemagglutination. In this respect the author has performed another good service, for physicists at least: he has provided the minimum biological facts in a readily assimilated form.

The process of conveying ideas as divergent as those arising in biology and physics is admirably achieved here. This process touches upon many fundamental aspects of biomolecular physics. If the old saying still holds that a problem is partly solved when it is properly stated and defined, then this book is a valuable contribution to biophysics in that it helps to define some of the fundamental problems.

For example, the method of the exact reduplication of viruses and the nature of forces in reduplication are central problems of biophysics. Thus, the reduplication problem prompts (on page 66) the sixty-four dollar question: "Presumably—the formation of duplicates is by physical forces—Van der Waals, valence or electronic. How does a spherical object so influence its surroundings as to generate a second spherical object?" In chapter eight, entitled Virus Genetics, Virus Multiplication, and Virus Physics, central problems are discussed in such a provocative manner as to constitute required reading for most physicists. While there is of necessity much speculation in this discussion, there are pointed up many fascinating avenues of research into the molecular structure of living matter.

The modern biophysicist should have this book. It shows the exciting possibilities that arise when sufficient data are available to support physical theories of living things. The numerous illustrations and tables are excellent. These along with the author and subject indices serve to carry the reader nicely through the interesting text.

The Nature of Light and Colour in the Open Air. By M. Minnaert. 362 pp. Dover Publications, Inc., New York, 1954. Paperbound, $1.95. *Reviewed by S. F. Singer, University of Maryland.*

This little book can best be described in one word—fascinating! A distinguished astronomer, director of the Observatory of Utrecht, Holland, who is also a keen and enthusiastic observer of nature, describes an astounding variety of optical phenomena and gives their explanation. Reading the book is a pure delight because the author manages to impart his enthusiasm to the reader so well that one is tempted to run outdoors immediately to start observing. This unique volume will probably be of the greatest direct value to those who teach physics, to physical meteorologists, to astronomers, and all who have a practical interest in the problem of visibility.

A History of the Theories of Aether and Electricity. The Modern Theories, 1900–1926. By Sir Edmund Whittaker. 319 pp. Philosophical Library, Inc., New York, 1954. $8.75. *Reviewed by William Fuller Brown, Jr., Sun Oil Company.*

This is the second volume of a three-volume work. The first volume, subtitled *The Classical Theory*, is a 1951 revision of a book first published in 1910; it was reviewed in this journal and in the *American Journal of Physics* in 1952. The third volume is to cover the period from 1926 to 1950.

The purpose of this volume is "to describe the revolution in physics which took place in the first quarter of the twentieth century". The book begins with the discovery of radioactivity and ends with the fusion of matrix- and wave-mechanics. It devotes a chapter to each of nine topics; the order is chronological within each chapter. Radioactivity gets one chapter, topics in electromagnetism and relativity get three, and topics in quantum theory get five.

This is a history of published papers rather than of the men who published them. Journal references are plentiful; dates of birth and death are given, and some details of academic history; but there are no anecdotes, no descriptions of social gatherings, no eye-witness reports of how somebody stumbled upon a new theory. If you are wondering under what conditions great ideas are born, you will not find the answer here; but what you do find will all be objective and verifiable.

The book includes a number of fairly complete and complex mathematical derivations; few readers will have time to read it with complete understanding at every step. Fortunately that is not necessary, for one can get a good general impression by reading the text and skimming the mathematics. At the same time, the detailed derivations will help the reader who wishes to study some particular subject more thoroughly.

Whittaker attributes several important discoveries to persons other than those usually cited. For instance, he traces special relativity to publications of Poincaré in 1901–1904; he describes Einstein's 1905 paper as having "set forth the relativity theory of Poincaré and Lorentz with some amplifications". (Despite this adjustment of credits, Einstein occupies more lines in the index than does any other entry.) I have not verified Whittaker's documentation in the particular cases he discusses, but in other fields I have noticed errors like those he corrects. A trivial but revealing example is the misspelling *Mosotti* for *Mossotti;* its persistence since 1932 suggests that physicists seldom consult the original sources unless those sources are very recent. Once an error becomes embodied in the folklore of physics, its permanence is practically assured, for attempts to correct it go unnoticed.

There are occasional references to "the true explanation" of some phenomenon. Does this mean merely the explanation accepted today, or is there some other connotation? The term, used without definition, seems incongruous in a book about the revolution in physics—a revolution that surely had epistemological implications.

It is clear that the author has made a careful and exhaustive study of all relevant research papers and has used no second-hand information. The impression I get is that the revolution in physics was a clumsier process, with more frequent blundering into blind alleys, than one might suppose from the usual glib accounts; and that more persons had a hand in the process than are usually mentioned. The impression you get may be different; but in any case I think you will find the book illuminating, and will get from it a better appreciation of the process of scientific discovery.

Applied Electronics. A First Course in Electronics, Electron Tubes, and Associated Circuits (Second Edition). By Truman S. Gray. 881 pp. The Technology Press, MIT, and John Wiley and Sons, Inc., New York, 1954. $9.00. *Reviewed by Louis Weinberg, Hughes Research and Development Laboratories.*

The present volume *Applied Electronics* represents a second edition of a book that has achieved wide recognition as one of a series put out by the MIT Electrical Engineering staff. Like its predecessor, the new edition is intended as a textbook for a first course in electronics and as a reference volume for independent study and use.

The over-all plan of the book is the same as that of the first edition; the three parts treat successively the physics of electronic conduction, the characteristics of typical electron tubes, and the analysis of active circuits. A final chapter on transistors has been added and the chapter of the first edition on polyphase rectifiers has been eliminated.

All of the virtues of the first edition have been retained: the stress is still on basic concepts and methods rather than on the presentation of a wide variety of electronic circuits, and the same scrupulous regard is paid to the definition and meaning of reference polarities so that the old bugaboo of the student—the minus sign—doesn't rise like an apparition to haunt him but always appears as an old and well understood friend.

Instructors and students alike will appreciate the expanded and improved discussion of feedback in tube circuits, the fuller treatment of direct-coupled amplifiers, and the rewritten version of thyratron control. Some other changes worthy of note are the addition of two articles on the analysis, both graphical and ana-