BOOK REVIEWS

The World of Atoms (2nd ed.). An Introduction to Physical Science. By J. J. G. McCue and Kenneth W. Sherk. 775 pp. Ronald Press, New York, 1963. $8.50. *Reviewed by William F. Meggers, National Bureau of Standards.*

"SCIENCE has played a major part in forming the mind of Western man. Through technology, it has had a decisive effect in shaping his environment. If humanism is the study of human affairs, science is certainly an integral part of twentieth-century humanism, though its inclusion under that head is not always welcomed by those who have excused themselves from learning anything about it. This book is an embodiment of the authors' conviction that science can be taught humanistically without being taught sloppily" (Preface).

In the title, "World" has the connotation "universe" because atoms are everywhere. In this introduction to physics, science is presented as a human activity; selected topics are developed to teach how a scientist works; laws and theories are discussed with a view to why we believe in them. Portraits and brief biographies of 25 outstanding scientists, Copernicus to Fermi, are included.

The subject matter is divided into 70 chapters distributed in eight sections, viz., Mechanics, Heat, Foundations of Chemistry, Electricity, The Structure of Atoms, The Grouping of Atoms, The Atomic Nucleus, and The Stars; thus covering most of physics, chemistry, and astronomy. Each chapter is headed by a quotation; many chapters contain simple experiments, but no mathematics beyond arithmetic; and each ends with a short summary, a list of questions, and suggestions for further reading. The text is illustrated by numerous halftones and line drawings, carefully chosen to clarify the subjects.

"The actual electronic configurations of all atoms have in recent years been worked out by studying spectra" (p. 464). This casual statement presents one of the most important facts of atomic physics; it should have been elaborated in more detail. It is developed in two short chapters (Quantum Numbers, pp. 450–457, and Electron Orbits and the Periodic Table, pp. 458–470), omitting mention of spectral series limits as electron binding energies, the discovery of multiplets, easy explanation of the Zeeman effect, and deduction of electron configurations from uniquely identified spectral terms. Although the section on mechanics contains a chapter on vector quantities (pp. 68–76), the simple vector model of the atom that proved indispensable during the past 40 years in the quantum interpretation of atomic and ionic spectra is not mentioned.

For easy reading of many scientific topics, *The World of Atoms* is an excellent book. With few exceptions, the presentations are adequate, clear, concise, logical, and rigorously accurate. On page 368, I noticed one slight departure from accuracy; "Millikan was one of the first Americans to receive a Nobel prize"; in fact Millikan was the second, because Michelson was the first! Being sadly aware of the blissful scientific ignorance of most people, we will wistfully hope that *The World of Atoms* may appeal to all the cultured humanists for whom it was written.

Microwave Circuit Theory and Analysis. By Rabindra N. Ghose. 418 pp. McGraw-Hill, New York, 1963. $12.00. *Reviewed by H. J. Hagger, Albiswerk AG, Zürich, Switzerland.*

THE large number of papers and books in the field of passive microwave components has forced the teacher and the student of an introductory course on microwaves to the laborious task of sorting out the essentials of microwave techniques. R. N. Ghose has bridged the gap between highly theoretical standard books and graduate-level reference data for the microwave engineer. In the short and comprehensive first three chapters, the historical, mathematical, and physical fundamentals of the microwave field and the symbolism of the book are given. These include paragraphs on cylindrical and spherical functions, summarizing remarks on variational principles and integral equations, and on Babinet's principle. Extensive use is made of the electric and magnetic fields, so that the reader is not confused with equivalent circuits which are not useful in microwave circuit analysis.

In the chapter on transmission lines, there is a good survey on the newer possibilities of transmitting microwave energy by microstrip lines, dielectric waveguides, and surface-wave transmission lines. The chapter on resonators is very helpful for an analytical treatment, but in an introductory course, further explanations by the teacher will be required. The field of microwave junctions (transitions, magic tees, directional couplers, etc.) is shown on the basis of the scattering matrix, giving a rough idea of the devices related to the subject. Microwave filters are treated from the standpoint of four-pole theory and transfer function in matrix representation. Only in the chapter on discontinuities is some use made of variational methods, and these paragraphs are very helpful in showing how to attack the most difficult problem in microwave circuitry, i.e., the effect of a field disturbance on the propagation qualities of the system. Nonuniform transmission lines are again treated with matrix analysis of the transfer function, and this chapter shows quite clearly how to design matching sections. In such a book, nonreciprocal networks cannot be omitted, because they play an im-