few typographical errors. Even though it does not quite attain the author's goals, the book will make a useful addition to the diagnostic laboratory.

LESLIE A. STAUBER
Department of Zoology,
Rutgers University

Origins of Quantum Physics

The Classical Atom. Francis L. Friedman and Leo Sartori. Addison-Wesley, Reading, Mass., 1965. x + 118 pp. Illus. Paper, $2.50.

The book by Friedman and Sartori, *The Classical Atom*, is clearly and concisely written, and is a pleasure to read. The monograph is the first one of a series intended for students as an introduction to quantum mechanics; problems are given at the end of each chapter. The first volume, which discusses the development of physics before the establishment of the Rutherford atom, is mainly an excellent demonstration that classical mechanics cannot explain many of the observed phenomena. The early experiments, which eventually led to quantum mechanics, are described in some detail. The mathematical apparatus needed to understand the physics is lucidly and rigorously derived.

The first chapter deals essentially with the discussion of the existence of atoms, and measurements of such fundamental constants as Avogadro's number and the charge of ions.

The second chapter might be entitled "Kinetic theory." The virial theorem is used to derive the equation of state. There is a good discussion of random walk and a derivation of the Maxwell-Boltzmann equation, as well as the classical equipartition law of the energy. The discrepancy between measured and calculated specific heat of various substances is the first indication that classical theory fails when applied to atoms.

The third and longest chapter deals with atomic structure. It begins with Thomson's discovery of the electron. Canal rays and the early beginnings of mass spectroscopy are discussed. The authors give an excellent description of the confused thoughts about atomic structure which lasted well into the 20th century. This is a period of physics which many of us have forgotten, and one which most have never heard of. Some of the false starts made in attempting to explain the behavior of atoms are described in some detail. Friedman and Sartori's description of the theory of the Thomson atom, which I knew only by name, I found particularly interesting. The scattering experiments with α and β particles led to the more successful Rutherford model of the atom. The book ends with a discussion of the early attempts to explain the structure of atomic nuclei. However, because the Rutherford atom would not be stable if the electron obeyed the laws of classical mechanics and electromagnetism, the book ends with a huge question mark.

I regret that the decision has been made to publish Friedman and Sartori's work in separate short monographs. It somewhat resembles a detective story in which the solution is promised to come in a later book. But the masterly execution of this first monograph leads one to look forward to the publication of the other volumes in the series.

MARIA GOEPPERT MAYER
Department of Physics,
Revelle College,
University of California, San Diego

Optical Quantum Electronics

Quantum Electronics and Coherent Light. Course 31, International School of Physics "Enrico Fermi." C. H. Townes and P. A. Miles, Eds. Academic Press, New York, 1965. xii + 371 pp. Illus. $16.

Although the subject of quantum electronics may be said to have come into existence in 1954 with the development of the molecular beam microwave maser, its present rate of growth did not begin until the appearance of the optical maser, or laser, in 1960. Since then, the "optical branch" of quantum electronics has grown phenomenally and was the subject of a course in August 1963 at the International School of Physics "Enrico Fermi," this course being the basis of the present volume.

Optical quantum electronics is connected with several branches of physics. It is, therefore, not easy to produce a collection of 21 papers that covers the subject sufficiently broadly to represent a course given at an international school and, yet, does not appear to be a series of unrelated articles, each touching only briefly on its subject. The editors have solved this problem reasonably well with papers on optically pumped and injection lasers, electromagnetic resonators, theory of laser oscillation, maser noise, the spectra of ions in crystals, nonlinear optical effects, Raman masers, and coherent Raman and Brillouin effects. Articles on high-resolution spectroscopic techniques and velocity of light measurements seem to be somewhat out of place. Regrettable omissions are articles on spectra related to gaseous lasers. Because the volume constitutes the proceedings of a course, much of the material is tutorial, but there is a considerable amount that can be regarded as a presentation or summary of the authors' latest research results. Inclusion of matter of the latter type in a volume published almost two years after the course was given inflicts a hardship on the reader who is not familiar with recent developments in the field; he cannot tell which material has been superseded, perhaps by the author himself. Yet this is just the reader for whom the tutorial material is intended.

Much of the tutorial material is well presented, and the book will be of value to the nonspecialist. Since the topics covered have a wide range, everyone is a nonspecialist in some of the topics, and even a worker in one field of quantum electronics will find that the material in the other fields is useful. The book is also a convenient source of references. Poor typography and lack of editorial attention to the English of some of the foreign contributors mar the volume.

I. R. SENITZKY
Institute for Exploratory Research,
U.S. Army Electronic Command,
Fort Monmouth, New Jersey

New Books

Biological and Medical Sciences

Global Impacts of Applied Microbiology. Proceedings of a coordination conference (Stockholm), July–August 1963. Mortimer P. Starr, Ed. Almqvist and Wiksell, Stockholm; Wiley, New York, 1965. 586 pp. Illus. $15. Forty-three papers on the following topics: Some philosophies of applied microbiology (5 papers); Interactions of general and applied microbiology (5 papers); Food and agricultural microbiology (12 papers); and Industrial and chemical microbiology (21 papers).

Grant's Method of Anatomy: By Re-

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