BOOK REVIEWS

J. J. Thomson and the Cavendish Laboratory in his Day. By Sir George Paget Thomson. 186 pp. Thomas Nelson & Sons, London, 1964. 25s. Doubleday, Garden City, N. Y., 1965. $4.95.
Reviewed by Norman Feather, University of Edinburgh.

It is not much more than a hundred years since Kelvin converted an old wine cellar in a professor's house in Glasgow into a physical laboratory, and began to enlist the help of volunteers from his natural philosophy class in the experimental researches on which he was engaged. So recently—and in so casual a manner—was the first research laboratory in physics established in a British university. By the time that the centenary of this event came round no university the world over, of any pretensions, was without such a facility.

There is something of surprise, for most modern readers, in this bare statement of historical fact. What is perhaps more surprising, for the situation is unlikely ever to recur, is that for nearly half that period one of these laboratories was, by common consent, preeminent among all the rest. From 1895 to 1935, or thereabouts, the Cavendish Laboratory in Cambridge was the mecca of the experimental physicist. For more than half that period of preeminence, J. J. Thomson was its director. He had been appointed Cavendish professor, within a few days of his twenty-eighth birthday, in 1884, and when he resigned, in 1919, the university created a personal chair for him, without stipend, which allowed him to continue his experimental work, and gave him the use of accommodation in the laboratory for as long as he had need of it. In the upshot, he outlived his pupil and successor, Rutherford, by nearly three years, dying on August 30, 1940—Rutherford's birthday.

J.J.'s son, "G.P.", himself Nobel prizeman, as his father was, has contributed the biography now under review to the British Men of Science Series; it is the first volume in that series to be devoted to a physical scientist. Possibly, today, in the popular mind, physics begins with the discovery of the electron; possibly expediency rather than policy decided priority for the publisher. In any case, Sir George Thomson prefaces his account of the life and work of his subject by an introductory chapter which leads the reader forward from Newton to Maxwell and Helmholtz and Stoney, thereby providing his own historical background. Against this background he paints a lively portrait, unsubtle perhaps, but clearly conceived and sharply in focus. He does not claim undue success for the first eleven years of his father's professorship ("this period is best regarded as one of preparation", p. 78), nor blink the scientific conservatism which settled upon him relatively early in life ("J.J.'s attitude to the theories coming into physics after the First World War tended to be conservative, though this did not prevent him advancing highly original and imaginative theories of his own. . . . He accepted Special Relativity though he did not use it . . . he was unwilling to give up the aether", pp. 154-5), but he gives a full and fair account of the twenty years of glorious achievement, 1895-1915, and he shows him as an old man of seventy-five doing "at least his fair share" of the work on the much enlarged third edition of *Conduction of Electricity through Gases*, and even later amusing himself "working out problems in the Mathematical Tripos papers which were sent to him"—for "he retained his facility with mathematics till a great age" (p. 163).

All in all, the record is straightforward and the survey wide-ranging and open. And there are clues enough to keep the inquisitive reader busy for many a day ferreting out for himself details of scientific investigations which could only be hinted at in the text. But for the few who will read this account having known J.J. personally there will, I think, somehow be found missing the warmth of his humanity—and even the stranger will ask in vain to be shown, even dimly, the inner working of that genius which indubitably belonged to this great and lovable man.

So far as the text is concerned, there is no difference at all between the English and American editions, except for the publisher's imprint. The only differences are in the binding and in the dust jacket. The binding of the Doubleday edition is definitely more attractive than that of the other, but the dust jacket is a failure. The so-called portrait of "J.J." is unrecognizable by any who knew him in later life or are familiar with authentic portraits of earlier days, and the blurb is full of mistakes. It implies fairly clearly that Thomson was Maxwell's immediate successor in the Cavendish Chair (which of course he was not), it claims that the Cavendish Laboratory produced among other distinguished physicists both Millikan and Bohr, for which claim there is absolutely no foundation, and it states that Thomson more than any other man discovered the proton. This again is entirely misleading and grossly exaggerated.

Unified Theory of Nuclear Models. By G. E. Brown. 178 pp. (North-Holland, Amsterdam) Interscience, New York, 1964. $7.25.
Reviewed by J. E. Mansfield, Harvard University.

This is one of those excellent little books that put one at ease by their lack of bulk and pretension. An entertaining style follows up the mood of a lively introduction. The language is for the most part that of many-body theory, as are many of the alternate derivations. The scope of the book is modest: the shell, collective, and optical models. Three early chapters introduce the application of Hartree-Fock theory to the nuclear problem. Second quantized notation is used, and the shell model is defined.

The bulk of the book considers particle-hole excitations in Hartree-Fock approximation. The Elliot-Flowers calculation is carried out in some detail, and other potentials are mentioned in passing. The natural extension of the shell model is done by time-dependent Hartree-Fock and by linearization of the equations of motion in the spirit of many-body calculations. Departures from spherically symmetric closed shells occupy a chapter. The Elliot model is done here.

Pairing and associated collective motions occupy considerable space. The degenerate model is solved, and the treatment of the two-level problem is given in the framework of the Bogolyubov-Valatin quasiparticle method. The last chapters deal with the optical model, and very nicely, carried to the great resonances in neutron scattering and the Green's-function formalism.

The title does not mislead: the treatment is indeed unified, mostly by the common use of many-body language and approximations. This makes for a readable book. One can envisage some "standard treatment" of the future organized on these lines.

Electrons and Waves. By John R. Pierce. 226 pp. Doubleday, Garden City, N. Y., 1964. Paper $1.25.
Reviewed by L. Marton, National Bureau of Standards.

Both the title page and the introductory statement preceding the title page state that the book is a revised and enlarged edition of the first eight chapters of *Electrons, Waves and Messages* by the same author, which was published in 1956 by Doubleday and Co., Inc. I happened to have missed the first edition, and to my surprise, I have not found any review in *Physics Today* of the first edition either. This is an added reason for my pleasure in looking over this delightful book and to report on it to the readers of *Physics Today*.

The new paperback edition of this book is part of the Science Study Series, and as such it should provide a survey within the grasp of the young student or layman. Dr. Pierce has used all his ability, demonstrated during the years when he was writing his science fantasy stories, to introduce the young readers or laymen into the world of electrons and of waves. This introduction goes by easy steps. The first chapters discuss generally the scope of the book and the laws of motion, essentially Newtonian mechanics. After discussion of the different fields, electrostatic and magnetic, and their action on the electron, there is a short chapter on waves.

The introduction to Maxwell's equations takes up 30 pages of the 200 odd pages of the whole volume, after which the author goes on to some applications of Maxwell's equations, including electromagnetic devices, vacuum-tube amplifiers, signal propagation, and similar things.

While the book on the whole is an excellent introduction to the subject, I am not entirely clear for whom it is written. The first chapters entice the reader with a very, very easy introduction into the most elementary notions of physics. There is an excellent introduction into vector notation, but then, later on, vectors disappear completely from the volume and are not used again. The treatment of Maxwell's equations uses an integro-differential representation and is much heavier going than the beginning of the book makes the reader believe. I had to reread some sentences three or four times until I was sure of the author's meaning or at least believed myself sure of it. Summarizing, I would say that while the second part of the book is definitely at the lower college level, the beginning is at the secondary-school level. The danger is that the first part may discourage the more advanced student, whereas the less advanced may find the latter part too heavy going for his taste.

The book shows every indication of having been written by one of the best authorities in the field. I could find but one misleading statement. I deliberately say misleading because what appears to be an error at first is repeated on page 113. The author states that, "for a 50 000-volt accelerating voltage, which is common in electron microscopy, the electron wavelength is about 2×10^{-9} inch", instead of the correct value of 2×10^{-10} inch. That this statement is not a typographical error, is manifested by the following sentence: "This is roughly a ten-thousandth the wavelength of visible light." It should be one hundred thousandth. Likewise, in the following paragraph, the resolution of the electron microscope is given theoretically as ten thousand times as good as a light microscope; instead of one hundred thousand times.

These are minor details perhaps and generally the statements are so correct and so well presented, that the book should be recommended warmly to all readers for whom the Science Study Series is intended. In particular, it should be very useful to science teachers, who may want to use Pierce's methods of presentation of a difficult subject.

Science and the Future of Mankind. Hugo Boyko, ed. 380 pp. Indiana University Press, Bloomington, 1964. $6.95.
Reviewed by R. B. Lindsay, Brown University.

Concern over the role of science in the progress of civilization continues unabated. Will the scientific method, already proved so powerful in mastering our natural environment, ultimately succeed in solving *all* the problems of mankind, or will science, by providing human beings means too powerful for their control, in the end pave the way for our complete destruction? These are questions one encounters in various forms on all sides, and innumerable are the pundits who arise to try to answer them. The present book consists of a series of twenty-one articles, long and short, on various phases of the relation between science and mankind, contributed by eminent authorities in science and the social studies. The volume is announced as the first in a series of publications to be sponsored by a new organization called the World Academy of Art and Science, founded in 1960 with the purpose of serving as a kind of "World University" for the discussion of the "vital problems of mankind . . . from an objective, scientific and global point of view", hopefully without the natural prejudices normally associated with national groups. The present president of the Academy is Lord Boyd Orr of Britain and the Secretary General is Hugo Boyko of Rehovoth, Israel, the editor of this volume.