The publishers are probably right in thinking that the book will become a classic, like the *Confessions* of Rousseau. Parts of it will certainly be quoted and re-quoted as superb examples of clear thinking and even clearer writing. Among these is the prologue, "What I have lived for", which begins: "Three passions, simple but overwhelmingly strong, have governed my life: the longing for love, the search for knowledge, and unbearable pity for the suffering of mankind. . . ."

D. G. KING-HELE

PROGRESS OF CHEMISTRY

The Atomic Debates

Brodie and the Rejection of the Atomic Theory. Edited by W. H. Brock. Pp. ix+186. (Leicester: Leicester University Press, 1967.) 35*s*. net.

IT is not surprising that the main efforts of the historians of chemistry have been directed to the episodes, theories and personalities that have contributed to the continuous progress of the science since it became an independent discipline. Far less attention has been paid to the heresies and false doctrines except when, like the theory of phlogiston, they have exerted a notable influence. Now Dr. Brock and his colleagues Dr. Knight and Mr. Dallas have given us in this volume a scholarly and well documented account of the British scepticism regarding atoms, leading up to Brodie's *Chemical Calculus* of 1866, which they describe. This aimed at replacing the current theory by mathematical symbolism, free from theory, under the stimulus of Boole's *Mathematical Analysis of Logic*. One chapter contains the fascinating correspondence between Brodie and Odling, Williamson, Herschel, De Morgan and Jevons, revealing some of the weaknesses of Brodie's *Calculus* in its arbitrary assumptions and its failure to explain such phenomena as isomerism and the benzene ring. The *Calculus* excited some interest but was still-born and exerted little or no influence. In the opening chapter the authors tend to overestimate the effect of atomic scepticism. It is surely misleading to say that by 1860 "chemistry had seen plenty of change but no progress". In 1843 Leibig's *Organic Chemistry* listed more than two thousand substances, each with its own atomic formula, without which the inter-relationships and reactions of these complex compounds could not have been disentangled. Even the sceptics on the Continent used Berzelian formulae. One is tempted to ask how far the prevailing scepticism in Britain was responsible for the meagre contribution of British chemists during the formative years of organic chemistry. Mendeleev has put on record his indebtedness to Cannizzaro, a convinced atomist, for the data that prompted his Periodic System.

HAROLD HARTLEY

GREAT PHYSICIST

Rutherford and the Nature of the Atom

By E. N. da C. Andrade. (The Science Study Series, No. 29.) Pp. xix+218+12 plates. (London: Heinemann Educational Books, Ltd., 1965.) 9*s*. 6*d*.

THIS is a life of Rutherford with an account of his work and of the contributions of some of his principal co-workers. It is adapted for readers with little or no knowledge of physics but even the professional physicist will find much that is new to him, especially if he is young enough to have entered his profession in the past thirty years. It is an admirable book both as an exposition of a great age of physics and as a biographical study of a great genius and leader of men. The portrait Andrade has drawn is masterly, with awe and realism well balanced. Those who are acquainted with his writings will not need to be told that it is written in crisp, clear English, in a style whose art is so well concealed that it is perfectly natural. Not all scientists are inarticulate!

Andrade is old enough to remember physics as it was before the First World War and has drawn a vivid picture of it. There was then a good deal less personal contact between scientists than there is now. When people complain that there are too many conferences, though I admit they have a case, I cannot help remembering the tragedies of able men who became a hindrance to science because they had been too isolated to appreciate what was novel. This also explains the slowness to respond to the quantum theory which Andrade stresses. Not that contacts were quite absent; I remember vividly the Stokes Jubilee in 1899 when Langevin, Cornu (of the spiral), Elster and Geitel (the inseparable pair who prepared the way for the discovery of cosmic rays), and Rubens of the Restrahlen stayed or came to parties at my father's (J. J.'s) house; not to mention the later occasion, it must have been in 1903, when I so misbehaved myself by blurting out on my father's return from the laboratory the message Rutherford had confided to my mother while they waited for him, that "Ramsey had got helium out of radium gas".

Rutherford was indeed a giant among physicists. In judging the stature of a truly great scientist one must take account of the number of his first-rate achievements even more than their effects. After all, there is a lot of luck in research, and what hits the bull's-eye may not really be a finer piece of work than another man's "inner", but one doesn't go on hitting the bull's-eye by luck, and look at Rutherford's record. Besides the 1896 paper with J. J. which founded the study of gaseous ions, he discovered α and β rays, and with Soddy founded the theory of radioactive transformation. He established the nature of α rays, thus showing that one atom can come out of another, gave the atom its nucleus, and discovered the disintegration of light atoms by α rays. Add to these his share in the work of others which he inspired in the Cavendish—Chadwick's neutron, Blackett's independent discovery of the positron, Cockcroft and Walton's atom smashing. Truly he was a giant in an age of giants.

A grand book; one calculated to add to the scientific prestige of the Commonwealth.

G. P. THOMSON

LESSONS IN QUANTUM MECHANICS

Basic Quantum Mechanics

By Robert L. White. (McGraw-Hill Physical and Quantum Electronics Series.) Pp. xiv+299. (New York: McGraw-Hill Book Company, Inc.; Maidenhead: McGraw-Hill Publishing Company, Ltd., 1966.) 80*s*.

THIS is a highly competent book, well written and along orthodox lines. After a brief review of early quantum theory and the Lagrange–Hamilton formalism of classical mechanics, the subject is approached uncompromisingly through its basic postulates. However, the author fully appreciates just how difficult a student can find concepts such as state function when he first meets them, and he makes full allowance for this. There follow a chapter on the Schrödinger equation, two treatments of the harmonic oscillator using both the Schrödinger and the matrix approach and a chapter on measurement and the uncertainty principle. After all this, the student is expected to have a grasp of principles, and he then applies these in turn to standard one- and three-dimensional problems and to time-independent and time-dependent perturbation theory. The book ends with a brief excursion into multi-particle systems.

The book is pleasantly produced, with clear diagrams. Each chapter ends with a very useful summary of what has been achieved, a set of examples and a bibliography, in which individual relevant chapters of various books are listed. Occasionally, such as in the discussion of the