

Nuclei and Radioactivity

By G. R. Choppin. Pp. ix+150. (New York and Amsterdam: W. A. Benjamin, Inc., 1964.) Cloth back, 5.50 dollars; paper back, 2.15 dollars.

NUCLEI and Radioactivity is one of a series of short monographs primarily intended for inclusion in a first-year university chemistry course. It covers the field commonly described in the United States as nuclear chemistry—nuclear forces, radioactivity, the radiations and their detection, accelerators and the production of radioactive species, and the study of nuclear species and reactions, including fission. The final chapter, however, is devoted to an outline of the applications of radioactivity in chemical, biochemical and technical studies. Brief appendixes on the biological effects of radiation and a table of isotopes are included, as well as a glossary.

All this is a great deal to attempt within such a brief monograph. Inevitably much must be discarded and opinions will differ on what can be regarded as expendable. A chapter is devoted to fission, culminating in an outline of the principles of a reactor; yet the delayed neutrons are not mentioned and the impression is given that an uncontrolled reactor will explode like a bomb.

An outline of nuclear spectroscopy, the shell model and of the different modes of nuclear reaction is included; but the procedures by which decay schemes are unravelled are not described and one has an uncomfortable feeling that some students will find that nuclear chemistry is too completely dissociated from the rest of their subject.

Nevertheless, it is certainly desirable that the chemistry graduate should be familiar with the whole of the contents of this book and I am by no means sure that this is yet true in Britain.

A. G. MADDOCK

Teilhard de Chardin

The Man and his Theories. By Abbé Paul Grenet. Translated by R. A. Rudorff. (Profiles in Science.) Pp. 176+15 illustrations. (London: Souvenir Press, Ltd., 1965.) 21s.

THE Abbé Grenet has written a concise and well-balanced book and has set out the many strands of Teilhard de Chardin's energy and intellect. The author deals with his scientific work, his philosophy and his theology. He shows how the writer of *The Phenomenon of Man* and *The Future of Man* exercised such a great influence in the field of prehistoric archaeology. No doubt Teilhard has been extravagantly praised in recent years: "He has emerged as one of the century's most remarkable prophetic thinkers, an Aquinas of the atomic era" and "some people rank him as the greatest thinker-prophet of the twentieth century".

Although Teilhard himself seems to have arrived at a satisfactory synthesis of his science, philosophy and theology, his superiors in his Catholic order seem to have been less happy about some facets of his thought. He was ordained a priest in 1911. He taught physics and chemistry, but his true interest was in geology and palaeontology. In 1923, he was sent to help with excavations in Central China, where he found traces of Palaeolithic man, a prelude to the discovery of Peking Man six years later. From that time much of his life was spent in China, and all his scientific work and his prehistoric studies were related, through his deep religious feeling, to the origin and future of mankind. The theological implications of his reflexions on evolution led his superiors to forbid the publication of much of his non-technical work. As a Jesuit priest he remained obedient to his order but nevertheless he freed and inspired the imaginations of others working on palaeontology and prehistoric archaeology. He was able to build up the strongest personal relations with all the major workers in his field. The citation of his promo-

tion as an officer of the d'Honneur read: "in the realms of palaeontology and geology he may now be considered one of the glories of France". Teilhard de Chardin concludes with some revealing extracts from his own writings, commencing with letters from the War front in 1917. It is well illustrated and has been ably translated by R. A. Rudorff.

W. L. SUMNER

Stability of Nonlinear Control Systems

By Solomon Lefschetz. (Mathematics in Science and Engineering: a Series of Monographs and Textbooks, Vol. 13.) Pp. xi+150. (New York: Academic Press, Inc.; London: Academic Press, Inc. (London), Ltd., 1965.) 60s.

STUDY of the stability of a linear dynamical system with linear control is a fairly well-organized domain, since the full linearity permits use of standard algebraic techniques. But with non-linear control, even of a linear system, these techniques lose their efficacy. Here, thanks to Soviet mathematicians in the first place, the direct method of Liapounov has been exploited; some five years ago, the Rumanian mathematician Popov produced two remarkable theorems on sufficient conditions for stability, using convolution and Fourier transforms. This has prompted further work in the United States, with Lefschetz himself, Kalman and LaSalle making important contributions.

Lefschetz gives a terse description of this work, the high points being Popov's theorems and some complements; the book has the master's customary vitality, illuminating phraseology, and unerring selection and emphasis of critical points in the argument. Of course, the reader is expected to be sophisticated, and reasonably industrious in supplying details; but knowledge assumed is not more than the amount of matrix theory and transform methods normally contained in a good honours degree course. Thus the young mathematician, contemplating research in a field which is likely to yield large dividends, should find the present monograph an efficient survey and guide, bringing him right up to the front line of advance.

T. A. A. BROADBENT

The Structure of Atoms

By J. J. Lagowski. (Classic Researches in General Chemistry.) Pp. vii+120. (Boston and New York: Houghton Mifflin Company, 1964.) 1.95 dollars.

THE purpose of the series of paperbacks of which *The Structure of Atoms* is a member is to give first-year students of science a glimpse of the crucial discoveries through the eyes of the discoverers. In this book passages from original papers are set in a narrative which describes the development of the essential ideas in our modern picture of the atom, presenting each discovery against the background of contemporary ideas and knowledge.

The present work achieves its purpose very satisfactorily. It takes the reader through the evidence for the existence of atoms from chemistry and from the physics of gaseous discharges (quoting from Dalton, Avogadro and J. J. Thomson). A reasonably full account is given of the discovery of radioactivity and isotopes (quotations from, *inter alia*, Becquerel, the Curies, A. S. Russel, F. Soddy and H. G.-J. Moseley) and of the nuclear atom (Rutherford). The final chapter deals with the extra-nuclear structure (Bohr). For a short book the coverage is full, though one wished that Marie Curie's recognition that radioactivity is an atomic phenomenon had been discussed explicitly and not merely mentioned incidentally.

This book provides an opportunity to glance at some of the most important publications of the modern age for students who might not otherwise be able to read them. It should also interest those whose primary studies are in fields other than science. [The late] K. E. B. JAY