REVIEWS

Measure, Lebesgue Integrals, and Hilbert Space. By A. N. Kolmogorov and S. V. Fomin. (Academic Press, New York and London), 1961. Pp. xii + 143. Price $ 4.00.

This book constitutes the second volume of the programme of the course of lectures on "Elements of the Theory of Functions and Functional Analysis" delivered by Prof. Kolmogorov at the Moscow State University. It is significant that the contents of the volume before us should be based on the course of lectures repeatedly given by him in the Mechanics-Mathematics Faculty, for, in spite of their abstract nature, these topics play a prominent part in statistics and many branches of applied mathematics. The combination of the theory of Lebesgue measure and Lebesgue integral with the theory of Hilbert space may not, at first sight, appear quite appropriate, but the setting up on the basis of the first two topics, a space L_2 of the so-called square-integrable functions which is isomorphic with Hilbert space provides a natural connecting bridge.

An innovation in the development of the Lebesgue measure theory is the free use of Borel sets which possess the property that the sum, difference or product of two such sets is again a Borel set, so that a class of these sets forms a system of double composition. This fact is utilised to build up an elegant theory of measure by introducing quite early the abstract notions of rings, semirings, and algebras. A very interesting general result derived is that the system of all Lebesgue measurable sets is a Borel algebra with unit E. Another innovation is the use of plane sets from the very beginning, thereby affording an intuitive understanding of abstract concepts. For those used to Lebesgue measure on the line R_1, it comes as a surprise, on reading the first chapter, to realise how much more well adopted the plane R_2 is for the purpose of aiding the intuition. In particular, the construction on p. 14 of the example of a non-measurable set on the circle is very elegant in contrast to what appear to be trivial examples of such sets constructed in R_1. An unusual topic made specially intuitive by the use of plane sets is that of Jordan measure.

The use of algebraic methods is continued in the treatment of the Lebesgue integral also to make precise the notion of Borel measurable functions used in the development. Further preliminaries relate to the μ-measurability of a real function which is dealt with on lines closely paralleling the treatment of de la Vallè Poussin, and the introduction of a special type of what are known as simple functions. Based on all these, the Lebesgue integral is given a rigorous treatment, and one finds here a wealth of basic properties of this integral, including the important Tchebichev inequality, Fatou's theorem, and Radon's theorem. Nowhere, however, do we find a reference to the Lebesgue-Stieltjes integral except for a passing reference on p. 17 to Lebesgue-Stieltjes measures.

The last two chapters relate to Hilbert space H, and the first of these adopts an intuitive approach by introducing earlier the space L_2 of square integrable functions isomorphic to H, mentioned above. The treatment of the Lebesgue integral in the previous chapters is fully utilised to develop L_2 rigorously, and derive a series of very interesting properties of the same including the possibility of the introduction of orthogonal systems of functions, and the process of orthogonalisation. This topic which is of great interest in applications is treated comprehensively, culminating in the derivation of the fundamental Riesz-Fischer Theorem. Also considered in this chapter is the space l_2, dealt with by Prof. Kolmogorov in the first volume of the programme devoted to metric and normal spaces, *viz.*, the space whose elements are sequences of numbers $x = (x_1, x_2, \ldots)$ satisfying the relation $\sum_{n=1}^{\infty} x_n^2 < \infty$, and also isomorphic to H. The Riesz-Fischer theorem is used to establish directly the isomorphism of the spaces l_2 and L_2, and it is pointed out that this isomorphism is related closely to certain problems in quantum mechanics, for e.g., from the purely mathematical point of view, the difference between the 'matrix" and "wave" mechanics is reduced to the fact that in constructing the mathematical apparatus corresponding to each, Heisenberg used l_2, while Schrodinger used L_2.

The last chapter, specifically devoted to the abstract Hilbert pace H, defines this space by five axioms, and shows that both l_2 and L_2 satisfy these axioms. The notions of sub-spaces of H, the direct sum of Hilbert spaces, the linear and bilinear functionals in H the latter, when

symmetric, leading to adjoint operators and the completely continuous self-adjoint operators in H leading to orthonormal systems, eigen-values of operators, and the reduction of matrices to diagonal form have all been treated briefly, but clearly, and are of much value in applications. The last topic dealt with is the application of H to solve integral equations with symmetrical kernel, and the related questions of finding eigen-values and eigen-functions of the corresponding integral operators, on the classical Hilbert-Courant methodology.

The volume before us constitutes an excellent introduction to the three topics treated in it, from the points of view of both pure mathematics and theoretical physics.

B. S. MADHAVARAO

The New Age in Physics. By H. S. W. Massey. (Elek Books Ltd., 14, Great James Street, London, W.C. 1), 1960. Pp. 342. Price 42 *sh.*

The extraordinary developments that have taken place in recent years in technology and measurements have completely changed the phase of Physics. It is possible now to count individual atomic particles and to make visible their tracks in gases and liquids. The physicist nowadays can study the properties of certain unusual kinds of matter, which are available to him in amounts so small that the chemist processing a millionth of a gram of a substance for analysis would seem, by comparison, to be dealing with matter in bulk. Frequencies can be measured to one part in ten million, and time intervals as small as one thousand millionth of a second can be made significant in measurement and control. Linear accelarators two miles long can produce energy tens of billions of electron volts. Whereas three decades ago the average man of science was satisfied that there existed only, say, six fundamental particles, namely, a heavy mass (protonic) and a light mass (electronic) each of which can be associated with a plus, a minus, or a zero charge, now he is confounded with more than thirty particles which have been physically detected, and yet no one believes that the end has yet been reached. Half this number are antimatter! The oddest particle is the 'ghost' particle the neutron, whose most significant property is that it has no observable properties at all! And yet we know quite a lot about it and this knowledge has led to new ideas and new basic laws about the universe.

This phenomenal progress in physical science has naturally made great impact on everyday life, and the average intelligent man who has studied science in his school or college is naturally inquisitive to understand these developments. It is for this class of readers (and of course, not to speak of the professional scientists in other disciplines), that this book *The New Age in Physics*, by Professor Massey, is intended.

Professor Massey has set on himself the difficult task of explaining the latest techniques and results in physical research in non-technical terms, and without in the least sacrificing scientific accuracy he has admirably succeeded in this. The contents of the book can broadly be divided into three sections. The first three chapters are concerned with atoms, electrons and atomic structure, followed by two chapters on relativity and quantum mechanics. The next section is concerned with nuclear physics, fundamental particles, and behaviour of matter at high energies, and this occupies four chapters. The last section of three chapters takes the reader from atomic scale phenomena to large-scale phenomena and deal with radioastronomy, upper atmosphere, and artificial satellites and space probes.

The book provides excellent reading to the nonspecialists and the generally educated public. The diagrams and photographs have been carefully chosen to drive home the explanations in the text. The get-up of the book is excellent, and the large type used in printing will make the reading of the book a pleasure.

A. S. G.

Books on Quantum Mechanics: *Quantum Mechanics.* By Eugen Merzbacher. (John Wiley and Sons. New York-16, India: Asia Publishing House, Nicol Road, Bombay-1), 1961 Pp. xii + 544. Price $ 12.00; *Quantum Mechanics.* By J. L. Powell and B. Crasemann, 1961. Pp. x + 495. Price $ 9.75; *Introduction to Quantum Mechanics.* By R. H. Dicke and J. P. Wittke, 1961. Pp. xi + 369. Price $ 8.75. (Addison-Wesley Pub. Co., Inc., Reading, Massachusetts, U.S.A.

While it is true that quantum mechanics has not yet provided a consistent description of elementary particles and interacting fields, there is no doubt that its importance in applications to atoms, molecules, nuclei, radiation theories, solid state physics, etc., has shown enormous progress. The subject which two decades ago was confined to a few chapters only in books on theoretical physics, now has grown so vast that separate volumes are devoted to it.

Eugen Merzbacher develops the subject in three stages, firstly ordinary wave mechanics with solutions of simple problems, secondly the

matrix form of quantum mechanics, and lastly the more abstract Dirac formulation.

In the *Introduction to Quantum Mechanics*, the authors Dicke and Wittke by limiting the scope of the text to the non-relative theory are enabled to develop the subject in a logical way first, showing how the basic concepts of classical mechanics must be altered to explain many atomic-scale phenomena, second, laying the groundwork for the more formal approach to quantum mechanics and wave mechanics, indicating their use in well-known problems, and lastly extending the scope to many other problems which can be effectively handled by this mathematical tool. The last chapter deals with quantum statistical mechanics extending the application to problems of modern physics.

The third book under review by Powell and Crasemann is written in a more advanced level. After a few introductory chapters along historical lines, the subject proper is introduced through a discussion of linear operations, eigen functions and commutation relations. Then there is the development of the algebra of linear vector spaces, methods of matrix mechanics, perturbation theory and the theory of radiation transitions. The last chapter gives a brief treatment of identical particles.

The three books can be recommended as suitable text-books on the subject for the Honours and Post-graduate students of Indian Universities.

Introduction to Transients. By D. K. McCleery. (Chapman and Hall, 37, Essex Street, London, W.C. 2), 1961. Pp. xi + 232. Price 42 *sh.*

Transient phenomena, governed by the exponential law, are of fundamental importance in electric circuit theory. Solution of problems beyond the single RC or RL circuits is a feat of memory to an average student of engineering. The standard method of solving them that has come into vogue is by the use of the Laplace transformation and contour integral methods. Rightly, this gives a rigorous treatment to which no mathematician will take exception. But to an "*engineering man*" who may be excused for possessing but an ordinary knowledge of calculus, it becomes too difficult a tool to be used with confidence.

The author believes that a simpler approach is possible, namely, the operational calculus of Heaviside's, to solve nearly all cases of linear circuits. The treatment is simple and logical. The book will be found suitable to first year electrical engineering students and to those who take the Diploma Technical Course. The chapters include Transients in thermionic valves, Extension theorem and Applications to cables, Surges on transmission lines, The superposition principle and the Laplace transform, and Response of circuits to alternating stimuli. It is unfortunate that the author did not live to see the book in print.

Long Range Ballistic Missiles By Eric Burgess. (Chapman and Hall, 37, Essex St., London, W.C. 2), 1961. Pp. xii + 255. Price 35 *sh.*

The book gives a complete and readable survey of the ballistic missile field ; its history, basic theory, applications as space boosters, defence, submarine launched missiles and test facilities. To collect the material for the book the author, who is well-known for his previous books on space technology, rocketry, etc., travelled many thousands of miles across the United States visiting the missile ranges test centres, air bases, missile plants, etc. The book is well-illustrated and will appeal to the general reader who is interested in the subject.

The Methods of Plane Projective Geometry Based on the Use of General Homogeneous Co-ordinates. By E. A. Maxwell. (Cambridge University Press, London, N.W. 1), 1960. Pp. xix + 230. Price 13 *sh.* 6 *d.*

This book was first published in 1946 and has already gone through six reprints, which speaks for its popularity and demand amongst those for whom it has been intended. In this book the author has given an excellent introduction to the methods of projective geometry, based on the use of homogeneous co-ordinates. It is not merely a catalogue of theorems but an appreciation of the methods, and as such lays the foundations for extensions in the subject as for example, study of the geometry of figures in three dimensions or in higher spaces. A valuable feature of the book is the large number of carefully selected and graded problems for solution.

Boundary and Eigenvalue Problems in Mathematical Physics. By Hans Sagan. (John Wiley and Sons, Inc., 440, Park Avenue South, New York-16, N.Y.; India: Asia Publishing House, Bombay-1), 1961. Pp. xviii + 381. Price $ 9·50.

Graduate and Honours students of Physics of Indian Universities will find much useful material in this text-book. Written from the author's experience gained as a teacher and

based on his lectures to science and engineering students the book deals with a variety of topics.

The first three chapters deal with some basic concepts such as Hamilton's principle and the theory of the first variation, Partial differential equations applied to heat conduction, vibrating strings and membranes, and Bernoullis separation method for the solution of linear homogenous partial differential equations These concepts lend unity to the subject-matter developed in the remaining chapters of the book on Self-adjoint boundary value problems, characterization of eigenvalues by a variational principle, and the non-homogeneous boundary value problem.

Graded problems which follow almost every section will help the student in understanding the new techniques developed in the section and gaining confidence in their use. A good knowledge of vector analysis, convergence and differential equations is expected on the part of the reader.

Partial Differential Equations of Mathematical Physics. By Harry Bateman. (Cambridge University Press, London, N.W 1), 1961. Pp. xxii + 522. Price 27 *sh.* 6 *d.*

This unique reference book by Professor Bateman needs no new introduction or re-reviewing. Suffice it to say that it has been popular with the students of mathematical physics for nearly 30 years, *i.e.*, ever since its first publication in 1932. As is well known, in this book, the analysis has been developed chiefly with the aim of obtaining exact analytical expressions for the solution of the boundary problems of mathematical physics.

Cambridge University Press has put all students and teachers of mathematical physics under a debt of gratitude in bringing out this classical reference work in cheap paper cover edition so that every one of them may own a copy.

Chemical Instrumentation. By Howard A. Strobel. (Addison-Wesley Publishing Co. Inc., Reading, Massachusetts, U.S A.), 1960. Pp. 653. Price $ 9.75.

The fundamental purpose of all instrumentation is to seek information about the nature of a physical property and to use this information to regulate the process in such a manner that the measured quantity is maintained at the desired value. In the control of chemical processes, the chemical nature of the substance is normally indicated by a related physical property. The regulation is then achieved by controlling other parameters, such as temperature, flow, pressure or pH. In recent years, automatic control based on on-line chemical analysis has been applied with remarkable success in the process industry and it has become increasingly necessary for the chemical engineer and the control engineer to have a basic appreciation of the methods employed.

The book under review provides a systematic treatment of the methods of measurement and quantitative analysis of chemical composition. Based on a two-semester course to advanced undergraduates in chemistry, the text has a research orientation and there is a strong undercurrent of physical and chemical theory and of instrument design.

The success of the book is due, in a large measure, to the fact that the author presents physical theory without recourse to mathematics. The emphasis throughout has been on the need to develop a functional understanding of the methods and instruments used.

The Chapters are organized into four groups. The first (pages 1-36) defines the basic requirements of an instrument for indicating, recording and controlling and demonstrates how the static observations could be searched, methodically, to define their level of confidence. The second (pages 37–266) discusses "Opticometric" methods, *i.e.*, techniques based on the interaction of light and other electromagnetic radiation on matter. This part considers emission spectroscopy, absorption and scatter photometry, refractometry and polarimetry. The third section (pages 267-599) deals with "Electrometric" methods based on the measurement of electrical and electrochemical properties, such as conductivity, e.m.f, electrolysis and radioactivity. The final section (pages 600-645) describes twenty-four laboratory experiments, well organised to give the student a working familiarity with the handling of representative instruments.

The bibliography is exhaustive and well classified.

PREM J. BHATT.

Radio for Examinations. By H. I. F. Peel. (Cleaver-Hume Press Ltd., London), 1961. Pp vii + 364. Price 55 *sh.*

Radio for Examinations is a book written with the object of helping students appearing for certain professional examinations in England such as those of the City and Guilds, I.E.E., and the Brit. I.R.E.

The contents of the book cover the familiar examination topics such as tuned circuits,

amplifiers, oscillators, transmission lines, aerials, direction finding, receivers, television principles, loud-speakers, microphones, etc. The author's plan is to give a brief refresher survey of the important expressions relating to the subject-matter of each chapter and work out typical numerical problems from previous examinations. Only a reader who has previously studied the standard texts will be able to benefit from this book as the book is not intended as a substitute for the text-books. The book will be particularly useful to private students who have not had the normal training in answering examinations in a college. The rather high price of the book does not appear to be consistent with the object of making it a useful aid to students.

B. S. RAMAKRISHNA.

Comparative Biochemistry, Vol. II—*Free Energy and Biological Function*. Edited by M. Florkin and H. S. Mason. (Academic Press, New York; India: Asia Publishing House, Bombay-1), 1961. Pp. xi + 685. Price $ 20.00.

The second volume of the comprehensive treatise on comparative biochemistry deals with free energy and its relation to biological function. The opening contribution by Atkinson and Morton is concerned with free energy and the biosynthesis of phosphate esters which are invariably associated with energy utilization and synthesis of new cell material fundamental to life. The thermodynamic aspects of phosphoryl and phosphate transfer reactions, the mechanism of enzymatic synthesis of phosphates by transfer reactions and by reversal of phosphorolysis and pyrophosphorolysis and the importance of phosphoryl transfer sequences in metabolism are described in great detail. The utilization of free energy for the biosynthesis of saccharides is taken up in the next article by Leloir, Cardini and Cabib who discuss the interconversion and the synthesis of monosaccharides from carbon dioxide and as a result of reversal of glycolysis, free energy changes in the formation of glycosidic bonds and the biosynthesis of di-, oligo-, and polysaccharides.

Diversity in the nature and structure of proteins is the basis of metabolic and morphological changes and is a manifestation of differences in the genetic material. Chantrenne gives a lucid account of the comparative biochemistry of free energy utilization for the biosynthesis of peptides and proteins and draws attention to the striking similarity of the fundamental mechanism of protein synthesis. Cohen and Brown contribute an article on ammonia metabolism and urea biosynthesis in which several reactions involved in ammonia production and utilization are considered and the energetics of various systems discussed. The enzymatic steps in the synthesis of urea are treated extensively and emphasis is laid on the fundamental importance of carbamyl phosphate in all living cells because of its role in the synthesis of arginine and pyrimidines.

The mechanisms of muscular contraction and other forms of movements in motile structures in various organisms are considered in the next two chapters wherein the central role of actomyosin complex in muscular contraction and the importance of adenosine-triphosphate and alterations in the form of protein structures in most of the phenomena of biomotility are emphasized. Considerable space is allotted to topics like cellular permeability and the utilization of free energy accumulated in cells to achieve the proper distribution of ions between a cell and its environment and to maintain the structural mosaic responsible for the various permeability characters of living membranes. Four chapters are devoted to a detailed consideration of the phenomenon of active transport, the maintenance of the balance of water and other diffusible components and the mechanisms of osmoregulation, nerve conduction and electrical discharge. The importance of the proper distribution of ions between a nerve and its surroundings for the generation of bioelectric potential and for the subsequent use of this electric current through morphological adaptations to transmit messages between distant points of an organism, is stressed. In the last chapter on Bioluminescence, Newton Harvey gives a most satisfactory survey of a field which is rapidly growing in biochemical significance and interest. The general distribution of luminescence in the living world, the nature of the luciferin-luciferase reactions and the essential chemistry of light production in well-known luminescent systems like the firefly and the ostrocod crustacean, *Cypridina*, are all clearly explained.

The volume under review can be highly recommended as a valuable acquisition for all those interested in the study of comparative biochemistry.

P S SARMA.

Spores II. Edited by H. Orin Halvorson. (Burgess Publishing Company, Minneapolis 15, Minn.), 1961. Pp. ix + 296 Price $ 5.00

The bacterial spore is unique for its dormancy, and resistance to heat and injurious chemicals Study of bacterial spores is important both from

public health and industrial points of view as they are instrumental in the spread of some diseases and the spoilage of foods during storage. Further, some of the bacterial spore formers produce antibiotic substances which are finding use in animal feeds, and to a limited extent in internal medicine. Spores of Bacillus papillæ have been successfully used in the control of the Japanese beetle and it is possible that other spore formers may prove useful in the microbial control of noxious insects.

Notwithstanding the above compelling reasons, the study of bacterial spores has been neglected by experimental biologists. The reasons for this neglect are not far to seek. A dormant system is apparently not as interesting or exciting as a dynamic system. Also these are not as easily amenable to study as a dynamic system. So for long the challenge of the bacterial spore has gone unaccepted.

The study of bacterial spores has been greatly stimulated by three findings, namely the observation by Hills that spores germinate rapidly in a chemically defined medium consisting of a mixture of amino-acids and nucleotides, the discovery by Halvorson and associates of active heat resistant enzymes and the discovery by Powell that spores contain dipicolinic acid which is absent in the homologous vegetative cells. These observations have been greatly extended in the past few years and significant advances have been made in understanding the mechanisms of germination, sporulation and dormancy. The role of dipicolinic in the resistance of the bacterial spore to heat is becoming increasingly intelligible and bacterial spores deficient in dipicolinic acid and as sensitive to heat as the homologous vegetative cells but at the same time dormant have been produced. These developments augur well for further rapid advances in this interesting field.

Spores II contains papers and discussions on several aspects of spore physiology and cytology presented by recognized specialists at the Second Allertan Spore Conference attended by nearly 80 investigators from the United States, Canada and other countries. All the papers contain unpublished data and the book will be of interest and importance to microbiologists concerned with food preservation, public health and spore research. K. G. GOLLAKOTA.

Cytology and Evolution. By E. N. Willmer. (Academic Press, New York), 1960. Pp. 430. Price $ 10.00.

This is a novel and unorthodox approach to the problem of evolution of cells and tissues. It has been customary to view organic evolution in the context of recent advances in cytology and genetics But attempts at extension of these analyses to explain the organization and integration of cells into a well ordered system of organs and tissues during embryogeny has met with little success. The author views the problem of cell and tissue evolution from his experience in the study of tissue cultures. Starting with mechanoblasts (fibroblasts) and amœboblasts the possible evolution of the vertebrate cell families are indicated in a genealogical tree (p. 226).

"The internal organization of a cell is unbelievably complex on the molecular and even sub-microscopic level. The results, therefore, obtained by making extracts of cells or tissues is not unlike trying to find out the plan of the practical course in biological chemistry at a university by applying the most modern and efficient demolition machinery (*cf.* the Waring blender) to the biochemical laboratory, with all its contained and systematically arranged chemicals, and then analysing the fluid that subsequently runs down the drains." (p. 406).

How far the suspicions voiced recently that even normal tissues on continued sub-culture have a tendency to become malignant affect these speculations on cell evolution is not indicated Some of the photographs reproduced lack clarity. M. K. S.

The Glycolysis and Respiration of Tumours. By Alan C. Aisenberg. (Academic Press, New York and London), 1961. Pp. 223. Price $ 8.00.

Since the initial observations of Warburg in 1923 on the abnormally high rate of anaerobic glycolysis of the tumours, the problem of damaged respiratory balance in relation to ætiology of cancer is constantly under study. These studies evoked two controversial schools of thought. One belongs to the group of Potter and his colleagues and the other of Weinhouse and his co-workers. The author of the present book has succeeded in presenting the whole problem of energy metabolism of tumours in a balanced and critical manner. The author has maintained an unbroken chain of thought in the book by laying together the considerable information on the subject, in a continuous narration.

The first part of the book has been devoted to the different aspects of glycolysis of normal and malignant cells *in vivo* and *vitro*. The author has presented the massive data on the carbohydrate and intermediary metabolism of normal and malignant cells in a tabular form.

He has discussed at length (1) The hexose mono-phosphate shunt operating in tumour tissue, (2) role of cofactors in oxidation, (3) specific oxidative components of the tumours and tumour mitochondria. According to the author, the role of mitochondria in damaged respiration of malignant cells is still to be explored.

In the latter part of the book Warburg's theory of carcinogenesis, the Pasteur effect and the Crabtree effect have been set forth expanded. Lastly, he has tried to co-ordinate the abnormally high rate of glycolysis with the synthetic processes of tumour cells.

The book with its extensive bibliography relates the different aspects of energy metabolism in lucid style and has brought together contradictory experimental work under one cover. It will also be a valuable reference book for workers engaged in metabolic studies on cancer cells. It could therefore be stated that a monograph on this subject is a welcome addition to this important field of study.

V. R. KHANOLKAR.

Progress in Cryogenics, Vol. 3. Edited by K. Mendelssohn. (Heywood and Company Ltd., Tower House, Southampton Street, London, W.C. 2), 1961. Pp. vii + 173. Price 45 *sh.*

Historically low temperature research is linked up with liquefaction of gases. The phenomenan of superconductivity and superfluidity added importance to the subject. Now, however, low temperature studies, or Cryogenics as it is called, have expanded into such new fields as the operation of computers, and microwave amplifiers, the separation and storage of free radicals, the production of high magnetic fields for thermonuclear reactors, etc. Cryogenics is now closely related not only with fundamental problems of physics but has increasing applications in industry and technology. With the increase in the number of laboratories, both academic and industrial, engaged in low temperature studies literature on the subject is also getting scattered in the various journals and research bulletins. Workers in this field who would like to keep abreast of developments will welcome this new series "Progress in Cryogenics" published under the editorship of Prof. K. Mendelssohn.

Volume 3 contains critical reviews and up-to-date information on the following subjects: (1) "Helium Liquefiers", by A. J. Croft; (2) "Low Temperature Heat Exchangers", by A. G. Lenfestey; (3) "Novel Refrigeration Cycles and Devices", by W. E. Gifford; (4) "Cryogenic Rocket Propellants", by I. E. Smith; (5) "Paramagnetic Substances for Nuclear Orientation", by R. P. Hudson; (6) "Dynamic Nuclear Orientation", by C. D. Jeffries.

Books Received

The Surface Chemistry of Solids. By S. J. Gregg. (Chapman and Hall, 37, Essex Street, London, W.C. 2), 1961. Pp. xvii + 393. Price 60 *sh.*

The Nature of Life. By C. H. Waddington. (George Allen and Unwin, Ruskin House, 40, Museum Street, London, W.C. 1), 1961. Pp. 131. Price 18 *sh.*

Catalogue of Scientific Periodicals in Calcutta Libraries. Compiled by K. Bhattacharyya. (Asiatic Society, 1, Park Street, Calcutta-16), 1961. Pp. vii + 263.

Reports on Progress in Physics (Vol. XXIV). By A. C. Stickland. (The Institute of Physics and Physical Chemistry, London, S.W. 1), 1961. Pp. 424.

Electron Microscopy—A Hand Book for Biologist. By E. H. Mercer and M. S. C. Birbeck (Blackwell Scientific Publications, Oxford), 1961. Pp. vi + 76. Price 9 *sh.* 6 *d.*

Techniques for Electron Microscopy. Edited by Desmond Kay. (Blackwell Scientific Publications, Oxford), 1961. Pp. xvii + 331. Price £ 3·3 *sh.*

The Atom—Friend or Foe? By Charles Noel Martin. (George G. Harrap and Co., 182, High Holborn, London, W.C. 1), 1962. Pp. 236. Price 25 *sh.*

Biochemical Society Symposia No. 21—*The Structure and Biosynthesis of Macromolecules.* (Cambridge University Press, 200, Euston Road, London, N.W. 1), 1962. Pp. 131. Price 20 *sh.* (paper). 30 *sh.* (cloth).

Introduction to Theoretical Physical Chemistry. By Sidney Golden. (Addison-Wesley Pub. Co., Reading, Massachusetts), 1961. Pp. xi + 307. Price Rs. 10·75.

Advances in Inorganic Chemistry and Radiochemistry (Vol. III) By H. J. Emeleus and A. G. Sharpe. (Academic Press Inc., New York; India: Asia Publishing House, Bombay-1), 1961. Pp. ix + 463. Price $ 12.50.

British Medical Bulletin—Genetics of Micro-Organisms. Vol. XVIII, No. 1, January 1962. (The Medical Department, The British Council, 65, Davies Street, London, W. 1), 1962 Pp 88. Price 20 *sh.*

Elementary Zoology. By M. A. Moghe (Macmillan and Co., 6, Patullo Road, Madras-2), 1962. Pp. viii + 311. Price Rs. 6 50.