REVIEWS

A History of Luminescence from the Earliest Times Until 1900. By E. Newton Harvey. (Published by the American Philosophical Society.) Pp. 692. Price $ 6.00.

The author of this volume engaged himself for many years in investigations on the production of light by luminous organisms. The results of these researches have found publication in numerous original papers and in a series of monographs. The book by him entitled "Living Light" published by the Princeton University Press in the year 1940 is a particularly attractive exposition of the subject. In the course of his studies, Prof. Newton Harvey had to delve deeply into the literature of the subject, and the present volume describes the results of these explorations. It covers a much wider field than that of animal luminescence and indeed surveys the entire literature of luminescence of living as well as of non-living material, including in the term every kind of light emission except thermal radiation.

Part I of the book is a historical survey of the subject from the remotest times up to the end of the 19th century. Part II deals in detail with the luminescence of non-living material under various heads, *viz.*, electroluminescence, phosphorescence, thermoluminescence, tribo-, piezo-, cristallo-, lyo-luminescence, fluorescence, radio-luminescence and finally chemiluminescence. Part III deals with bio-luminescence under three heads, *viz.*, shining fish, flesh and wood, phosphorescence of the sea, and animal luminescence. The book contains a selected bibliography covering some sixty pages of the work, and also some illustrations of historic interest.

The spirit in which the book has been written is indicated by the quotation on the title page: "It is a noble employment to rescue from oblivion those who deserve to be remembered." It may be remarked in this connection that the present pace of scientific research is such that for a paper to be remembered and quoted after two decades is rather exceptional. But the extraordinary interest of the subject and the fact that its origins go back to the beginnings of science appears to justify the loving labour which the author has devoted to his self-imposed task. The book is a mine of information to those interested in the history of science. Reading it through, one recaptures the enthusiasms of the past, as for example, the enormous furore created by the discovery of the Bolognian stone at the beginnnig of the 17th century. One also comes across in its pages, the names of men the memory of whose achievements does not need to be rescued from oblivion, as for example, Robert Boyle, Sir George Stokes, and the Becquerels. The work of such men will always be remembered, since they were the great path-finders.

The autnor of the book as well as the American Philosophical Society are to be heartily congratulated on this scholarly publication which will remain of permanent value to the historian of science.

C. V. R.

Industrial Electronics Handbook. By Dr. R. Kretzmann. (Philips Technical Library), 1956. Pp. 298. Price 42 *sh.*

In the present era of automation, control of industrial machinery and industrial processes is relegated to electronic and electric devices which function according to a predetermined set of instructions. High reliability of operation combined with an almost inertialess response of these devices have gained them a great popularity, and in the field of application of atomic energy where many operations have to be manipulated by remote control, their use is a rule rather than an exception. Today, industrial electronics is a highly developed subject and according to the needs, special types of tubes have been developed and innumerable new circuits have been invented. It is therefore imperative, that an industrial engineer who is not a specialist in electronics should have a basic knowledge of the several types of tubes and control circuits that are available, so that he can make use of such devices that would suit his needs.

The book under review provides relevant information regarding basic principles of a number of electron tubes and circuits which are widely used in various applications. Part I of the book is principally devoted to a consideration of the fundamental aspects of several gas-filled and vacuum tubes and their basic circuits. Rectifying tubes, thyratrons, ignitrons, excitrons, voltage stabilisers, photocells, trigger tubes, cathode ray tubes and vacuum tubes come under its purview.

In Part II electronic relays, electronic counting circuits, electronic timers, industrial rectifier

circuits, electronic dimming of lamps, circuits for speed and temperature control, electronic control of resistance welding, electronic motor control, high frequency inductive heating of metals, high frequency capacitive heating of dielectric materials and other electronic apparatus for a few miscellaneous applications are dealt with. A lucid account of the principles of operation of the circuitory is given under each application with numerous circuit diagrams and graphs. For several of these applications, complete circuits employing Philips valves with component values are given. Mathematical relationships of electrical quantities involved, are briefly discussed in the appropriate places, in order to give an outline of general design considerations. Data of some preferred types of Philips tubes for industrial application are given at the end.

The get-up of the book leaves nothing to be desired as all the Philips publications are, and the entire matter is printed in beautiful art paper. The book is very informative and would be welcomed by all those, who are interested in the applications of electronic techniques.

X-ray Attenuation Coefficients from 10 kev. to 100 Mev. By Gladys White Grodstein. (National Bureau of Standards Circular 583, issued April 30, 1957.) (Order from Superintendent of Documents, U.S. Government Printing Office, Washington-25, D.C.) Pp. 54. Price 35 cents.

This publication results from widespread requests for basic input data for evaluating the penetration of radiation. Some of the data presented in this NBS Circular has already been published in radiological handbooks and technical journals. The present form is a more extensive and systematic study. It will be useful to physicists studying basic problems in radiation and nuclear physics, to physicians and hospitals utilizing radiation from X-ray generators and gamma rays from radioactive substances, and to designers of shielding for nuclear reactors.

In addition to tabular and graphical data for 29 absorbing materials, which make up the bulk of the publication, there is a discussion of the principal absorption and scattering processes involved in the interaction of radiation with matter: namely, photoelectric effect, scattering (Compton and Rayleigh), and pair production. Existing theoretical and experimental data for these processes have been compiled and evaluated.

Separate tabulations have been made for the probabilities of the dominant interactions as well as the total attenuation coefficient—the sum of the above processes. It appears that the present information is adequate for many applications. However, improved theory and additional experimental data are needed in certain areas. This need is pointed out by a comparison of the calculated and experimental coefficients.

Industrial Electronics Circuits. By R. Kretzmann. Philips Technical Library), 1957. Pp. 199. Price 35 *sh.*

This book is a sequel to *Industrial Electronics Handbook* by the same author and the two together form a continuous whole. A vast number of circuits, employed for industrial controls and in making electronic equipment for varied purposes, are given. The circuits described use Philips tubes and are complete with component values. Brief descriptions as to the nature of the circuits and the manner in which they function make the work, of immense interest.

Circuits appear under six major classifications: (1) photoelectrically controlled apparatus, (2) counting circuits, (3) stabilising circuits, (4) contact and control devices, (5) oscillator and amplifier circuits, (6) rectifier and motor control circuits. These six headings cover well over 90 separate applications, and in the opinion of the reviewer contains a wealth of circuitory that will interest industrial engineers, technicians and all those who are engaged in the building and development of electronic equipment.

The book is beautifully got up and is simple and clear in its presentation. It is certainly a very useful and welcome addition to the one, mentioned at the outset by the same author.

Chromatography: A Review of Principles and Applications. Second completely revised and enlarged edition. By E. Lederer and M. Lederer. (Elsevier Publishing Co.), 1957. Pp. xx + 711. Price 72 *sh.*

The first edition of this book was published in 1953 and was subsequently reprinted in 1954 and 1955. The present second edition was projected on account of the need to bring the matter up-to-date and also to eliminate work which had become obsolete. The result is a major revision as will be clear from the fact that the volume contains 50% more pages, illustrations and Rf tables than the first edition and twice the number of references; the authors have also added an Appendix of references published after the book went to Press.

As a technique for the analysis of mixtures of chemical compounds, chromatography is

unique in its importance. Though Tswett introduced it about the beginning of this century it has developed rapidly during the past three decades beyond all expectations and it is still a rapidly expanding field. It markedly differs from other standard laboratory methods of separation in employing a wide variety of techniques, adsorbents and solvents.

The book begins with a brief history of chromatography and contains five divisions, each division having a number of chapters. The first three divisions deal with adsorption chromatography, ion exchange chromatography and partition chromatography which constitute the three major types. In each division the technique is discussed with reference to the apparatus, materials and special features. Division IV deals with the chromatography of organic substances in the course of 21 chapters constituting more than half the book. This provides a comprehensive account of a large number of groups of organic compounds in relation to their chromatography. The last division (V) concerns the chromatography of inorganic substances. Literature references occupy nearly 100 pages and the index is comprehensive.

This book presents a critical review of the chromatographic methods developed during recent years. It provides information on existing methods in any given field and the literature references help in obtaining necessary details from original papers. The large collection of Rf values is an important feature of the book. Written by authors who are among the pioneers in the use of chromatographic techniques, the book is invaluable to all investigators in the fields of organic and inorganic chemistry for whom the method is of daily use.

T. R. SESHADRI.

Methods of Biochemical Analysis. Vol. IV. Edited by David Glick. (Interscience Publishers, Inc.), 1957. Pp. ix + 362. Price $ 8.50.

The ever-increasing pace of biochemical research has created the need, on the part of the investigator, the teacher and the student alike, to keep abreast of developments in methods and techniques and hence an annual review service is of distinct value for the growth of fundamental research. Necessarily only a few subjects can be included in any single volume and a certain amount of haphazardness cannot, therefore, be avoided. Nevertheless a judicious selection of topics of current importance is made each time. While there has been a generally uniform pattern in the organization of individual chapters, there is also considerable variation in style and presentation which allows for the projection of the author's own expression. The topics have included physical, chemical and biological assay procedures as well as basic techniques and instrumentation for determination of enzymes, vitamins, hormones, carbohydrates, lipids, proteins, minerals, other metabolites and antimetabolites.

The present volume has contributions relating to determinations of carotene, vitamin A, polyunsaturated fatty acids, urinary ketosteroids, amino acids by use of bacterial amino acid decarboxylases, serum acid phosphatases, sulfatases and succinic dehydrogenase activity, and one on the maintenance of constant pH for kinetic studies in biological systems. Each chapter presents a critical evaluation of various approaches and a presentation of the procedural details of the methods recommended by the authors. The close association of the authors with the respective fields renders these reviews particularly useful and authoritative.

A. S.

The Chemistry of Heterocyclic Compounds, Vol. X. (1, 2, 3- *and* 1, 2, 4-*Triazines, Tetrazines and Pentazines and Their Derivatives.)* By J. G. Erickson, P. F. Wiley and V. P. Wystrach. (Interscience Publishers, Inc.), 1957. Pp. xi + 261. Price $ 10.50.

The chemistry of triazines and tetrazines are so intriguing that few venture into this field, although members of this heterocyclic group offer fertile opportunities for fine structure determination. The appearance of the book under review is sure to help prospective workers to formulate schemes of investigation.

Three triazines are theoretically possible: the 1, 2, 3-, the 1, 2, 4-, and the 1, 3, 5-triazines. The parent compounds are unknown, but derivatives of each have been prepared. The chemistry of the 1, 2, 3- and the 1, 2, 4-triazines has been treated exhaustively by Dr. J. G. Erickson. The 1, 2, 3-triazines condensed with carbocycles have been investigated more intensively and Chapter I affords the reader a thorough review of the chemistry of the system. The almost certain presence of the grouping -N : N-N- makes the system easy of cleavage and hence structural determination creates many difficult points of ambiguity. All these are clearly explained.

The first synthesis of a 1, 2, 4-triazine was reported in 1889 and as far as is known this system seems to have offered no widespread utility. The parent of this class can exist in two non-equivalent Kekule' forms. Two compounds are known in which a 1, 2, 4 ring has one carbon atom in common with a pentane ring

constituting spiro-rings. Cyclic 1, 2-diquinones react to form condensed 1, 2, 4-triazines, the reaction of camphorquinone being illustrative of the same. Many compounds of the 1, 2, 4-benzo-triazine group are known, and those condensed with heterocycles have attracted attention. Chapter II gives a very delightful account of all the known facts about 1, 2, 4-triazines.

The study of 1, 2, 3, 4-tetrazines probably originated from investigations on the oxidation products of osazones of 1, 2-diketones. Chapter III, written in clear style by Dr. V. P Wystrach, is devoted to the synthesis and reactions of 1, 2, 3, 4-tetrazines. As a class they have not been very extensively studied. The general method of synthesis arose from the work of Zincke and Lawson (1886) on the chemistry of certain azo-compounds. No compound containing the 1, 2, 3, 5- or *as*-tetrazine ring has yet been described. The 1, 2, 4, 5- or *s*-tetrazine and its dihydro-, tetrahydro-, and hexahydro-derivatives have received considerable attention. The chemistry of this group has been presented in a delightful manner by Dr. P. F. Wiley. The colour schemes of these compounds present interesting speculation. *s*-Tetrazines are deeply coloured, being deep red, bluish-red, or violet-red. The dihydro derivatives are usually white or yellow solids, the tetrahydro- and hexahydro-*s*-tetrazines are white solids. The pentazines should still be considered as not having been synthesised, the compounds claimed to be pentazines seem to be tetrazole derivatives.

The monographs on the chemistry of heterocyclic compounds have given researchers instructive reading matter. The present volume, the tenth in the series, gives a comprehensive account of a group of compounds which are not usually even mentioned in many text-books. It is a very welcome addition to literature and is sure to give much profit to those who study the volume carefully.

K. N. MENON.

The Physiology of Reproduction in Fungi. By Lilian E. Hawker. (*Cambridge Monographs in Experimental Biology*, No. 6.) (Cambridge University Press, Cambridge), 1957. Pp. 128. Price 15 *sh*.

Dr. Lilian Hawker's *Physiology of Reproduction in Fungi*, which has just appeared as the sixth in the series of the Cambridge Monographs in Experimental Biology, is a worthy addition to that series. It may be read as a follow-up of Professor Ingold's excellent book on "Dispersal in Fungi", published a few years ago.

The book is intended as a survey of the available information on the physiology of reproduction in fungi which is indeed a field of fascinating and useful interest in experimental mycology and one which doubtless deserves more attention from investigators that it has received hitherto. Following an Introduction, the book is divided into six Chapters: (*i*) The growth of spores and of spore-bearing structures; (*ii*) The physiology of vegetative reproduction; (*iii*) The effect of environment on sporulation; (*iv*) The effect of nutrition on sporulation; (*v*) The physiology of sex; and (*vi*) Reproduction in the natural habitat. The book concludes with a useful bibliography giving full citations of all the papers referred to in the text and an index.

As a review of this complex field of experimental research, this book is an achievement for its learned author and a most useful and concise summary for those interested in the physiology of fungi. The entire subject is dealt with most lucidly and written in a simple and precise style with little of what may be termed 'horrid and frightening scientific jargon'. In particular, the Chapters on the effect of environment on sporulation, on the effect of nutrition on sporulation and on the physiology of sex are examples of elegant presentation of information spiced with discrete and stimulating discussion. Hypotheses relating to metabolism and the reproductive phase, and to heterothallism and the physiology of sex in fungi are admirably stated and critically discussed on the basis of available experimental evidence. There is no doubt that the lucid and critical analyses of these fascinating facets of fungal physiology would stimulate thought and further work on these problems, and this in itself should commend the book for careful study.

There are, however, one or two lines on which improvement may be sought in future editions of this valuable book. A greater emphasis on techniques would doubtless be useful for investigators; for instance, mention is made on page 87 of Raper's use of a perfusion technique for demonstration of chemical control of sexual reproduction in fungi. Whilst details of this technique can be gathered from Raper's original paper, brief elucidation of these in the text of the present book would have been useful. Many other similar examples can be cited. Indeed, a chapter on techniques, if included in future editions of this book, would prove most useful for investigators. Another deficiency (if that is a deficiency at all) is the somewhat cursory treatment of the subject under the

Chapter on "Reproduction in the natural habitat". Whilst mention is rightly made of the excellent and painstaking work of Wilkins and his collaborators on the ecology and fruiting of fungi in natural habitats, the notable work of Friedrich and others in this field is omitted. Again, under Chapter 5 on the effect of nutrition on sporulation, the effect of trace elements on sporulation could have been dealt with in greater detail.

Notwithstanding these omissions, Dr. Hawker's book ranks as the first in introducing in detail the physiology of reproduction in fungi to scientific readers. It is a difficult task admirably fulfilled within the small compass of 128 pages and is well worth the price of fifteen shillings and, what is more, worth repeated reading and careful study by mycologists investigating fungal physiology.

C. V. S.

Advances in Enzymology, Vol. 18. Edited by F. F. Nord. (Interscience Publishers, Inc.). 1957. Pp. v + 435. Price $ 9.00.

Few other volumes on advances in Biochemistry have become so indispensable as those on advances in Enzymology, and it is, therefore, pleasing to note, that in the present volume, which is the eighteenth in this series, Editor Nord has maintained the same high standards of excellence of the earlier volumes, both in the selection as well as in the editing of the review articles. There are nine reviews in all in this volume and most of them have been drawn from the biochemistry of the plant kingdom. The first article on 'Cytochrome in Higher Plants' by E. F. Hartree gives a most up-to-date and readable account of the nature and properties of the cytochrome components, their distribution, detection and estimation as also the interrelationship which exists between cytochrome and photosynthesis. Another article in the same field is the one entitled, 'Reaction Paths in the Respiration of Higher Plants' by W. O. James. The author reviews the various pathways of carbon metabolism in plants including a survey of the enzymes concerned in electron transfer and in phosphate transfer. R. A. Peters, in his article, gives an account of the mechanism of the toxicity of the active constituents of South African cattle poison, *Dichapetalum cymosum*, as well as of related compounds. He has, however, confined himself to a consideration of only the monosubstituted CF compounds such as their general toxicity and the biochemistry of fluoracetate and its mode of action and has made no attempt to deal with CF_2 or CF_3 compounds. Other articles which are of equal interest and importance are: (*i*) Newer knowledge of succinic dehydrogenase, by T. P. Singer, E. B. Kearney and V. Massey; (*ii*) Deoxy Ribonucleo-protein, A Genetic Material, by J. A. V. Butler and P. F. Davison; (*iii*) Pyrophosphorylases and Phosphorylases in Biosynthetic Reactions, by A. Kornberg, (*iv*) Le-role Biosynthetique du Cycle des Acides Tricarboxyliques, by J. M. Wiame, (*v*) Chemistry and Function of Lipoic Acid, by L. J. Reed; and (*vi*) Lignification, by W. J. Schubert and F. F. Nord. However, the newer knowledge about succinic dehydrogenase will have to be necessarily supplemented by the recent advances reported in this field by D. E. Green and others and the same appears to be true in regard to such other articles as deoxyribonucleoprotein and lipoic acid, where significant progress has taken place since the publication of this volume. All the same, the several articles presented here serve a very useful purpose of focussing attention of the biochemist to the very rapidly advancing frontiers of biochemical knowledge and coming as they do from authors who have spent years of study and research in these different fields, they are most enjoyable to read and thought-provoking in the extreme. There are a few misprints in the text such as adenine for adenosine in page 222 and DNA for DNP in page 161; but these are minor blemishes in what is otherwise an excellent volume, elegantly printed with cumulative index for volumes one to eighteen. Undoubtedly, biochemists will find the volume under review, extremely useful to keep abreast of recent advances in enzyme chemistry.

P. S. Sarma.

Books Received

A Second Course of Electricity. By A. E. E. Mckenzie. (Cambridge Univ. Press, London, N.W. 1), 1956. Pp. viii + 357. Price 18 *sh.*

The Effects of the Sulfonylureas and Related Compounds in Experimental and Clinical Diabetes. By Rachmiel Levine and others. (*Annals of N.Y. Acad. Sciences,* Vol. 71, Art. 1, 2, East Sixty-third Street, New York-21), 1957. Pp. 292. Price $ 4.00.

Advances in Food Research, Vol. VII. Edited by E. M. Mrak and G. F. Stewart. (Academic Press, Inc.), 1957. Pp. x + 404. Price $ 9.50.

A Practical Guide to Plant Sociology. By F. R. Bharucha, N. C. Deleeuw. (Orient Longmans, Nicol Road, Bombay-1.) Pp. v + 46.

Transactions of the Society of Rheology, Vol. I. Edited by B. Maxwell and R. D. Andrews. (Interscience Pub.), 1957. Pp. 222. Price $ 6.00.