
REVIEWS

The Evolution of Development. By J. T. Bonner. (Cambridge University Press, Bentley House, 200, Euston Road, London, N.W. 1), 1958. Pp. 102. Price 17 s. 6 d.

Dr. Bonner's controversial lectures given at University College, London, less than two years ago have now been printed. They were controversial because they demanded imagination and humility. His critics were whisked from subjects about which they had never heard, and therefore had no previous interest, to those about which they were so convinced that "they knew it all before" that they switched off mentally, and so did not recognise that it was at least being said "inside out", and often in consequence, it was not only surprising but constructive.

For example, Dr. Bonner's main attack is one of the most well-tryed in biology. He examines the efficient causes of an evolutionary advance by the method of comparing the many unsatisfactory attempts to solve it; as for example, an understanding of the function of the reptilian-avian egg may be sought in a comparison of the many kinds of terrestrial eggs of amphibia and fishes; and discussion of the "conquest of the land" requires an understanding of the stimuli that bring so many fish species up to gulp atmospheric air.

But Dr. Bonner applies this method to the very general problem of a repeated development of multicellularity from a unicellular zygote by each individual (*Sensu lato*) in every generation, and he can speak of the solutions not in this anthropomorphic, creationist, finalistic vocabulary which I have used, but as the result of past and continuing selection pressures. The nature of embryologist's material makes this especially difficult for them—witness their leanings towards Lysenkoism.

I think many young people may (perhaps) overestimate Dr. Bonner, because they will remember all their lives the excitement with which they read this book. It is especially recommended to Indian readers because it gives some glimpse of the *bhakti* which is inseparable from this sort of biological research in the West, and is so sadly rare in this country.

H. SPURWAY.

Biological Ultrastructure. By Arne Engstrom and J. B. Finean. (Academic Press, Inc., New York), 1958. Pp. ix + 326. Price \$ 8.00.

The field of biological ultrastructure and the molecular organisation in living systems has attracted a great many workers from diverse fields like histology, biochemistry and X-Ray crystallography. The results of their researches have contributed to the vast growth of the subject in recent times. The aim of the book according to the authors is to provide an introductory account of the subject to students and research workers in a variety of areas ranging from zoology and botany, medicine and pathology to biochemistry and biophysics. In this aim the authors have achieved good success.

Nearly a third of the book forms the prologue to the main theme, developed in the rest of the pages, and deals with the methods in ultrastructural research and the principles of molecular structure. The latter topic is bound to be particularly useful to those who are not very familiar with the principles of stereochemistry and the reactivities of the various simple molecular groupings. Though it is not possible to give, in a book of this size, anything but a short account of any of the topics chosen, one still wishes that the chapter on experimental procedures were treated in greater detail.

The subject-matter of this book—molecular organisation in living systems—is treated under five chapters, viz., the role of proteins, lipids, nucleic acids, carbohydrates and minerals. These contain much of recent work on the structural models of many macromolecules, their aggregations and their mutual interactions. Wherever it is possible to speculate, ideas are given about the mechanism governing the synthesis of these macromolecules in the living systems and the subsequent formation of the morphologically distinguishable components. Perhaps some of the ideas presented in this volume are likely to be modified in the wake of further researches. But, as it is, the book gives an excellent account of the present state of knowledge and the trend of further research in this field.

The book is very well written: the presentation is remarkably original and the style generally very lucid. There are few misprints and the get-up is excellent. The most attractive

feature of this book is, however, the abundance of illustrations and diagrams—all beautifully reduced. The book will prove to be an important and a very useful aid to all those interested in biological research.

Y. T. THATHACHARI.

Bioenergetics. By Albert Szent-Gyorgyi. (The Academic Press, Inc., New York), 1957. Pp. x + 143. Price \$4.50.

This is a highly readable book written by one of world's greatest workers and thinkers in the field of biochemistry. It contains three almost equal parts: (1) General considerations, (2) Biological Structures and Functions, (3) On Drugs, Hormones and Diseases. The object of the book is stated as follows. One of the most characteristic features of present-day biochemistry is the co-existence of highlights with darkness, knowledge with ignorance. While we have an astounding knowledge about the processes in which our foods are used to build our body, we know nothing about how energy is driving life. The book represents an attempt to provide this knowledge.

In the beginning of the first part, the problem is stated clearly using the well-known subject of muscle contraction as example. The conclusion is reached that the energetics of the living world consist of only two processes: photosynthesis and its reversal. The energy stored up in the molecule by the former process is marked (E) and the excitational energy as E^* ; the transformation is then represented as $(E) \rightarrow E^* \rightarrow W$. The author then develops the idea of the transmission of energy from one part of a molecule to another by means of free electrons. The phenomenon of fluorescence is used to indicate that the molecule is capable of accepting and transmitting energy and does not dissipate it. In this process water plays an important part as a regulatory influence. Its capacity is attributed to its strong dipole nature and its tendency build structure-ordered layers around surfaces reaching deep into the fluid phase. The water structures built around dissolved molecules will vary with the atomic groupings involved. The dimensions and the nature of the 'ice bergs' will decide how far these molecules can approach one another and interact. A further conclusion is that within the water structure electronic excitations may assume an unusual long-lived form suited for biological energy transmissions. Water and the

electromagnetic field are thus considered to provide the matrix of life. In this line of thought the phenomenon of quenching and the part played by quenchers provide useful information regarding the mechanism of interference with excitation.

The ideas developed in Part I are applied in Part II to biological structures and functions. The explanation of molecular contraction is as follows: the myosin particle is kept stretched out by its water structures; contraction is induced by the collapse of these structures, the re-establishment of which is relaxation. The A.T.P. molecule is considered to be not only a storage battery, but also a transformer and it is able to perform its function because of the correct dispositions of the concerned oxygen and nitrogen atoms and for a similar reason riboflavin phosphate is efficient in oxidative phosphorylation. Then follows a discussion of the effect of ions, glutathione, sugars and alcohols, oxidative phosphorylation and uncoupling.

The final part dealing with Drugs, Hormones and Diseases starts with the declaration: "The author's research has always been dominated by the idea that there is but one living matter which has overgrown this globe's surface, taking on different shapes, sizes, colours and complexities, adapting itself to different conditions. In spite of the great variations in its appearance life is built on the same limited number of basic principles, wherever and in whatever form we meet it; there is no real difference between cabbages and kings. But if the foundations of normal life are simpler than its appearance, then the same may be true also for disease, and a great variety of symptoms can be caused by disturbance of single basic mechanisms, and the way in which disease declares itself may have no direct relation to the underlying cause". It is followed by an interesting discussion of a few typical drugs and of diseases, Myotonia, Myasthenia and Cancer.

The author concludes, "I have no doubts that the coming century will witness a profound revolution, extension of biology, the establishment of a quantum mechanical biochemistry, built on top of the Lucretian one. This book may be but one of the early swallows of this spring".

The book provides most fascinating reading and is fully thought-provoking. It is not a textbook for the uninitiated, but can provide the excitational energy for scientific adventure.

T. R. S.

The Spectroscopy of Flames. By A. G. Gaydon (Chapman & Hall), 1957. Pp. x + 279. Price 50 sh.

The great utility of the study of flame spectra lies in its ability to yield information about intermediate products in combustion processes. Since these intermediate products, called radicals, have a life-time of the order of 10^{-8} sec., their presence cannot be detected by any chemical means. Combustion plays a vital role in generation of energy in many important means of transport such as the internal combustion engines in motor cars, aeroplanes, etc. The advent of jet engines and rockets flying at speeds greater than that of sound (supersonic flow) give rise to phenomenon of shock waves, which are amenable to analysis by flame spectra. A book dealing with such wide applications of flame spectra is therefore greatly welcome.

In earlier years, the principal interest in the study of flame spectra lay in identifying the radicals giving rise to various spectra. Well-known among those were the water vapour bands (OH), hydrocarbon bands (CH) and carbon bands (C^2), which are also of great astrophysical importance. Now, however, successful efforts have been made to understand what part such radicals play in combustion processes. Since information about chemical reactions can be obtained by better control of the flame, or the nature of the reacting species, new experimental techniques have been developed, among which are flat flames, low pressure flames, low temperature flames, atomic flames, flash-photolysis, and shock tube excitations. These are described in Chapter III.

Three chapters cover discussions of the spectra of well-known flames, like hydrogen, carbon monoxide and hydrocarbon flames. The problems which arise in individual flames, such as the nature of the emitter of CO flame bands or the intensity distribution of OH bands are treated in detail. In a separate chapter (Chapter VIII) are described spectroscopic methods of measuring flame temperatures (vibrational, rotational and translational) which have yielded valuable data regarding the mechanism of production of different radicals.

Chapter X has been devoted to an interpretation of the spectroscopic data described in previous chapters. This deals with the nature of chemical reactions in cool flames, diffusion flames, premixed flames and the reactions forming excited radicals.

Flames produced in inaccessible regions such as the internal combustion engines and the jet

engines have been studied spectroscopically, which has thrown considerable light on the phenomenon of "knock" and the nature of exhaust flames in jet engines. These are discussed in Chapter XI.

Other flames, whose spectra are described in the book (Chapter XII), are various organic flames, like NH_3 , halogens, etc. Infra-red emission from flames is also included in a separate chapter (Chapter IX).

The book has several plates and an appendix giving data on the characteristics of band-spectra emitted by flames.

Spectroscopic studies of combustion is an important field of research, particularly with the advent of jet engines and rockets. A book devoted to such a subject is of considerable help to research workers in this field. The book will also be useful to those who wish to get acquainted with the contributions of spectroscopy to a better understanding of the phenomenon of combustion.

V. M. W.

Infra-red Absorption Spectra of Steroids—An Atlas, Vol. II. By G. Roberts, B. S. Gallather and R. N. Jones. (Interscience Publishers, New York), 1958. Pp. 95. Price \$ 20.

The highly characteristic infra-red absorption spectra exhibited by individual steroids have been often utilized for the identification of these compounds. As the amount of the compound involved is minute in quantity, this method of 'fingerprint' analysis is the simplest and at the same time most precise. The present volume contains, besides, an introductory chapter and table of characteristic group frequencies, 452 spectral charts of diverse compounds the region of absorption recorded ranging in general from 600 to $1,800\text{ cm}^{-1}$ and in some cases up to $4,000\text{ cm}^{-1}$. The present atlas will prove valuable to all laboratories engaged in the isolation, synthesis and identification of steroids and related natural products.

D. K.

Absorption Spectrophotometry. Second Edition. By G. F. Lothian. (Hilger & Watts, Ltd., London), 1958. Pp. viii + 246. Price 52 sh.

Most of the chapters of this second edition on absorption spectrophotometry have been rewritten to keep in step with the vast developments that have taken place in this subject since 1949, when the first edition was published. The book is divided into three parts dealing

with the principles, applications and techniques of spectrophotometry. In the first part are dealt, in detail, the effects of finite slit widths, measurements on diffusing specimens and the total intensity of a band. A few typical examples of the several growing applications of spectrophotometry are discussed in the second part. The third part is devoted to the modern instrumentation, which covers also the vacuum ultra-violet region. The design, operation and adjustment of the instruments and related topics like cells, solvents and standards also figure in this section. The book includes a list of publication on the subject for further reading and exhaustive references to recent original papers and commends itself as a valuable introductory text to students and workers in this field.

D. K.

Colorimetric Determination of Non-Metals.

Edited by David F. Boltz. *Chemical Analysis*, Vol. VIII. (Interscience Publishers, Inc., New York), 1958. Pp. xii + 372. Price \$8.50.

The literature covering the field of Colorimetry continues to grow. It is not always possible for any publication to keep pace with the published work on many divisions of Chemistry. In Colorimetry new methods, modified classical methods, improved techniques, and better instrumentation have resulted in many interesting developments.

This book is the eighth volume in the "Chemical Analysis" series of monographs published by the Interscience Publishers. This volume and the volume (Vol. 3) on "Colorimetric Determination of Traces of Metals" published by the same publishers together are intended to form a complete unit. The publication of a book of this type was overdue. Numerous methods have been perfected for the colorimetric determination of metals and a number of publications are available on this subject. However, reliable methods on the colorimetric determination of non-metals are meagre and they are mostly indirect.

The book is divided into eleven chapters and the first introductory chapter deals with the general principles and practices of colorimetric analysis under the heads of Visual and Photoelectric Colorimetry, Spectrophotometry, Turbidimetry and Nephelometry; specific methods to be adopted keeping in view the solution variables in the preparative procedures and the general procedures to be adopted for the separation and isolation of the desired constituents

from the interfering elements. The methods of separation and isolation of the concerned elements given in each chapter are clear and concise.

The second and subsequent chapters deal with the estimation of the various elements like phosphorus, silicon, nitrogen, chlorine, bromine, iodine, fluorine, sulphur, tellurium, selenium and boron. Each chapter is divided into three sections and the first deals with the separation and isolation of the particular element; the second deals with the methods adopted for the actual determination and the third with the specific applications of these methods.

The only leading method given for the determination of phosphorus (as orthophosphate) is as molybdenum blue (Heteropoly Blue) derived by the reduction of the phosphomolybdate or the phosphovanadomolybdate. The determination of silicon is also largely accomplished in a similar way by measuring the transmittance of the molybdenum blue or by measuring the transmittance and absorbance of the yellow molybdo-silicic acid complex. The determination of nitrogen is dealt with in great detail. The main principle is to convert the nitrogenous material into an ammonium salt, liberate ammonia and estimate it by the Nessler reaction. Nitrite is determined by diazotization and coupling reactions and nitrates by using either phenoldisulphonic acid or brucine as a reagent. Chlorine is determined using O-Tolidine while chloride is determined by using silver salts or mercuric nitrate. Chlorate and hypochlorite are determined by using benzdine and methylene blue for perchlorate. Bromine is determined either by König's reaction or by methyl orange, phenol red and rosaniline. Iodine is determined by its action as a catalyst and by the starch-iodine procedures. Fluorine is determined indirectly by displacement of a colour-forming ion from a complex like oxidised titanium solution, ferric thiocyanate, or a lake like that of alizarin and zirconium. Sulphur is converted into sulphates or sulphides and determined by turbidimetric methods or by reduction to hydrogen sulphide and determination by methylene blue. Selenium and tellurium are determined by reduction to the elemental form as coloured sols. Boron is estimated using quinalizarin or carminic acid or dianthramide in the presence of strong sulphuric acid or by curcumin in an alcoholic or aqueous medium.

At the end of every chapter a comprehensive and useful bibliography on the concerned subject is given and at the end of the book a

useful table of transmittance-absorbance conversion is given.

Considering the scope of the book it should be said that the chapter on phosphorus does not deal with the subject in full, particularly no procedure is given for the separation and estimation of phosphorus in soils and plants, in silicates, ores, etc. No reference is made about the determination of oxygen, ozone, carbon and its oxides and major organic compounds. The authors have no doubt taken great pains in selecting their material and making each article as concise as possible. But it would have been more helpful if sufficient data had been given on the subject of the actual preparation of the solution from the various materials that are to be tested.

The book is well written and presented and would be extremely useful to all students of analytical chemistry.

N. JAYARAMAN.

Surface Active Agents and Detergents. Vol. II.

By Anthony M. Schwartz, James W. Perry and Julian Berch. (Interscience Publishers, Inc., New York), 1958. Pp. xv + 839. Price \$ 17.50.

Literature on the chemistry and applications of surface-active substances is growing at such an enormous rate that great effort is needed to keep abreast with the up-to-date advances in any particular branch of this subject. The immensity of the task can be gauged by the fact that between 1948-56 there are nearly seven hundred publications dealing with the processes for synthesising and manufacturing surfactants. When authors undertake such a stupendous task, it is only natural that they cannot give a critical account of every aspect of the subject-matter dealt with. But this is more than compensated by the extensive and exhaustive survey of the literature.

The volume is divided into four parts: Part I dealing with the processes for synthesising and manufacturing surfactants and Part II with special function surfactants and compositions, in which the surfactants are functionally classified into ten sections like surfactants for non-aqueous systems, for germicidal and fungicidal applications, anticorrosive compositions, textile processing applications, etc. Grouping of this type will be of great advantage to industrial chemists who can have an outline of the applications of surfactants in their specialised branch of study. But the sections on analysis and analytical behaviours of surfactants, in-

organic and organic builders and additives used with surfactants are out of place in this part. Part III is devoted to the Physical and Colloidal Chemistry of surfactants in theory and practice. In this part the Physical Chemistry principles of surface processes like adsorption and surface layer formation, bulk properties of surfactant solutions, foaming, wetting, emulsification and detergency are outlined. This part, although quite informative for a beginner, is a bit disappointing to a specialist in theory; perhaps the space allotted was inadequate for a detailed discussion of the theory. Part IV gives a fund of information regarding the practical applications of surfactants to a variety of industrial and miscellaneous purposes. The book is very well got up and the printing is excellent. Typographical errors are very few indeed and the authors are to be congratulated for bringing out this valuable book which is indispensable to any chemist interested in the theory and practice of the surfactants.

M. R. A.

Enzymes. By Malcon Dixon, F.R.S. and Edwin C. Webb, M.A., Ph.D. (Published by Longmans Green & Co.), 1958. Pp. xxxiii + 782. Price 90 sh. net.

The ever-increasing tempo in enzyme research certainly needs a standard text-book on the subject for purposes of ready and facile reference. Such a need is admirably filled by the book under review. It is an authoritative treatise on the general principles of enzymology rather than its methodology. It imparts rather than informs and is, therefore, thought-provoking. It is excellent for its matter, for its presentation and for its get-up. It is written in an expert way in classroom lecture style, masterly in arrangement and clarity. Many tables are presented, docketing useful information in a condensed form. This is a novel and welcome feature of purveying information and is worth emulating in general, in text-books. The title of the book is not sufficiently indicative of the depth, range and richness of information provided, nor of the method of treatment. No review can do adequate justice to its value. One may get perhaps some measure of it if it is pointed out that the authorship is steeped in the best traditions set by that great master, Hopkins, with whose many sage words, the book begins, resounds and ends, and, therefore, glows.

Basic knowledge about enzymes more than that contained in the introduction would be

necessary to follow the rest of the 12 chapters written in the esoteric language of enzymology under the captions, "Techniques", "Isolation", "Kinetics", "Reaction", "Specificity", "Mechanisms", "Inhibitors", "Cofactors", "Structure", "Formation", "Systems" and "Biology". This arrangement follows in a sense the stages in the development of our knowledge on this dynamic subject.

As occasionally happens even in the best prepared lecture, there are minor defects of omission and commission. For example, every one will not agree with the authors that the device sometimes adopted by them of referring to the enzymes by their numbers (given to them in Table V, 1) is the most convenient. Some of the foot-notes (cf. pp. 395, 568) are unduly long and act as a lump in reading the text. Though a bibliography arranged in alphabetical order according to the first author is provided, still an author index was necessary in fairness to all the collaborating authors in a conjoint effort. The rare collection of microphotographs of crystalline enzymes given in the opening pages could have been presented in an alphabetical order. In the chapter on "Enzyme Techniques", a sub-title "Classes of Methods" does not appear to be quite exact. Dilatometric methods once used in kinetic studies do not find a mention. In describing tests for dehydrogenase activity (pp. 30-31) omission to refer to methods based on the use of the tetrazolium salt as an electron acceptor is a little puzzling. "Enzyme Kinetics" has deservedly met with the most detailed treatment. Chapter V is unique because of the novelty in presentation. It contains an exhaustive table listing 659 enzymes, grouped functionwise, giving against each enzyme information concerning active groups and cofactors, source, substrate or reaction with references. Preceding text is a description of the table, while the succeeding one is devoted to a more detailed discussion. Available information on the specificity of enzymes has been marshalled in Table VI, 1. As against this, Table VI, 5 relating to the specificity of glucose oxidase is an offender and looks odd, containing, as it does, almost a whole column of zeros (because with each of the 39 substrates cited, the rate of oxidation is zero). Co-enzyme I and Co-enzyme II get special treatment and steps involved in arriving at their configuration are described in detail. It is difficult to justify the major treatment given in insulin in several contexts in the book. In dealing with the reducing properties of ascorbate (p. 409), it would have been more

realistic to have referred to reducing capacity of ascorbic acid towards acid silver nitrate. In showing the difference in the configuration of folic acid and its anti-vitamin aminopterin (p. 446), the differing groups could have been distinguished in bold print. As regards the influence of metal ions, the following statement (p. 448) "Some ions are poisons for some enzyme and activators for others: some may even inhibit an enzyme at one concentration and be an activator of the same enzyme at another" needs support from examples and literature references. The chapter on "Enzyme Structure" is incommensurate with the promised fare. Real knowledge giving some insight into enzyme formation is comparatively a recent acquisition, having had to depend on the development of tracer technique for providing evidence. These results only bear out, as the authors point out, the obvious conclusion that the biosynthesis of an enzyme is ultimately the biosynthesis of a protein, the explanation for modification into an active species being sought in genic control. In the last chapter under the heading "Enzyme Biology", such speculative subjects as enzymes in relation to life and their origin are discussed freely. Perhaps the authors could have risked a little more and taken a peep into less chartered areas and given us a travelogue of the looming pastures like aromatisation and unfathomed seas like the phenomenon of optical activity.

This authoritative and comprehensive book will be widely welcomed by students and research workers in the field and is sure to remain a standard reference on enzymes till it is replaced by the next edition by the authors themselves.

M. SRINIVASAN.

Methyl Glucoside. By C. N. Bollenback. (Academic Press, Inc., Publishers, New York; India: Asia Publishing House, Bombay-1), 1958. Pp. 189. Price \$ 5.50.

The book under review deals with the occurrence, preparation, physical constants and derivatives of methyl-D-glucopyranosides and methyl-D-glucofuranosides. It contains well over 500 references collected up to 1956, as well as unpublished information from the records of Corn Products Refining Company with which firm the author is connected. The section on the derivatives is the largest and is valuable to those interested in the various uses of these substances. Certain derivatives such as the anhydro and deoxy compounds have not been

included in this book, as **useful reference library on these is available.**

The general arrangement and get-up of the book are indeed excellent. The book is, however, of interest only to the specialist working in the field and will be a **useful** addition to any reference library.

N. V. SUBBA RAO.

New Frontiers of Knowledge. (Public Affairs Press, Washington, D.C.). Pp. x + 125. Price \$ 2.75.

This book is based upon the series of talks broadcast by the U.S. Information Agency during the year 1957. Although known in parts to many through the press and the radio, this publication in a collected form will be welcomed by the general reading and thinking public.

"The frontiers of knowledge and humanity's hopes for the future" was, in essence, the main theme on which distinguished men of the world were invited to participate. Here we have 36 men belonging to 14 different countries drawn from such varied fields as philosophy, mathematics, religion, law, government, history, economics, education, literature, anthropology, biology, psychiatry, medicine, physics, technology, planning and co-operation, giving their considered opinions, based on experience and deep thought, on the new problems facing mankind in this nuclear era.

Evidently the staggering advances in science and technology and the growing expansion in the frontiers of knowledge are creating new problems. From one point of view the effect of the increased speed of scientific and technological processes is, as John Von Neumann says, "that it has not only enlarged the size of political, economic and cultural units, but it has also at the same time increased the danger of collision among nations, among economies, among cultures."

From another point of view, these rapid advances in science have created an awareness in the minds of men and the achievements of science are looked upon not with admiration but with philosophical thinking on the Universe, the creation and the purpose of living. As Bridgmann says "the most important impact of science is not in its transformation of the external conditions of our daily living, but in something deeper, namely, in our complete world outlook". According to Arnold Toynbee "the rise of modern science has created a spiritual vacuum in man", and as science has expelled religion, he pleads for the "recovery of religion".

The ordinary man, standing in the middle of the century on the threshold of a new age and looking around to the rapidly expanding frontiers of knowledge, can only watch, and perhaps think, but he cannot come to any conclusion. It is here that this little volume containing the thoughtful convictions of learned men of the world from different spheres of activity comes to his aid and gives him hope to face the future with confidence that the tremendous force that has been discovered will be directed **not toward death but toward life.**

A. S. G.

Organic Syntheses with Isotopes—Part I. Compounds of Isotopic Carbon. By Arthur Murray and D. Lloyd Williams. (Interscience Publishers, New York, London), 1958. Pp. 1146. Price \$ 25.00.

The need for a compilation such as the volume under review has been increasingly felt with the growing popularity of tracer methodology. Details of synthetic procedure with isotopes are scattered throughout the scientific literature extending from Agriculture to Zoology and covering many different languages. It is not easy for a prospective user of an isotopically labelled compound to find out whether the compound under question has already been synthesized or not, unless he has ready access to a vast reference library. Moreover, in the current scientific literature the practice of giving experimental details of new isotopic syntheses does not appear to be popular. In most cases a new synthetic procedure is presented in the barest outline.

Syntheses of labelled compounds involve the best techniques and skill the organic chemist can put forward and something more. The high price of isotopes and very often the hazards associated with the use of them require that the synthetic procedure be carried out with a degree of precision which is not necessary in routine non-isotopic organic synthesis. Usually the synthesis of a labelled compound which appears as a condensed short paragraph in scientific literature represents months and sometimes years of hard work comprising of standardization of the best conditions for the synthesis in non-isotopic pilot runs, the reproduction of the highest yields with trace amounts of isotopes, the proof by unambiguous methods of the purity of the desired product and of the desired location of the isotope in the molecule and finally, the full-scale isotopic synthesis. Furthermore, the ingenuity of the investigator is very often

put to the test to obtain the maximum isotopic recovery in the desired product.

The authors, therefore, are fully justified in suggesting in the preface that the book should not be confined in its uses to the labelled compounds alone but it should be of considerable interest to the organic chemist, as the procedures were chosen for or developed to give high yields. Among many interesting examples, the dihydroresorcinol procedure for synthesis of long chain fatty acids and the elegant syntheses of many aminoacids involving the substituted hydantoins may be of interest to the organic chemist.

It is noteworthy that already some confusion has developed in literature regarding the nomenclature of isotopically labelled compounds and the precise formulation of six basic rules of nomenclature in the introductory chapter is timely and useful. The introduction also deals with some essential information about the properties and procurement of isotopes and a brief outline of tracer methodology. Cross-references are given to the standard literature on these subjects to assist the new-comers in this field.

The different classes of labelled compounds have been arranged alphabetically beginning with the acids and concluding with the vitamins. The syntheses of a few key intermediates, such as acetate, formate, cyanide, etc., are dealt with in exhaustive detail including alternative methods. New equipments used have been described and illustrated in many cases. Dr. Murray has the distinction of being one of the pioneers in radiocarbon syntheses and the subtle tips regarding the procedure from the accumulated experience of the authors and other workers in this field described in the notes following the experimental procedure would be of great assistance to the users of this book. The description of each synthesis follows closely the standard sequence adopted in Organic Synthesis—the experimental procedure, notes and suggestions, alternative methods and a wealth of references.

It would have been better to include an index at the end of each volume instead of a cumulative index with Part II which deals with the synthesis of organic compounds labelled with isotopes other than carbon. Such a procedure would have saved the user the inconvenience of handling two bulky volumes instead of one. The reviewer hopes that this small oversight will be rectified in the subsequent editions.

The book should be unreservedly recommended for every organic chemistry library.

P. K. B.

The Nucleus. (*An International Journal of Cytology and Allied Topics.*) Published in two issues a year. [Editorial Office, Kalputuru Palace, 223, Chittaranjan Avenue (North), Calcutta-6.] Price Rs. 13-00 per issue.

It is a pleasure to welcome the first issue of *The Nucleus* edited by Dr. A. K. Sharma with the aid of Advisory Board composed of leading cytologists like Prof. Kihara of Japan, Prof. Riley, Prof. Taylor and Dr. Kaufmann of U.S.A., Prof. Oehlkers of Germany, Prof. Love of Canada and Prof. Sirks of Netherlands.

The get-up is attractive and the reproduction of photographs good. If the standard of contributions in this issue is any indication the journal has a promising future.

M. K. SUBRAMANIAM.

Books Received

Potato in West Bengal. By H. C. Choudhuri. (Department of Agriculture, Govt. of West Bengal, Writers' Buildings, Calcutta), 1958. Pp. 125. Price Rs. 6.

Industrial Hygiene and Toxicology—General Principles, Vol. 1, Second Revised Edition. Edited by F. A. Patty. (Interscience Publishers, New York), 1958. Pp. xxviii + 830. Price \$ 17.50.

Mycology and Plant Pathology. By S. N. Das Gupta. (Indian Botanical Society, University Botany Laboratory, Madras-5), 1958. Pp. iv + 118. Price Rs. 5.

Animal Disease and Human Health. By J. Lieberman. (*Annals of the New York Academy of Sciences*, New York), 1958. Vol. 70, Art 3. Pp. 277-762.

Nuclear Scattering. By K. B. Mather and P. Swan. (Cambridge University Press, London N.W. 1), 1958. Pp. viii + 469. Price 80 sh.

Grundriss Der Photographie Und Ihrer Anwendungen Besonders in Der Atomphysik. By G. Joos and E. Schopper. (Akademische Verlagsgesellschaft, m.b.h. Frankfurt am Main), 1958. Pp. xii + 408. Price not given.

Palæmon. By S. S. Patwardhan. (The Zoological Society, Calcutta-12), 1958. Pp. xiv + 102. Price Rs. 5.

Solid State Physics—Nuclear Quadruple Resonance Spectroscopy. By T. P. Das, E. L. Hahn. (Academic Press, New York; India: Asia Publishing House, Bombay-1), 1958. Pp. ix + 223. Price \$ 7.00.