REVIEWS

Lie Algebras.—*Interscience Tracts in Pure and Applied Mathematics Number* 10. By Nathan Jacobson. (Interscience Publishers, New York, London), 1962. Pp. ix + 331. Price $ 10.50.

In this book the author presents a systematic account of the structure theory of Lie Algebras and their representations. It is meant to be a text-book for a course on Lie Algebras and is based on lectures which the author has given at the Yale University during the past ten years. Besides the usual general knowledge of algebraic concepts, a good acquaintance with linear algebra, elements of Galois theory and Wedderburn structure theory of associative algebras is presupposed. An idea of the coverage of the book may be obtained from the following listing of the chapter headings.

I. Basic concepts, II. Solvable and Nilpotent Lie Algebras, III. Cartan's criterion and its consequences, IV. Split Semi-simple Lie Algebras, V. Universal Enveloping Algebras, VI. The theorem of Ado-Iwasawa, VII. Classification of irreducible modules, VIII. Characters of the irreducible modules, IX. Automorphisms, X. Simple Lie Algebras over an arbitrary field.

A welcome feature of the book is the orientation prefixed to each chapter and a good number of exercises listed at the end of each chapter. These exercises (166 in all) are supplemented with occasional hints and references. An extensive bibliography and a general index add to the facilities of reference and further study. Although no attempt has been made to indicate the historical development of the subject, there are brief indications here and there of the names of those responsible for the main ideas. In short, it is a very valuable book on the subject.

M. S. Huzurbazar.

Spectroscopy (Vol. I)—*Atomic, Microwave and Radio-frequency Spectroscopy*. By S. Walker, H. Straw. (Chapman & Hall, 37, Essex Street, London W.C. 2), 1961. Pp. xix + 267. Price 50 *sh*.

Although there are a number of well-known text-books on spectroscopy which deal with different branches of the subject separately at advanced level, there does not seem to exist that type of book at an introductory level from which the student can obtain a connected account of all the branches together, and thus gain an over-all picture of the fundamentals of spectroscopy and intelligently anticipate its applications to the many problems in chemistry and physics. The present publication, designed in two volumes, is expected to fill this gap and form an introduction to the more advanced books.

Volume I under review deals with four branches of spectroscopy, namely, Atomic, Microwave, Electron spin resonance, and Nuclear magnetic resonance. There is also a short chapter on Introduction to molecular spectra in which basic ideas about energies and energy levels are considered.

Atomic spectroscopy is dealt with in sufficient detail (it covers nearly half the volume) to give the necessary background for a full appreciation of the other three topics.

The book is well written and is reasonably up-to-date and can be recommended as a suitable text-book for the graduate and honours courses in Chemistry and Physics of Indian Universities.

The announcement on the cover says that Volume II in preparation will contain ultra-violet, Visible, Infra-red and Raman spectroscopy.

A. S. G.

Crossed-Field Microwave Devices. By E. Okress, Editor-in-Chief. (Academic Press, Inc., New York), 1961. Vol. I: Pp. 648. Price $ 22.00. Vol. II: Pp. 520. Price $ 18.00.

The dynamical equations of motions of electrons in crossed electric and magnetic fields are so complicated that even now there are no self-consistent solutions for the trajectory of electrons in a magnetron, even though magnetron had its origin as far back as 1921 and proved to be indispensable in wartime radar. The book written by a number of authors presents successfully the fundamentals of all existing types of crossed-field devices. It enables the student, as well as the professional physicist and engineer, to perceive the problems posed by each element of the device in theory and in practice, to know the essential approach to solve these problems, and so, to approach the design of such devices in a scientific manner.

This is probably the second comprehensive book on crossed-field devices, the first one being

the *Microwave Magnetron*, published in 1948 by the M.I.T. Radiation Laboratory. Many new developments such as the voltage-tuned magnetron, carcinotron, the magnetron amplifier, and strophotron have taken place in the post-war period. The theoretical and experimental aspects of these new developments are presented in these two volumes.

Much of the materials contained in this book was available in journals or obscure technical reports. It is not meant to be a text-book which has as its primary aim to lead the reader from topic to topic, developing each from fundamental principles. It is rather a compilation of papers from contributors mainly from the United States, Britain, Sweden, Japan and France, and presents various topics concerned with the post-war developments in crossed-field devices. Like most of the other group publications, one finds little coherence among different topics. The symbols used, though not uniform throughout all the papers, are listed at the end of each paper which makes it easy to read each paper out of context.

The book indicates what phenomena are not well understood, such as the steady-state behaviour and noise performance and this lack of understanding imposes limitations on gun design for linear injection systems. The book, in short, summarises the progress and the present state of our knowledge in the art of crossed-field microwave devices. In this respect, the book has achieved its purpose very successfully. This book, being the only single and compact source where one can find a record of valuable research work done during the last fifteen years, is highly recommended as an indispensable document to the individual worker and research laboratories dealing with microwave problems.

S. K. CHATTERJEE.

Toxic Phosphorus Esters—*Chemistry, Metabolism and Biological Effects.* By Richard D. O'Brien (Academic Press, New York; India: Asia Publishing House, Bombay-1), 1960. Pp. xii + 434. Price $ 14.50.

The volume under review deals with the chemistry, metabolism and biological effects of organophosphorus compounds. These compounds which are phosphorus esters are generally toxic and serve as potent pesticides as also tools of research for study of diverse problems such as nerve function and the nature of active enzyme centres. A comprehensive account of the various biochemical and physiological properties have been given and the various chapters have been so written as to emphasise the concept that the toxic effects of organophosphorus compounds are due to esterase inhibition.

After a brief historical introduction, Dr. O'Brien has dealt with non-enzymic reactions of toxic phosphorus esters, the reaction with cholinesterase *in vitro*, enzymic degradation and activation *in vitro*, and the effects of these compounds on isolated whole tissues, mammals, insects and plants, as well as the nature of selective toxicity exhibited by some of the organophosphorus compounds. In the last chapter, the author has given an account of the various techniques used in the analysis of these compounds. Also, details of electronic interpretation and chemical structure of a large number of organophosphates are given in the appendix. A pleasing feature is the emphasis on the practical applications of such toxic phosphorus compounds as diazinon, malathion and parathion, with an account of their metabolism and individual effects in animals, insects and in plants. In view of the growing problem of insect resistance to chlorinated hydrocarbons, particularly DDT, interest has increased of late in these insecticidal organophosphates which are as effective as the chlorinated compounds and which possess besides low mammalian toxicity. Scientists interested in agriculture, as well as physiologists and biochemists will find this volume fascinating to read and profitable to possess for the purpose of constant reference to various aspects of toxic phosphorus esters. The get-up of the book is excellent and leaves little to be desired.

P. S. SARMA.

Annual Review of Biochemistry (Vol. 30). (Annual Reviews, Inc., Grant Ave., Palo Alto, California), 1961, Pp. viii + 758. Price $ 7.00.

The series of *Annual Reviews* on different branches of scientific research published by the Annual Reviews, Inc. California, are well known throughout the world, and these volumes are eagerly looked to every year by teachers and working scientists in the respective fields concerned. The earliest of these publications, *Annual Review of Biochemistry*, was started thirty years ago and is still going strong under the same able editorship of Prof. Murray Luck. Biochemists all over the world would wish to record their appreciation of this long service of Prof. Murray to the cause of biochemical literature and would wish him well for continued activity for many years more.

Volume 30 of the *Annual Review of Biochemistry* contains 24 review articles on topics already familiar to its readers, and covers their progress during the year 1960. The first article on "Biological oxidation", reviews new investigations on the relationship of structure to mechanism of action at molecular as well as cellular levels. A well-illustrated article on "X-ray studies of compounds of biological interest" by Rich and Green takes up the subject where it was left four years ago in the review in this series by Kendrew and Perutz, and deals with the results of X-ray investigations on amino-acids, peptides, and proteins ; crystalline nucleic acid derivatives ; and finally viruses. Progress on the "chemistry of the nucleotides" has been reviewed by Michelson, and that on "Nucleic acid metabolism and biosynthesis" by Abrams. There are articles on protein structure, protein nutrition, and specificity in protein synthesis. There are two articles on water-soluble vitamins, and one on fat-soluble vitamins. Recent work on the biosynthesis of steroid hormones and new pathways and enzymatic mechanisms involved in their transformations *in vivo* and *in vitro* are discussed by Engel and Langer. The last three articles in this volume are respectively on the biochemistry of Cultured mammalian cells, Genetic factors, and the Dividing cell.

Following the recommendations of the Enzyme Commission of the International Union of Biochemistry, the hitherto familiar coenzyme abbreviations DPN and TPN have been replaced by NAD (nicotinamide-adenine dinucleotide) and NADP (nicotinamide-adenine dinucleotide phosphate) in this volume.

The prefatory chapter is written by Prof. J. H. Northrop who discusses the present-day virus controversy and likens it to the enzyme controversy of fifty years ago. We quote the following from this chapter to bring out his thesis that history (of biochemistry) repeats itself:

"It is not surprising, therefore, that the history of biochemistry is a chronicle of a series of controversies in several of which I have been more or less engaged. These controversies exhibit a common pattern. There is a complicated hypothesis, which usually entails an element of mystery and several unnecessary assumptions. This is opposed by a more simple explanation, which contains no unnecessary assumptions. The complicated one is always the popular one at first, but the simpler one, as a rule, eventually is found to be correct. This process frequently requires 10 to 20 years. The reason for this long-time lag was explained by Max Planck. He remarked that scientists never change their minds, but eventually they die." "At the present time, therefore, the virus controversy is in the same condition as was the enzyme controversy 50 years ago. There is a simple and unpopular hypothesis and a complicated and popular one, and another 30 years may be needed to reach a decision. What this will be cannot be predicted, but what can be predicted is that, when this controversy is ended, another similar one will take its place."

A. S. G.

Fluctuations in Mitotic Index in the Shoot Apex of Lonicera Nitida. By Elizabeth Edgar. (University of Canterbury Publications, Christchurch, P.B. 1471, New Zealand), 1961. Pp. 91. Price 20 *sh.*

This is the first of a series of research monographs issued by the University of Canterbury, New Zealand. The present monograph describes the results of a carefully conducted study of the fluctuations in mitotic rate in the shoot apex of *Lonicera nitida* under various conditions. Although a considerable amount of information on the occurrence of diurnal periodicity of mitosis in shoot and root apices is available in the literature, this information has not so far been properly collated. Also, most of the available data stem from experiments carried out under artificial conditions of light and temperature. There is very little information on fluctuations of mitosis in plants growing in the field and hence the present work carried out under natural conditions presents some welcome additions to our knowledge.

While most investigators of periodicity in the shoot apex have been concerned only with an endogenous rhythm of cell division which persists when plants are grown in constant darkness and at a constant temperature, the cyclic change occurring within the apex itself with the formation of leaf primordia has never been critically studied. The primordia arise from the apex at more or less regular intervals of time—the interval of time between the formation of successive leaves being termed a *plastochron* and during each *plastochron* the apex goes through a cycle of characteristic shape changes. The author of this monograph is to be congratulated both for devising a method of investigating the fluctuations in mitotic index with the stage of *plastochron* and for studying the process intensively.

M. S. SWAMINATHAN.

Discovery Reports.—1. *The Appendages of the Halocypridae*. By E. J. Iles. Vol. XXXI. 299-326, 1961. Price 15 *s*. net. 2. Salpa fusiformis *Cuvier and Related Species*. By P. Foxton. Vol. XXXII. 1-32, 1961. Price 22 *s*. net. 3. *Reproduction, Growth and Age of Southern Fin Whales*. By R. M. Laws. Vol. XXXI. 327-483, 1961. Price 75 *s*. net. (Issued by the National Institute of Oceanography and Published by the University Press, Cambridge.)

The first account deals with an intensive study of *Conchœcia borelis* G. O. Sars var. *antipodi* G. W. Miller (Halocyprididœ, Ostracoda) and seeks to fill a lacuna in our knowledge of the anatomical and spatial relationships of the various limbs. The appendages are described in detail including a feature in the articulation of the mandible with the body. The method of capture of food, chiefly Copepoda, and the mastication of same are discussed. The appendages of *Archiconchœcia*, *Euconchœcia* and *Halocypris*, the other members of the family, are compared with those of *Conchœcia*; the mandibles of all these are found to have the same type of articulation but differences in the gnathobases of the mandibular coxæ exist. The differences noticed in the instance of *Halocypris globosa* and *H. brevirostris* are significant to warrant inclusion of these species in separate genera. The backward shift of the posterior limbs and of the position of the mouth present in Cypridinidæ is absent in *Conchœcia*. The contribution is a valuable addition to our knowledge of the functional morphology, taxonomy and evolution of this group.

2. The salps are of great importance in the economy of the Southern Ocean especially as they occur in dense concentrations and being herbivores graze down the phytoplankters, thus competing with *Euphausia superba*, another herbivore, the favourite food of the whales. The account under review deals with *Salpa fusiformis* Cuv. and related species; the author has attempted to unravel the prevalent confusion among the four species and has established the four species, *S. fusiformis*, *S. aspera*, *S. thompsoni* and *S. gerlachei* on solid grounds and provided a key for identification. Relevant synonymy as well as morphological characters of taxonomic importance are discussed. The limits of the distribution of the species is touched upon but more details regarding their ecology is promised in a later account. The contribution will be of great help to students of marine ecology.

3. In the temperate countries, the whale fishery forms the backbone of several industries whose existence plays an important role in the economic life of the people. For any rational exploitation of the natural resources, an authentic knowledge of all aspects of the bios concerned is essential. The account by R. M. Laws (mentioned above) adds considerably to our knowledge of one of the whales, the southern fin whale. *Balœnoptera physalus* (L), the only comprehensive account on the reproduction, growth and age determination of this species to-date. As the female is more concerned with the propagation of the species, the author devotes the bulk of the account to the gross and microscopic anatomy of the ovaries, and all aspects of the reproductive cycle. In addition, age determination by means of ovarian corpora is described, compared with the other methods and the validity of the ovarian corpora counts for age determination stressed. The account is well illustrated, results are compared with those of relevant earlier accounts. The twenty-five point summary and the exhaustive bibliography should prove very useful. Limitations of space forbid an ingression into the details of the achievement which is remarkable indeed considering the difficulties involved in an investigation of this nature and magnitude. The account should form a very valuable guide to all interested in the whale fishery in particular and fishery biologists in general and should help them to regulate the fishery in a rational manner.

All the three reports will form an asset to all biological research institutions.

R. SUBRAHMANYAN.

A World Bibliography of Locusts.—*Bibliographia Agrididiorum*. By M. L. Roonwal. A bibliography of the Orthopterous insects of the Family *Acrididæ* (comprising the short-horned grasshoppers and locusts) from the earliest times to the end of 1954 (with some additions for 1955-57)—*Rec. Indian Mus.*, Delhi, 56 (1-4) [1958], 1961. Ppp. iix + 1-611-*a*, 1 ul.

Bibliographia Acrididiorum is a fairly bulky volume of over 600 pages, containing a world bibliography running to over 7,200 references on locusts and grasshoppers—Family Acrididæ (Insecta—Order Orthoptera), covering a vast period from biblical times up to the end of 1954 A.D., along with some additions for the years 1955-57. It is a compilation for which Acridologists all the world over, as well as all ento-

mological workers in general, should feel grateful to the author, for the veritable mine of information he has provided.

The present publication takes one's memory back to the troublous years, 1929 and 1930, when India—in fact even a great part of Africa and Western Asia—suffered one of the worst locust infestations in the memory of man. Consequently, the Government of India started, with the ultimate object of combating this evil, a comprehensive scheme of investigations on the Desert Locust in India in 1931. The workers in the scheme, however, soon found to their dismay, a dearth of readily available references in respect of earlier work, so that a part of their time had to be diverted to a search for literature. A reference book of this type would have been invaluable to them, if it had then been available.

According to the author, it has taken him nearly 25 years to amass the stupendous amount of information from various sources and to have it analysed, arranged and typed, to make it press-ready. To him, the great self-imposed task must evidently have been a labour of love-being the outcome of his deep interest in the subject (in which he has 61 papers to his credit).

The publication consists of an introduction, the bibliography proper with an author index and a subject index, and two supplementary lists for the years 1955-57 accompanied by their appropriate indexes.

The Introduction gives a general idea of the latest trends in the classification of the various subgroups along with remarks on particulars of their distribution and habits. Interesting analyses of the various references in the bibliography as viewed from different aspects are also given. The earliest reference in historical times is that of the Arab writer, Ad-Damiri (d. 1430 A.D.) after which there is a blank for the 16th century. There are 13 references for the 17th century, followed by 43 for the 18th, 787 for the 19th, and nearly 6,000 for the 20th century up to the end of 1954.

The individual references in the bibliography have been arranged alphabetically author-wise, and chronologically under each author. In cases of multiple authorship, cross-references are given to the second and third author in alphabetical order. Wherever the name of the author is unknown, the items are shown under "Anonymous", or under the country concerned (*e.g.*, Argentina, India, etc.), or under "International". All items except the cross-references are numbered serially.

The subject is conveniently divided under the various aspects of modern zoological research, such as General; Investigational reports; Morphology; Development; Physiology; Bionomics and Ecology; Phases and Biometry; Evolution and Genetics; Control; and Zoo-geography, Taxonomy and Faunistics.

Altogether the publication under review is a most useful book of reference for research workers on locusts and grasshoppers. It can be ordered directly from the Manager of Publications, Government of India, Civil Lines, New Delhi, or through any book-seller. In either case, the Code No. ZSI. 4. LVI. 1-4|800 should be quoted in addition to the title, author, journal, etc.

Y. RAMCHANDRA RAO.

Treatise on Analytical Chemistry—*Analytical Chemistry of the Elements.* Edited by I. M. Kolthoff, Philip J. Elving. (Interscience Publishers, Inc., 250, Fifth Avenue, New York-1, N.Y.), 1961. Part II, Volume 5: Pp. xxi + 409. Price $ 13.75; Part II, Volume 7: Pp. xxiii + 567. Price $ 20.75.

The volumes in Part II of this comprehensive treatise present a systematic treatment of all aspects of classical and modern analytical chemistry. They form a source book of information and will be of great help to all practising analytical chemists.

Volume 5 deals with the analytical chemistry of the six elements Titanium, Zirconium and Hafnium, Thorium, Nitrogen and Phosphorus.

Volume 7 deals with Sulphur, Selenium and Tellurim, Fluorine, the Halogens, Manganese and Rhenium.

Atlas of Avian Hematology.—*Agricultural Monograph 25, Atlas of United States Department of Agriculture,* By A. M. Lucas and C. Janroz. (Regional Poultry Res. Lab., East Lansing, Mich. Animal Husbandry Res. Divn.), 1961. Pp. vi + 271.

Avian hematology is a picture book that functions as a dictionary. The beautiful coloured illustrations presented in this volume vividly depict the nature and types of cells seen not only in the circulating blood of the adult bird but also that of the embryo and includes the developmental stages found in the blood forming organs of the fowl. The atypical, the unusual and the abnormal cells, one is likely to come across and representative studies on avian species other than the domestic chicen have also been described and illustrated.

The volume is the first in the programme designed to publish authoritative information on basic histology and anatomy of the fowl and more than justifies its claim as a reference volume in the study of "Avian hematology".

Captured Stars. By Heinz Letsch (Published by VEB Gustav Fischer Verlag Jena), 1959. Pp. 183. Price DM 16.

This is the English version of the 4th edition of the German book *Das Zeiss-Planetarium* by Heinz Letsch. This is a pictorial Handbook on the well-known Zeiss Planetarium. It contains a concise and popular account of the astronomical principles of the Planetarium, a description of the instruments used there and constructional details of the dome. The book is amply illustrated with 125 diagrams and persons concerned with the building or use of planetaria will find much useful information in this book.

A. S. G.

Euglena—*An Experimental Organism for Biochemical and Biophysical Studies.* By J. J. Wolken. (The Institute of Microbiology, Rutgers, The State University, New Brunswick, New Jersey), 1961. Ppp. xii + 173. Price $ 4.50.

Euglena is a unicellular protozoan, more accurately an "algal flagellate". It has the characteristics of a plant but shares as well some of the attributes of an animal cell. It behaves as an animal cell in darkness, but as a plant in light. Hence it forms an ideal experimental organism to study such fundamental problems in biophysical and biochemical research as the effect of light on growth, the mechanism of energy conversion, transfer and storage of energy in living systems, photoreceptor organelles and their action, etc.

This is an amply illustrated informative book and gives the results of the author's studies extending over a period of ten years on Euglena. It shows how an apparently simple unicell can provide the research tools for many fundamental biological problems such as growth, cellular structure, pigment synthesis, the relation of chloroplast structure to photosynthesis, and photoexcitation to vision.

Books Received

From: Academic Press, New York and London:

Methods of Experimental Physics (Vol. 3)—*Molecular Physics.* Edited by D. Williams, 1962. Pp. xiv + 760. Price $ 19.00.

An Introduction to Elementary Particles. By W. S. C. Williams, 1962. Pp. ix + 406. Price $ 11.00.

Advances in Mathematics (Vol. 1, No. 1). Edited by H. Busemann, 1961. Pp. 102. Price $ 3.80.

Physical Techniques in Biological Research (Vol. IV) *Special Methods*—Edited by W. L. Nastuk, 1962. Pp. xiv + 410. Price $ 13.00.

Methods in Hormone Research (Vols. I and II). *Chemical Determination; Bioassay.* Edited by R. I. Dorfman, 1962. Pp. xii + 423. Price $ 13.00; Pp. xv + 774. Price $ 24.00.

Air Pollution (Vols. I & II). Edited by A. C. Sterin, 1962. Pp. xviii + 656. Price $ 20.00; Pp. xvii + 586, Price $ 18.50.

Introductory Atomic Physics. By M. Russell Wehr and J. A. Richards Jr., 1962. Pp. xi + 420. Price $ 6.50.

Cerebral Sphingolipidoses. Edited by S. M. Aronson and B. W. Volk, 1962. Pp. xvii + 456. Price $ 18.00.

Introductory Organic Quantum Chemistry. By Karagounis. Translated by F. C. Nachod, 1962. Pp. viii + 204. Price $ 6.50.

An Introduction to Probability and Mathematical Statistics. By H. G. Tucker, 1962. Pp. xii + 228. Price $ 5.75.

From: Cambridge University Press, 200 Euston Road, London N.W. 1:

The Psychology of Insanity. By Bernard Hart, 1962. Pp. xi + 127. Price 6 *sh.* 6 *d.*

Viruses. By K. M. Smith, 1962. Pp. 134. Price 21 *sh.*

The Physics of Rain Clouds. By N. H. Fletcher, 1962. Pp. x + 386. Price 65 *sh.*

From: Dover Publications, 180 Varick St., New York-14, N.Y.:

Heredity and Your Life. By A. M. Winchester, 1960. Pp. 333. Price $ 1.45.

The Orientation of Animals. By G. S. Fraenkel and D. L. Gunn, 1961. Pp. 376. Price $ 2.00.

Conditioned Reflexes an Investigation of the Physiological Activity of the Cerebral Cortex. By I. P. Pavlov. Translated by G. A. Anrep, 1961. Pp. xv + 430. Price $ 2.25.

From: John Wiley and Sons, Inc., 440 Park Avenue South, New York-16:

High Polymers (Vol. XV)—*Radiation Chemistry of Polymeric Systems.* Edited by Adolphe Chapiro, 1962 Pp. xvi + 712. Price $ 21.00.

International Series of Monographs on Organic Chemistry. By Ye L. Gefter. Translated from Russian by J. Burdon, 1962. Pp. vii + 302. Price 70 *sh.*