REVIEWS

Royal Society Mathematical Tables. VII. Bessel Functions. *(Part III.—Zeros and Associated Values.)* Edited by F. W. J. Oliver. (Published for the Royal Society at the University Press, Cambridge), 1960. Pp. x + 79. Price 50 *sh.* net.

Bessel functions find such wide application in physics, engineering and mathematics that there is no need to point out the importance and value of tables containing the values of the cylindrical functions and their zeros. In the present volume, there are three tables: Table I gives the zeros $j_{n,s}$ of $J_n(x)$, $y_{n,s}$ of $Y_n(x)$ and the values of $J_n'(j_{n,s})$, $Y_n'(y_{n,s})$. Table II gives zeros $j'_{n,s}$ of $J_n(x)$, $y'_{n,s}$ of $Y_n'(x)$ and the values of $J_n'(j'_{n,s})$, $Y_n'(y'_{n,s})$. Table III gives zeros $a'_{m,s}$, $b'_{m,s}$ of the derivatives $j_m'(x)$, $y_m'(x)$ of the spherical Bessel functions

$$j_m(x) = \sqrt{\frac{\pi}{2x}}\, J_{m+\frac{1}{2}}(x),$$

$$y_m(x) = \sqrt{\frac{\pi}{2x}}\, Y_{m+\frac{1}{2}}(x)$$

and also the values of $j_m(a'_{m,s})$, $y_m(b'_{m,s})$. The ranges covered are

$n = 0(\frac{1}{2})\ 20\frac{1}{2}$; $s = 1\ (1)\ 50$ (Tables I and II)
$m = 0(1)\ (20)$; $s = 1(1)\ 50$ (Table III).

This introduction gives a good account of the important properties of the Bessel functions, their zeros, and the numerical methods of computing them.

K. S. VISWANATHAN.

Interfacial Phenomena. By J. T. Davies and E. K. Rideal. (Academic Press, New York and London, Asia Publishing House), 1961. Pp. xiii + 474. Price $ 14.00.

Developments in surface chemistry on the theoretical side, and more so, on its practical applications in industry and engineering, and in such important problems as the conservation of storage water in lakes and reservoirs, have been significant and rapid during the last two decades. Literature on the subject is growing, large and scattered. There is a need for a connected account of the latest researches, especially on the theoretical aspects of the subject, which will be of help to investigators in this discipline. The present volume by two well-known workers in the field will meet this need.

Sir Eric Rideal is well known for his outstanding contributions, spread over a period of nearly forty years, on surface phenomena, interfacial tensions, and the physics and chemistry of monolayers. Latterly Professor Davies joined Sir Eric in these investigations, and the present volume is, in the main, a systematic presentation of the results of their joint studies during the last ten years in this field of research. The book is without doubt authoritative and the treatment in the majority of chapters, like their contents, is original, and therefore highly instructive.

In the first chapter on the Physics of Surfaces, fundamental ideas about surface tension, surface energy, kinetics of spreading, and contact angles are clearly explained. The principles underlying their experimental determinations are given. The second and third chapters deal, in a largely original way, with the electrostatic and electrokinetic phenomena occurring in surfaces and interfaces. The fourth chapter deals with the thermodynamics of adsorption and desorption, and with Gibbs's equation. The fifth chapter treats with the properties of monolayers, and the sixth chapter with reactions in monolayers and emulsions. Chapter seven is on Diffusion through interfaces, and discusses, among other things, barriers impressed by monolayers to the passage of vapour and solvents across phase boundaries, and resistance to evaporation and its reduction. In the last chapter is discussed the characteristics of disperse systems and of adhesion, especially in so far as these follow from the the fundamental interfacial properties described in the earlier chapters.

As the only book now available which gives a systematic and original account of the latest developments in interfacial phenomena, the book is warmly recommended not only to chemists and chemical engineers but also to biologists who will find in it many stimulating ideas.

A. S. G.

Low Temperature Physics. By L. C. Jackson. (Methuen's Monographs on Physical Subjects.) Methuen and Co. Ltd., London, 1962. Pp. vii + 158. Price 18 *sh.*

Since the first publication in 1934 of this well-known Methuen Monograph on *Low*

Temperature Physics it had gone through four editions, each edition being revised and the subject-matter brought up-to-date. The fourth edition of the book was published in 1955. Since then there has been much progress in low temperature investigations of physical and electrical properties of substances, and results of fundamental significance to our knowledge of the subject have been achieved. Taking all these into account the author has completely revised and rewritten this monograph and the new fifth edition should prove as successful as the previous ones.

Laboratory Instruments—Their Design and Application. (2nd Edition). By A. Elliott and J H. Dickson. (Chapman and Hall, 37, Essex St., London W.C. 2; India: Asia Publishing House, Bombay), 1959. Pp. xvi + 514. Price 55 *sh.*

Successful research workers as well as persons who have anything to do with laboratory work and maintenance of apparatus should have some fundamental knowledge of instrument design and workshop practice. It often becomes necessary for a research student to design and construct some simple instruments of his own to suit his special needs of research. A guide book for the purpose is essential. *Laboratory Instruments* which has been written on the basis of accumulated experience gained during many years of research work by the authors can be recommended as an ideal book to meet the purpose, at least so far as mechanical and optical matters are concerned.

The first edition of the book which was published in 1951 was well received. The demand for a second edition has enabled the authors to revise and add new materials so as to bring the book up-to-date. The chapter on properties of materials has been expanded to include corrosion-resistant metals and a fuller account of plastic materials. "Natural and synthetic optical crystals" is again a new chapter giving latest available information on the refractive index of materials useful in infrared spectroscopy. Photometry, colour vision, and photography are other sections in which substantial new matter has been added. Again there is a new chapter on a subject of practical importance, namely, corrosion in laboratory instruments.

A. S. G.

Scientific Foundations of Vacuum Technique. (Second Edition.) By Saul Dushman. (John Wiley and Sons, Inc., New York 16, N.Y.), 1962. Pp. xviii + 806. Price $ 19.50.

Dushman's book on vacuum technology is a classic on the subject and it contains the results of the author's lifetime study of every aspect of high vacuum technique, both in theory and in practice, at the General Electric Research Laboratory. The book enjoyed great popularity amongst students and research workers since its first publication in 1949. For some time past the book has been out of print even though the demand continued to persist. Hence the appearance of this second edition of the book will be widely welcomed.

Like many other branches of science, vacuum technology also has made rapid strides during the last decade both in research and in industry. Ultra high vacuum techniques have already had a profound influence on work in surface physics, surface chemistry and gaseous electronics. These techniques are sure to play a big role in various disciplines of modern research in the immediate future. It may be said that from the point of view of an inquiring research worker on high vacua there is at present no other treatise on the subject which is as comprehensive as the one now under review. It contains not only practical information on the technology but also the fundamentals of background information necessary for a sound understanding of the applicability of modern techniques and future advances on the production, measurement, maintenance and utilization of vacua.

The task of re-editing this work to satisfy the present developments in the subject has been undertaken by J. M. Lafferty with the close co-operation of a selected number of specialists of the General Electric Research Laboratory, where Dushman himself worked. The original plan of the book and the division into chapters as given below have been maintained, but each topic has been thoroughly revised bringing the contents and references more up-to-date.

The chapter headings are: (1) Kinetic Theory of Gases, (2) Flow of Gases through Tubes and Orifices, (3) Vacuum Pumps, (4) The Utilization of Pumps, (5) Manometers for Low Gas Pressures, (6) Sorption of Gases and Vapours by Solids, (7) Sorption of Gases by "Active" Charcoal, Silicates (including Glasses), and Cellulose, (8) Gases and Metals, (9) Chemical and Electrical Clean-up and Ultrahigh Vacuum, (10) Vapour Pressures and Rates of Evapora-

tion, (11) Dissociation Pressures of Oxides. Hydrides and Nitrides.

A. S. G.

Barley and Malt—Biology, Biochemistry, Technology. Edited by A. H. Cook. (Academic Press, New York and London), 1962. Pp. xiv + 740. Price £ 7/10 *sh.*

The volume under review deals with the biological, biochemical and technological aspects of barley and barley malt. Malt is the basic raw material for the brewing industry and also for the preparation of malt extract. A large volume of research work has been carried out during recent years in several countries on the biochemistry and technology of malting of barley and other grains. The book is the result of contributions by several leading authorities on the different aspects. The volume presents, for the first time, a unified account of the diverse aspects of the subject of barley and malt.

The first five chapters deal with the barley plant, first in general terms and later with respect to scientific aspects of breeding new barley varieties suitable for malting, including a consideration of diseases of barley. The next three chapters are concerned with the subject of malting under the heads, evaluation of malting process. The concluding three chapters summarise available information on the chemical analysis and chemistry of barley and malt and the enzymic changes during the malting process. Every effort has been made by the authors to incorporate recent developments in the field and to make the book authoritative and up-to-date. The book will serve as a reference work not only to research workers in the field but also to others interested in the subject of malting. The get-up of the book is excellent.

M. SWAMINATHAN.

A Laboratory Manual—Ionization Constants of Acids and Bases. By A. Albert and E. P. Serjeant. (Methuen and Co., Ltd., London), 1962. Pp. xii + 179. Price 21 *sh.*

This is a carefully written laboratory manual on the practical determination of the ionization constants of acids and bases. The determination of the ionization constants has important theoretical and practical uses. For one thing, it helps to find out the proportions of the different ionic species into which a substance is divided at any chosen pH. This kind of information is of significant help in spectrophotometric work. Ionization constants are closely related to solubility. Again the structure of newly found substances can often be inferred from the ionization constants.

After a brief theoretical introductory chapter dealing with the outlines of the chemistry of ionization, the manual proceeds to describe, with all necessary details, in four separate chapters the various methods of determining the ionization methods, then the spectrometric methods, and finally the conductimetric methods. In each method detailed instructions are given about the use of the apparatus, preparation of solutions, carrying out of the experiments, calculation of results illustrated by some simple worked examples, precautions to be taken, common difficulties that may be encountered and how these can be overcome, etc.

There is a chapter on solubility-ionization relationships, one on Zwitterions (Dipolar ions), and one on stability constants of metal complexes. Ionization constants of some 400 typical acids and bases are given in the form of appropriate tables with suitable commentaries.

Electron Microscopy—A Handbook for Biologists. By E. H. Mercer and M. S. C. Birbeck. (Blackwell Scientfic Publications, Oxford), 1961.

This is a handy booklet detailing "well-tried recipes" for electron microscopy of biological material. Since at a rough estimate the resolution obtained with an electron microscope is said to be only one-tenth the thickness of the object, the need for ultra-thin sections would become obvious. For contrast, the use of specific fixatives and "stains" is necessary.

Detailed instructions are given on handling of material but a beginner is advised "to spend a short time with an experienced electron microscopist".

The book would be of great value to biologists.

M. K. SUBRAMANIAM.

Methods in Hormone Research. Edited by Ralph I. Dirfman. Vol. I: *Chemical Determination.* Vol. II: *Bioassay.* (Academic Press, New York and London; India: Asia Publishing House, Bombay-1), 1962. Pp xiii + 423. Price $ 16.00; Pp. xv + 774. Price $ 24.00.

Developments in methodology are the essential forerunners of progress in any scientific field. The rapid advances in instrumentation and the introduction of refined techniques in the allied

branches of biochemistry, physiology and organic chemistry have given to the endocrinologists elegant tools capable of resolving many problems associated with hormonal disturbances which, because, of the microquantities involved, had hitherto resisted all attempts of analysis.

Information resulting from the application of these techniques for hormonal research found scattered in the various journals has now been brought within the framework of these two comprehensive volumes.

The critical analysis of the various methods besides the general survey provide authoritative reviews, most welcome to analytical chemists, pharmacologists engaged in bioassay of hormones and to physicians planning clinical research programmes.

Volume I deals with the 'chemical and physical methods' of determination of the following hormones: Estrogens, 17 ketosteroids and Testosterone, progesterone, pregnane-diol, pregnanetriol, pregnanetriolone—an abnormal urinary steroid, Adrenocorticosteroids, Aldosterone and metabolites, Adrenaline and noradrenaline and the chemical assay of thyroxine-like materials. The reviews provide a biochemical background of their metabolism, principles involved in assay procedure and detail the newer physico-chemical procedures for isolation of small amounts of these hormones from biological fluids.

Volume II is complementary to the first volume in its coverage. Bioassay is still essential and in many cases the only method available for determining the hormonal activity of some biological materials.

Biological standardization needs clear grasp of statistical analysis. Statistical methods used in biological experimentation are lucidly presented in the introductory chapter of this volume.

The methods of bioassay for steroidal and protein hormones are exhaustively dealt with and a separate chapter mentions the standard methods adopted by official organizations for such bioassays.

"Antihormonal substances" discussed in some chapters also visualise new approaches for the chemotherapy of clinical disorders associated with hyperhormonal secretions.

M. SIRSI.

Books Received

Natural History of Infectious Disease (3rd Edn.). By M. Burnet. (Cambridge University Press, London N.W. 1), 1962. Pp. x + 377. Price 30 *sh.*

The Wealth of India—Raw Materials (Vol. IV) — *Fish and Fisheries.* (Council of Scientific and Industrial Research, New Delhi), 1962. Pp. xv + 132. Supplement to Vol. IV.

Science Puzzlers. By Martin Gardner. (Macmillan and Co., London W.C. 2), 1962. Pp. 123. Price 10 *sh* 6 *d.*

The Diagnosis of Mineral Deficiencies in Plants by Visual Symptoms (3rd Edition). By T. Wallace (Her Majesty's Stationery Office, London W. 1), 1961. Pp. vii + 125. Price 63 *sh.*

Plant Embryology—A Symposium. (C.S.I.R., Rafi Marg, New Delhi-1), 1962. Pp. vi +273. Price Rs 20·00

Seasonal Flowers. By B. L. Desai. (I.C.A.R., Queen Victoria Road, New Delhi), 1962. Pp. x + 177. Price Rs. 11·00.

Water Plants. By B. B. Singh Bhadri and B. L. Desai. (I.C.A.R., Queen Victoria Road, New Delhi), 1962. Pp. x + 44. Price Rs. 3·75.

Fish in Nutrition. Edited by E. Heen, and R. Kreuzer. [Fishing News (Books Ltd.), Ludgate House, London E.C. 4], 1962. Pp. xxiii + 447. Price £ 6 6 *d.*

Diseases of Sorghum Sudan Grass and Broom Corn. By S. A. J. Tarr. (Commonwealth Mycological Institute, Ferry Lane, Kew, Surrey), 1962. Pp. x + 380. Price 60 *sh.*

The Life-Story of the Fish. By Brian Curtis. (Dover Publications, Inc., New York 14, N.Y.). 1961 Pp xii + 284. Price $ 1.50.

Hydraulics. By N. S. Govinda Rao. (Asia Publishing House, Bombay-1), 1962. Pp. xvi +412. Price Rs. 22·00.

Study Guide for the Mainstream of Physics. By A. D. Beiser. (Addison-Wesley Pub. Co., Reading, Mass., U.S.A.), 1962. Pp. viii +166. Price $ 2.50.

Proceedings of the International School of Physics. 'Enrico Fermi' Course XVII: Topics on Radiofrequency Spectroscopy. Edited by A. Gozzini. (Academic Press, 111, Fifth Avenue, New York 3, N.Y.), 1962. Pp. viii + 312. Price $ 10.00.

Text-Book on Spherical Astronomy (5th Edn.). By W. M. Smart. (Cambridge University Press, London N.W. 1), 1962. Pp. xii + 430. Price 22 *sh.* 6 *d.*

Self-Smoothing Fabrics. By J. T. Marsh. (Chapman and Hall, London W.C. 2), 1962. Pp. vi + 399. Price 70 *sh.*

Artificial Earth Satellites (Vols. 9 and 10). (Consultants Bureau Enterprises, Inc., 227 W, 17 St., New York 11, N.Y.), 1962. Pp. 239. Price $ 30.00 ($ 15.00 per vol.).