

## REVIEWS.

**Chemistry of Food and Nutrition.** By Henry C. Sherman, Ph.D., Sc.D. Fifth Edition. (The Macmillan & Co., Ltd., New York), 1937. Pp. x + 640. Price 12s. 6d.

The time has come when scientists ought cheerfully to accept the reproach of descending below the dignity of science if they could only succeed in writing their message so as to be read in every cultured home. We emphasise the paramount importance of the application of the results of research to the problems of humanity and civilisation whose participators enjoy neither leisure, nor health, nor happiness must be a reproach to the general progress of knowledge. How can there be peace and harmony in any community in which a large percentage of people are ill-fed, ill-clothed, ill-tended and ill-housed? In its attempts to discover whether God is a mathematician or an engineer, science has not been equally busy how to make the creatures in his own image healthy and contented. We have precise knowledge about the physical and chemical constitution of distant stars, but do we have equally precise knowledge of the child mind, and do we have the power of directing and controlling its destiny? In dealing with the human mind, our attitude seems analogous to the proverbial horse whom one man can lead to water but twenty cannot make him drink.

Dr. Sherman's book is a splendid contribution to the science of nutrition. Although the book is intended to meet the requirements of college classes, its scope and usefulness extend far beyond the interests of students and the purpose of public examinations. It is one of the rare textbooks on science which statesmen and housewives will find indispensable in the discharge of their tasks. The chief attraction of the book is the wealth of carefully tested information on all aspects of the chemistry of food and nutrition and the engaging graces of literary scholarship. It is increasingly recognised that the chief value of science to mankind does not consist in the static description of its results, but chiefly in the study of their

application in the promotion of people's health and prosperity. The book provides an adequate description of the structural chemistry of the proximate principles found in food, but the emphasis is laid on the consideration of the functioning of these substances in nutrition. Nutrition is the functional aspect of the study of food chemistry, and therefore its dominant aspect from the point of view of present-day science occupies the greater part of the book.

The book comprises 27 chapters which present an eminently clear and precise account of the principles of the chemistry of food and nutrition from the standpoint of the study of chemistry and from the point of view of the needs of the community, which obviously must underlie not only our judgment of the values of the different articles of human diet, but also the use of food for the advancement of health. According to the present indications, the results of research work in food chemistry might, in a small part, stimulate the production of synthetic foodstuffs, and much more largely, the increase of crops and farm animals; but the principal contribution which the latest development of this branch of knowledge will be in the direction of furthering human welfare and progress through the more scientific use of food.

Controvertial views are not neglected. The discussion on them just indicates that some of the views are capable of more than one interpretation, and that on others fresh evidence is available. But the most valuable part of the book, which is also the most difficult task for presentation is the exposition of the latest findings of the newer chemistry of nutrition in a way which puts them in their proper value and importance. The range of subjects included in the book is no doubt wide, and each chapter can be read independently, and the reader can take any topic, without being obliged to read the previous chapters. Still the student using the book for serious class work, will find that several chapters form a coherent whole, and at the end of each chapter are lists of references which put the reader in touch with the significant literature so valuable for students

seeking for fuller information. In the four Appendices given at the end of the book much that is new of the data on mineral contents and vitamin values of foods is given, and in several instances, there are here presented for the first time average of a new order of precision with statistically determined probable errors and coefficients of variation.

The book is superb, its value as a scientific treatise is only excelled by its usefulness for the enlightened general public.

**Origins of Clerk Maxwell's Electric Ideas as Described in Familiar Letters to William Thomson.** Edited by Sir Joseph Larmor. (Cambridge University Press), 1937. Pp. 56. Price 3/6 net.

Theoretical Physics has throughout its history been alternating between the action-at-a-distance view and continuous action theories. Faraday and Clerk Maxwell turned electrical science from Coulomb and Ampère's distant action ideas into the conception of a field of continuous action. Prof. Max Born has, in recent times, attempted to develop a unified field-theory which is designed to find a natural place for electrons and protons in its logical growth. At such a time a perusal of the mode of origin of Maxwell's electric ideas is bound to be stimulating and diverting. Maxwell's attempts to build up a dynamical basis for his field theory from a detailed mechanical picture of the ether, present, however, a radical contrast to modern methods which start from Hamiltonians and Lagrangians with frankly no apology for their introduction. The letters brought together in the present connection are not many of them concerned with electricity at all. We are given a glimpse into Maxwell's, many-sided investigations — his theory of bending of surfaces, colour vision and so on, the electrical portion being about a third of the whole. The Editor has an excursus at the end on the idea of entropy. We should have welcomed more of the illuminating remarks of Sir Joseph Larmor indicating the connection of many of the allusions in the letters with other available papers of Maxwell and Kelvin, for these remarks will soon become important historically on account of Sir Joseph's peculiar position as a connecting link between classical and modern Physics.

T. S. S.

**Physics, an Introductory Text-Book.**

By H. J. Taylor Humphrey Milford. (Oxford University Press), 1937. Pp. x + 448. Price Rs. 5.

This book is in a sense the lineal descendant of the many excellent text-books of Theoretical Physics which have been appearing in increasing numbers in recent years, as for example those of Arthur Haas, Joos, Leigh Page, Wilson, Westphal, Houston and others, but it aims at a much lower standard which is stated by the author to be that of the Bombay Intermediate Examination. Like them it is modern in outlook, pruned of experimental details, compressed and cut down to the minimum compass by a rearrangement of topics which avoids repetition at all costs. Like them also it can only serve as a guide for more detailed study and as a compact summary for recapitulation. Its modern outlook is evidenced by brief references to the Theory of Relativity, Andrade's work on the striations in a Kundt's tube, crystal structure, shape and orientation of the molecules of organic compounds, acoustics of buildings and so on. There is a number of beautiful photographs such as those of ripples, biprism fringes, model of soap molecules and so on. The emphasis is judiciously thrown on the cardinal principles, and often, as in his remarks on music, the author is very interesting. But the explanations are everywhere meagre and appear to be unwillingly inserted out of sheer necessity. Experimental details are almost entirely wanting, and it is doubtful whether such a separation of theory and experiment is desirable at the Intermediate stage. Though in this way the book has been made very compact, the student will necessarily require another text for practical physics and then there is no guarantee that the experimental course will correspond to the treatment in this book. Even if the author of this book were to prepare a companion volume, much avoidable repetition of the theory will become necessary. If one looks at the amount of theory included in the Wien-Härms' *Handbuch der Experimental physik*, one will be convinced that a divorce between theory and practice is impossible. Another departure from usual practice noticeable in the book is the amount of Kinetic Theory and Physical Optics included in spite of the fact that the Calculus

is excluded, as also the complete absence of worked examples. The few examples given at the end of the book cannot compensate for the lack of exercises on the individual chapters. Though the tendency to compactness is due to the modern necessity of passing on more and more knowledge to the student in the same interval of time as before, the student at the Intermediate stage cannot be expected to fatten exclusively on these compressed tablets of knowledge, so entirely freed from bulk material.

The author has avowedly aimed at avoiding certain "spurious definitions" but we cannot say that his attempt is an unqualified success. It is an impossible task to define fundamental quantities strictly, since they cannot be made to depend on simpler concepts. The best course seems to be to start from intuition and then make the idea more precise as soon as the necessity for greater precision has been shown to exist. The author criticises the statement that "mass is the quantity of matter" but says that "the mass of a kilogram is the amount of matter which has the same weight as the standard kilogram". He also says that the gravitational pull exerted by the earth on a body compared with the pull at the same place on the standard kilogram, gives the mass of the body. Does this mean that mass is a pull or that it is a ratio of two pulls? Immediately afterwards the word 'force' is introduced without any definition at all. The author criticises the statement that "temperature is the degree of hotness" on the score that the method of determining the degree of hotness is not clear. His definition that "temperature is the indication of a standard thermometer" is equally faulty since the definition does not prescribe how the standard thermometer is to be constructed. It is a wonder he does not define force as the indication of a standard dynamometer.

We do not understand such statements as "a hypothesis is the opposite of abstraction," "observing a law," "the length of a spring gives the force extending it," "Boyle's law is a more general statement of Charles' law" and so on. Instead of proving that the pressure at a point in any liquid is the same in all directions, the author proves the less useful theorem that in a weightless fluid the pressure is the same

at all points. We find absolutely no precedent for defining specific gravity as the weight of a unit volume and contrasting it with relative density. In the description of Fig. 65, the letter P is mentioned but is not to be found in the figure. The

formula  $n = \frac{2}{l} \sqrt{\frac{F}{\rho}}$  is wrong and should be

$n = \frac{1}{2l} \sqrt{\frac{F}{\rho}}$  and correspondingly the previous

statement that  $k = 2$  should be  $k = \frac{1}{2}$ . The closed end of a pipe is wrongly called a pressure node on p. 126. In finding the specific heats of liquids by the method of cooling we take equal volumes of liquid and not equal weights. The convention of signs adopted gives the same formula for mirrors and lenses and this, being contrary to current practice, is likely to cause confusion. To say that magnets are made of iron is misleading. The term "intensity of magnetisation" is abruptly introduced on p. 321 without any definition, the explanation of the term occurs much later. The statement on p. 373 that "the current in the wire flows from the lead plate to the peroxide plate" in an accumulator cannot be correct. The full path of the rays in a compound microscope is not correctly shown on p. 269. We find 's' for 'is' on p. 249. On p. 420, Q. 24, 432 cm. should be 432 mm.

Although we have indulged in a lengthy criticism, our intention is only to see that a good book is made better. The sections on photometry, polarisation, molecular structure of solids and centres of pressure are admirable. The whole outlook of the book is also fresh and stimulating. We can only invite the author to lay students under a deeper debt by rendering the exposition clearer even at the cost of some prolixity.

T. S. S.

**The Metabolism of Living Tissues.** By Eric Holmes. (Cambridge University Press), 1937. Pp. x + 235. Price 7s. 6d. net.

The object of the biochemist is to interpret the various activities of life in terms of chemical reactions knowing of course as a biologist that one of the fundamental characteristics of life is growth and change. The starting point of the biologist is the living cell in which, however, the chemist discovers

a series of biochemical reactions. Undoubtedly this investigation and the interpretation of the interplay of the chemical reactions is largely limited since the cell is so susceptible to the change in environmental conditions like temperature, oxygen-content, etc. Dr. Holmes, the author of this fascinating book under review, leads us into a domain where biochemical discoveries have been of recent origin and deals with them in such a lucid manner that the beginner "will acquire an understanding of the aims and present position of the science which will add greatly to the interest of his later studies." Some of the chapters included in the book like Enzymes, Hormones, Vitamins, Oxidations, the Liver and Kidney Metabolisms, make extremely interesting reading. In dealing with enzymes, the author points out that there are several classes of them, some of which, at any rate, can be isolated as pure substances, e.g., the proteolytic digestive enzymes, while others are difficult to be dissociated from the cells. The condition under which energy reactions take place is also described. It is noticed that in these reactions besides the association of the enzyme and its substrate with suitable conditions of temperature and pH, there is a third factor called "co-enzyme"—a substance which is frequently thermostable and often non-colloidal. By a set of careful but difficult experiments on mammals, it has been conclusively proved that liver is the chief site of the formation of urea, though tissues other than the liver may also contribute in very small proportions. For the formation of urea, ammonia and CO<sub>2</sub> are necessary and probably some ammonia is brought into the liver from exterior since it is not all made locally. The little that is manufactured in the liver is by the deamination of the amino-acids. The chapter on the nervous system could have been certainly enlarged. After describing the dependence of the brain upon the oxygen supply derived from the blood brought by carotid and vertebral arteries, the author points that besides O<sub>2</sub>, the brain must also have an adequate supply of glucose which also it draws from the blood. A brief account of the chemical action of the drugs on the nervous system is also given.

In conclusion, Sir Gowland Hopkins rightly points out in his Foreword that "Characteristic of his presentation of facts and inferences is a continuity which en-

courages the reading of the book from cover to cover."

The get-up of the book is excellent.

L. S. R.

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**Silicate Analysis**—A Manual for Geologists and Chemists with chapters on Check Calculations and Geochemical Data. By A. W. Groves. With a Foreword by Prof. Arthur Holmes of the University of Durham. (Thomas Murby & Co., London), 1937. Cloth : Price, 12s. 6d.

There is a very voluminous but scattered literature on analytical methods. Standard methods are being constantly improved upon and new methods are being tried out for increasing the accuracy and for making the procedure simpler and less liable to errors. A number of special treatises confining themselves to particular elements, compounds, natural or artificial substances have been published, and several comprehensive handbooks such as those of Scott, Mellor, Treadwell (Hall), Hillebrand and Lundell, are now available which may be considered indispensable in any analytical laboratory.

During the last few decades specialisation has so far advanced as to call for separate works on methods of analysis of silicates and silica products. Industries such as glass, ceramics, refractories, cement, etc., have to exercise as strict analytical control on their raw materials and finished products as the metallurgical industries. In addition, the development of mineralogy and petrology depend in some measure on the thorough understanding of the composition of minerals and rocks; similarly, the elucidation of geochemical and petrogenetic problems need the help of quantitative chemical data.

In this special field of silicate analysis the works that have so far appeared in English are from chemists with a long background of experience in the well-equipped laboratories of the United States Geological Survey. W. F. Hillebrand's well-known *Analyses of Silicate and Carbonate Rocks* now available as Bulletin 700 (U.S. Geol. Surv.) grew out of the earlier notes which accompanied a publication of collections of analyses done in those laboratories. This was followed by H. S. Washington's *Chemical Analyses of Rocks* now in fourth edition (John Wiley, New York, 1930), which is unsurpassed as a laboratory manual, particularly for the meticulous care with which details of procedure are outlined. Dr. Groves' book, under

review, is a welcome addition to the literature in this field. The author claims in the Preface that he has kept in mind the needs of the chemist and the petrologist. Considering the limitation imposed by the size of the book, the author has, in some measure, succeeded in this task. It is but natural that he should follow the general scheme of the excellent work of Washington's. The introductory chapters deal with laboratory equipment and apparatus, the preparation of the sample, the reagents necessary, the constituents to be determined and the common operations in analytical work. The procedure is given carefully and fully, with useful emphasis on points which call for special precautions. In the text, the analytical procedure is printed in heavy type and thus separated from general discussion which is in ordinary type. Special chapters are devoted to alternative methods under special circumstances, and for technological applications. A welcome feature of the work is, as pointed out by Prof. Holmes, a chapter on the geochemical distribution of the elements on which a great deal of information has accumulated during the last few years, particularly in European Continental literature. The data presented are up to date and well-documented. The book should prove useful to silicate analysts in general and rock analysts and petrologists in particular, especially as it supplements the information contained in Hillebrand's and Washington's treatises. The printing and get-up are excellent and the price is not excessive for a work of this type.

M. S. K.

**Gases and Metals.** By C. J. Smithells, D.Sc. (Chapmann and Hall, Ltd.), 1937. Pp. vii + 218. Price, 18s. net.

This book is a complete introduction to the study of gas-metal equilibria. It deals with an important subject for, as the author points out, the absorption of gases on metals is now known to be a critical factor in many catalytic processes and in the manufacture of electric lamps and thermionic valves. A knowledge of the principles underlying the diffusion and solution of gases in metals is essential in the control of many metallurgical operations.

This volume contains three chapters dealing respectively, with the phenomena of absorption, diffusion and solution as

they occur in gas-metal systems. The chapters though each about 70 pages long are not unwieldy, as they are logically subdivided. The results of research in all these fields are carefully and accurately described, numerous diagrams being included in the text.

Although the author has not attempted to deal with the practical application of the work, he discusses this collection of fundamental principles and research data in a readily accessible form which will be of great help in the understanding and solving of related industrial problems.

This book is exceedingly well written and can strongly be recommended to anyone interested in this subject, and indeed generally to physical chemists and physicists.

T. S. W.

**An Introduction to the Scientific Study of the Soil.** By Norman M. Comber (Edward Arnold & Co., London), 1936. Price 7/6.

This book does credit to the author's intention as expressed in his preface to the third edition: "This book is essentially communication from a teacher to student and is written to give the general agricultural and horticultural student a concise account of the science of the soil. . . . No attempt is made to give a description of laboratory methods: the sole object has been the presentation of a general conception of soil constitution and phenomena. The whole field of soil science is covered in a short space and yet the book does not suffer by brevity; the facts are stated in clear and unambiguous terms. The chapter on Base exchange termed "Adsorptive properties" and that on "Soil water" make refreshing reading. The author has escaped the baneful influence of interpolating personal views on controversial topics to which many authors are subject and puts views as they are conceived by others and not himself. He gives no doctrinaire views: the chapter on Adsorptive properties — a field to the knowledge of which he has contributed in no small measure.

In keeping with the above one comes across warnings to the students as "It is customary as in dealing with many reactions, to speak as if the equilibrium between soil bases and solution bases was a stat

equilibrium. The student will realise however, that the equilibrium must obviously be dynamic."

A valuable chapter is the one on "The Artificial Treatment of Soil" including "Randomised Block method" of field experimentation. One wishes that a chapter on soil mapping had been added with instructions for reading soil maps. To the list of books of reference given at the end, could usefully be included the German work "Handbuch der Bodenlehre".

It is an excellent book for study by all beginners and will help the Indian student — especially of agriculture and forestry — in understanding the complicated processes going on in the soil, a necessary implement for his profession.

N. G. C.

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**Introduction to Optics.** By G. B. Deodhar. (Indian Press, Allahabad), 1936, Pp. 614.

After a brief historical Introduction, the author devotes the first five chapters to Geometrical Optics; Chapter VI contains a good elementary treatment of optical instruments. In Chapter VII an excellent account of the several methods of determining the velocity of light including the latest work of Michelson, is given. Before proceeding to the treatment of the phenomena of Interference, Diffraction and Polarisation of light in Chapters X, XI and XII, the author deals with the theories of light in the eighth chapter. Chapter XIV is mainly concerned with the description of the different spectral regions and in Chapter XV, dealing with the elementary theory of spectra, the reader is introduced to the Quantum Theory. The next chapter deals with some of the more recent discoveries like the Compton and the Raman Effects. The last three chapters successively deal with "Colour", "Photometry" and "the Ether".

We thus see that the subject-matter dealt with is fairly comprehensive as a preliminary course in Optics. A feature of this book is the inclusion of a number of photographic reproductions. The treatment of the subject is clear, simple and free from advanced mathematics. The usefulness of the work is further enhanced by the inclusion in the

Appendices important tables containing useful data.

We have no hesitation in recommending the book to University students who are in need of an introduction to the important subject of Optics.

B. V. R. RAO.

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**Bulletin of the Madras Government Museum.** 1. Scyphomedusæ of Krusadai Island. By M. G. K. Menon. Vol. I, No. 2, Pt. 3 (1936), Pp. 9, Price As. 8. 2. Decapod Larvæ from the Madras Plankton. By M. K. Menon. Vol. III, No. 5 (1937), Pp. 55, Price Rs. 1-14-0.

The first publication is one of the series of reports on the Fauna of the Krusadai Island issued under the joint auspices of the Madras Museum and the Madras Fisheries Department. It deals with the collections of Scyphomedusæ made by Dr. F. H. Gravely and the officers of the Madras Fisheries Department. Nine species of eight genera are recorded. Owing to the paucity of the material, one of the forms has been provisionally assigned to the genus *Tamoya* F. Müller. Detailed notes are given about the various species, except for those already dealt with in detail in the author's earlier paper (1930) on the Scyphomedusæ of the Madras Coast in the same journal. The most interesting of the present collection is *Chrioplasmus quadrigatus* Hæckel originally described from Madras, but since recorded from the Philippines.

The second publication forms a continuation of an earlier report (1933) in which the author described the larvæ of four species of Decapods of the Madras Coast. In the present paper, the author deals with a large number of forms of the two sub-orders, Natantia and Reptantia. Detailed descriptions of the various structures of the different stages of the larvæ of the Decapods dealt with in the report are given and the account is accompanied by very good illustrations of the whole larvæ and the various structures. The various forms dealt with have been identified generically and in some cases even specifically, but as most forms were not reared to the adult stage, the identifications in some cases are provisional. It is to be hoped that the author will be able to carry on his work further.