

REVIEWS

Physical Constants of Hydrocarbons. By Gustav Egloff. (Reinhold Publishing Corporation, New York), 1940. Pp. 605. Price \$12.00.

The present volume is the second of the four-volume work on the collation and systematic study of the important physical constants of different classes of pure hydrocarbons. In the first volume which was published in March 1939 (cf. this Journal), physical constants of the paraffins, olefins, acetylenes and other aliphatic compounds were fully described. Physical constants of cyclo-paraffins, cyclo-olefins, and other alicyclic compounds are reported in this volume which in 605 pages covers nearly every known pure hydrocarbon in these series. The enormity of the task can be gauged from the fact that alicyclic hydrocarbons are available in nature in enormous quantities. Of the oil production of the world for 1939 which was about 2,000,000,000 barrels, 500,000,000 were cyclo-paraffin hydrocarbons and they are largely consumed as motor fuel, gas oil, kerosene, diesel oil, lubricants and fuel for household and industrial purposes. The physical constants of the alicyclic compounds have not been studied with the same degree of accuracy as those of the paraffinic series owing to the recognition of their special advantages only during recent years.

The book deals with a brief introduction on the subject and includes such important considerations as:

- (a) Structure of alicyclic hydrocarbons,
- (b) Mono-cyclic rings of the alicyclic series,
- (c) Cycloparaffins containing fused rings,
- (d) Double and triple bonds in alicyclic hydrocarbons,
- (e) Geometrical isomerism, and
- (f) Nomenclature of alicyclic hydrocarbons.

Four physical constants namely the melting point, the boiling point, density, and refractive index for every compound are given in as many cases as literature makes it possible. Additional data are occasionally given which add to the value of these constants and establish their accuracy. The volume is really a dictionary of constants and the reviewer has very little to add ex-

cepting to confess that the work is a strenuous effort which must have cost lot of patience and time and should be utilised by workers in petroleum industry and students of hydrocarbon chemistry. Further research, however, will probably lead to many corrections in the actual values of the constants, as it is only during recent times that the need for a systematic study of the physical properties of pure hydrocarbons has been felt.

In these investigations on the purity of hydrocarbons, new physical discoveries such as Raman effect, the molecular scattering of light by pure substances and the X-ray methods of analysis have already played an important part. Other physical properties such as dipole moments and viscosities will probably be of equal importance and the constants obtained by the methods will probably find a fitting place in new editions of this otherwise useful book.

S. S. B.

Hydraulic Measurements—A Manual for Engineers. By Herbert Addison. (Messrs. Chapman & Hall, Ltd., London), 1940. Pp. x + 301. Price 21sh.

This book forms a companion volume to the author's earlier work "A Text-Book of Applied Hydraulics" which has now run through the second edition. It is mainly intended to be a practical manual for engineers and gives experimental details for all the methods available for the measurement of the pressure and flow of liquids. The progress made during the last two decades in the scientific study of the laws of hydraulic flow has enabled the author to formulate the laws on a more stable basis than hitherto. He has also given full weight to the practice adopted on the continent and embodied in the book the work of *Irrigation Engineers in Egypt and India*. Now-a-days, when more and more attention is being paid to the metering of city water supplies, the methods described for stream gauging will be found very useful by Municipal Engineers. Similarly, due to the development of the oil and petroleum industries and the immense increase in the use of liquid fuels, the metering of piped discharges has assumed very great

importance and the book deals exhaustively with this.

The author assumes considerable acquaintance on the part of the reader with the theory of Hydraulics and no theory is given regarding any meter or instrument. An actual meter is described and the method of using it with all possible sources of error and necessary precautions to be taken are given in detail.

The whole of the first chapter is devoted to direct reading meters for the measurement of depth, head and pressure and the second chapter with indirect reading meters. Installation and operation of pressure and depth gauges is dealt with in the 3rd chapter and the next three chapters deal with the measurements of weight and volume, velocity and discharge. The measurement of discharge in closed pipes is dealt with under three heads, (1) Quantity meters, (2) Rate of flow meters, and (3) special methods and a separate chapter is devoted to each. Similarly, the measurement of discharge in open streams, by free flow methods, by weirs and flumes, and by regulating sluices and by scale models is discussed in great detail, each occupying one separate chapter. The twelfth and the last chapter deals completely with indicating, recording and integrating instruments for flow-measuring installations.

The author has made the actual use of each and every appliance mentioned in the book more intelligible by the introduction of photographs and hand sketches wherever possible. One very attractive feature of the book is that any doubts that one may have with regard to the practical use or calculations relating to any meter, are cleared by the profuse introduction of worked examples at each stage.

E. K. RAMASAMI.

An Introduction to the Study of Air Mass and Isentropic Analysis. By Jerome Namias. (American Meteorological Society, Mass.), 1940. Pp. 232. Price \$1.25.

The book is a valuable asset to every student of meteorology. A number of experts have made contributions to it, and its popularity is shown by the present edition being the fifth edition in five years.

The book opens with an introduction by J. Namias and a discussion of the conditions of atmospheric stability, and the properties best conserved by air masses during their movements, properties by which they can

be identified and distinguished. The Rossby diagram, its interpretation and applications are dealt with in two sections, followed by three sections devoted to warm and cold 'fronts' and the elements of cyclonic structure. The Norwegian wave theory of cyclones is expounded in a few pages by B. Haurwitz. The eighth section deals with the 'Tephigram' of Shaw and its application in forecasting weather by a study of the upper air. A study of the origin, classification and forecasting of thunderstorms is given in the next section.

Having shown that a study of air masses and fronts, and their movements and modifications is of great importance in explaining and forecasting weather, in the next part of the book, pp. 72-108, H. C. Willet takes up a detailed study of the sources, classification and characteristic properties of North American air masses, their movements and modifications and their significance in weather production. These studies are continued in pp. 109-113 by Al. K. Showalter, and the following pages 114-35 contain charts illustrating the features and phenomena described.

Section 10, pp. 136-75 by J. Namias expounds the analysis of meteorological factors and events through a study of 'isentropic' surfaces, with a number of illustrations and charts. The importance of upper air data for such analysis is brought out.

A noteworthy feature is the very extensive and detailed bibliography, pp. 176-227, classified under 10 headings and 27 sub-headings, with over 1,900 references. The last five pages contain a glossary of technical expressions. The different recent methods of analysis of meteorological data for the study and forecasting of weather are explained in the book in a concise manner with illustrative charts on a large scale. No keen student of meteorology should be without a copy of this book.

A. VENKAT RAO TELANG.

Handbook of Economic Entomology for South India. By T. V. Ramakrishna Ayyar. (Government Press, Madras), 1940. Pp. xviii + 528. Price Rs. 4-12.

According to the author the book has been compiled from lectures delivered by him to the students of Madras Agricultural College for over twenty years and is especially intended for agricultural students and educated farmers of South India.

Part I of the book deals with general entomology, in a lucid and simple style showing the position of insects in the animal kingdom and their importance. It then deals briefly with the external and internal system, physiology, reproduction and growth of insects, the general features in the activities of insects and lastly with insect classification. The most important feature in Part I is a simple key to recognise the important insect groups of South India. This key in most cases should make it possible to quickly locate the order of any common insect of importance referred to in the book and will be helpful to all agricultural students in India.

Part II deals with economic entomology, insect pests of cultivated plants including the chief agricultural crops of South India, vegetables, fruit trees and of other plants yielding dyes, drugs, spices, etc. This part also acquaints the reader with pests of garden plants, fodder crops, some useful trees of the plains, pests, affecting food products, cattle and domestic animals. There are also brief references to methods of control of the various pests. The author has also briefly dealt with household, and disease-carrying insects and a few beneficial insects of productive and helpful forms. The book ends with four useful appendices and a list of reference to literature on South Indian Entomology.

In short, the book is packed full with information on the various aspects of entomology and is not only a good text-book for agricultural students but an attractive guide to those whose interest in entomology is casual.

An outstanding feature of the book is the abundance of illustrations most of which are clear and simplified but in a few important cases the simplicity and clearness have been marred by reduction in size, overcrowding of many figures in one illustration and faint lettering, e.g., in Fig. 3A, it is difficult to read names of bones and in 3B it is difficult for a beginner and a layman to find out what and where the chitinous exo-skeleton is; Figs. 60 and 61, illustrating several biting and sucking insects along with the nature of damage caused by them, have been crowded together, making the illustrations less informative and educative about the form of the insects and nature of the damage caused by them; Figs. 76 and 77 which respectively illustrate the calendar

of important pests of chief crops other than paddy and Madras insects which become pests only in certain years, the food plants, insect pests and lettering are not prominent and clear; this has greatly affected the value of these illustrations.

The author has been unkind to the insect world by reducing their estimated population from seventy-five to sixty per cent. of the living species of animals. American spellings have been introduced here and there; on page 28 one of the definite functions assigned to fat bodies is that of excretory organs though the opinions of workers greatly vary on this point. In spite of the earnest attempts and appeals of the entomologists to follow uniform terminology words like 'deterrents' have been used for 'repellants', etc.

Under chemical methods of insect control by the use of non-arsenical materials like sodium fluoride which are more in use these days for treating vegetables and fruits against biting insects, short notes on use of easily available ones would have been useful to the farmers.

To the reviewer's regret, the author has made certain inaccurate statements in the chapters on beneficial insects, e.g., Lac is called an ingredient of shellac when in fact shellac is nothing but purified lac; the name of the most common lac insect has for some years been changed to *Laccifer lacca* but the author still calls it *Tachardia lacca*; there are both apterous and winged males among the lac insects, the former class being more prevalent but the author has mentioned only winged males; even the winged male does not fly out of its resinous covering as stated by the author but crawls out like an apterous male. The scraped lac when coarsely crushed and washed is called 'seed lac' and not 'lac'. Shellac is not made by boiling 'the powdered seed lac encrustation with a chemical like yellow arsenic or orpiment' but by filling the seed lac in a long narrow bag, melting it and forcing it through the cloth by pressure; the orpiment is not at all necessary for this purpose but is sometimes used only to lighten the colour of dark coloured lac. In the list of provinces where lac is cultivated on a fairly large scale, omission of Bihar which produces over three-fourths of the total production is regrettable. Mistakes of this type could have been easily omitted if recent publications on lac had been referred to. In his own

province of Madras, the author has mentioned his own small efforts of growing lac on certain hosts but has not mentioned large-scale lac cultivation by the Madras Government in Salem and Madura.

Either adding another appendix or arranging appendix 'A' according to important food plants and giving the names of chief insect pests with their orders in brackets against the food plants would prove more useful and handy to the readers than the present arrangement. In spite of the errata, there still remain a few printing errors which perhaps are inevitable in a first edition. The printing also is not as attractive and neat as it should be for such a useful book.

These criticisms, however, do not detract from the enormous value of the book to those for whom it is especially meant. It is also patent that the author took great pains in preparing his college lectures and finally compiling the present book which should prove more useful to the agricultural students and educated farmers in India than some books on foreign agricultural entomology now in use in India.

P. S. NEGI.

Principles and Practice of Chromatography. By Zechmeister and Cholonoky. English translation by Bacharach and Robinson. (Chapman & Hall, Ltd., London), 1941. Pp. 362. Price 25sh.

Few will disagree that science advances as much through presentation of an important problem as through the invention of a new technique. Referring to the latter some twenty years ago Emich and Pregl perfected the method of micro-analysis to such a degree that many a chemical problem could now be attacked which was previously given up as impossible. During the last ten years the "Chromatographic procedure" has likewise revolutionised chemical manipulation, both in isolation as well as in purification of compounds. For example Lactoflavin or Vitamin B₂ is present as traces in milk; it was impossible to isolate it by any other technique. It was finally concentrated by adsorption on alumina and recovered through elution by means of benzene and methyl alcohol. Among cancer producing hydrocarbons it was necessary to obtain substances in an ultra-pure condition since their potency was apparent when they were present even

in traces. Dibenzanthracene as ordinarily obtained was accompanied by a trace of an yellow coloured impurity. The classical methods of purification were all found useless for purifying dibenzanthracene; the purification was achieved by the application of chromatography.

Chromatography was developed by the Russian Botanist, Tswett, in 1906 but was entirely neglected until the German Chemist, Richard Kuhn used it in isolating Lactoflavin in 1931 and several polyene pigments subsequently and thus showed its importance.

So much work has been done by its help within these ten years that enough literature has grown up to be embodied in a book originally written in German by two Hungarian scientists, Prof. Zechmeister and Dr. Cholonoky which underwent two editions, the last appearing in July 1938. Drs. Bacharach and Robinson of the Glaxo Laboratories have translated the book to which Prof. Heilbron has written a short foreword. The translation is published by the well-known firm Messrs. Chapman & Hall and the book covering over 370 pages of printed matter and containing 74 illustrations is moderately priced 25sh.

The half-tone blocks seem to have been lent by Julius Springer of Vienna the publishers of the German edition; some of the illustrations show the presence of spots which do not interfere with their explanatory value but do reduce their artistic standard. Fig. 20, for example, has two black spots in the background and a white one on the neck of the flask. Fig. 68 again has two white spots and is moreover printed upside down as compared with the German original. The Germans write exhaustively, the French lucidly. The English translation has followed the French method by abbreviating the bibliography and omitting titles of the papers carefully given in the German original and leaving only the references to publications. The taste for clarity is very apparent in the translation. For the original "Kunsblich bereitete Porphyrin Präparate" the English edition states "Synthetic Porphyrins" which is as lucid as it is precise. Many such examples could be given which makes the translation even superior to the original. The sub-titles of smaller paragraphs are often found at the beginning of their sentences in the German book. The translators have given them the importance they deserve and printed the

headings in thicker type and by themselves at the top of each paragraph. For example the German edition says on page 185: "(a) Absorptions verhalten einiger basischer Farbstoffe" running in one sentence the English version prints as follows:

"(a) Basic Dyes.

The order in which a number of basic dyes"

The original text itself is not written in the characteristic heavy style of the Germans but the English translation makes the contents even more easily assimilable. The English rendering is so well done that the

work no where reads like a translation and the meaning is everywhere more clearly expressed than in the original. Even if one were able to read German without the help of a dictionary we would recommend the English translation.

Finally we wish to endorse what the publishers communicate on the wrapper "This is the first account of Chromatography to be published in English and the first book dealing exclusively with a subject that has already proved of enormous value in different fields of research."

S. M.

PHYSIOLOGY OF RESPIRATION OF THE AIR-BREATHING FISH, *MONOPTERUS JAVANENSIS* LACÉPÈDE [= *FLUTA ALBA* (ZUIEW)] :—A REVIEW

MARKED seasonal changes, especially in regard to the alternation of dry and wet periods, in the climatic conditions of India have resulted in a number of interesting adaptations in certain fishes of the country. The most remarkable among such adaptations is the habit acquired by some forms to make direct use of the atmospheric air for tiding over periods of drought when the waters in which they live either become very stagnant or dry up altogether. Though this habit has been acquired by many species in a greater or lesser degree, depending on the environments in which they live, the end in view is the same in all cases; the means adopted for its achievement and consequently the structural modifications undergone by the various fishes belonging to widely separated families are, however, quite different. The highly interesting subject of aerial respiration in fishes attracted the attention of not only the earliest ichthyologists who investigated the Indian fauna but is still being studied by a number of students both in this country and abroad. With the advances in the technique for carrying out physiological experiments, the mass of data collected within recent years has materially helped to elucidate the nature and cause of evolution of this remarkable phenomenon. In a recent contribution on the subject, Wu and Liu (The Bucco-Pharyngeal Epithelium as the Principal Respiratory

Organ in *Monopterus javanensis*, *Sinensia*, April 1940, Vol. XI, pp. 231-38), as a result of direct observations and a series of illuminating experiments, have been able to establish that in *Monopterus javanensis* the bucco-pharyngeal epithelium serves as the principal respiratory organ, both in air and water; they have also been successful in elucidating the exact rôle of the gills and the skin in this vital process. Finally the authors studied the morphological features of the branchial apparatus of the fish with a view to ascertaining the rather limited function of the gills and the capacity of the fish for cutaneous respiration.

Wu and Liu describe in detail the mode of respiration of *Monopterus* and show that for six-tenths of the period the fish remains in a state of suspension, three-tenths in the aerial phase of respiration, and only one-tenth in the aquatic respiring phase. They fully support the reviewer's views (Physiology, Bionomics and Evolution of the Air-breathing Fishes of India, *Trans. Nat. Inst. Sci. India*, 1935, Vol. I, pp. 1-16) with regard to the less laborious nature of the aerial as compared with the aquatic respiration, higher efficiency of the aerial respiration in obtaining oxygen and, in consequence, only a small expenditure of energy on the part of the animal adopting this mode of obtaining air. From the results of their elaborate experiments on the efficiency of