field of animal parasitology. In this half century the knowledge of the structure and activities of these organisms and an understanding of their significance in human welfare have been largely increased by active students of the field. Many general publications covering various aspects of the subject have been contributed by workers in all countries, but it has been left for Neveu-Lemaire to solve the difficult problem of bringing together all the work accomplished and of including it without serious loss in a single treatise, which should give a successful picture of the entire field.

Of this monographic undertaking, which is to comprise three volumes—helminthology, entomology and protozoology—the first and second have already appeared and the third is approaching completion. The volume on helminthology contained 1,544 pages and was illustrated by 787 figures. The volume on entomology, which has just come from the press, has 1,376 pages and 597 figures. Both volumes are worked out on the same plan. The first section is devoted to a consideration of general topics in that field, starting with a historical sketch and including thereafter discussions of degree of parasitism, origin of the parasitic habit, details of life history and mode of attack as evolved by various types of parasites, responses of the host to parasitic invasion and other biological problems involved in the varying interrelations of the organisms.

The second section treats of the anatomical and taxonomic features of the various genera and species of the parasites of man and the domestic animals. The geographic distribution of these forms has been well worked out and emphasis laid on their pathogenic rôle in parasitic diseases which has been shown to be highly significant through the investigations especially of the last forty years. This section is well organized, complete and up-to-date, and naturally it occupies the major part of each volume. An extended discussion of hosts and the different taxonomic groups of free living animals which give shelter and sustenance to particular parasites brings together in lists, tables and condensed forms a mass of valuable material not otherwise easily available to students in parasitology.

The illustrations are reasonably numerous, in large part new, and so far as checked also rightly credited to their original sources. The volumes are well printed and provided with good indexes. As the result of detailed checking of the data given in various sections of these volumes, the reviewer has been impressed with the breadth and accuracy shown. This work justly ranks as the most comprehensive treatise of recent date in this field. Work done in all European and extra-European laboratories has been carefully brought together and due credit given to foreign authors, thus escaping the criticism of national overemphasis charged against some writers. The text manifests that clarity and effectiveness in style generally characteristic of French publications. The treatise is a most valuable addition to the literature of parasitology.

HENRY B. WARD

SOLAR RADIATION

Etude Practique des Rayonnements Solaire, Atmospherique et Terrestre (Methodes et Resultats). By CH. MAURAIN. Paris, 1937.

THIS is a very comprehensive summary of our present knowledge on the important subject of the character, the intensity and the duration of solar radiation. It covers 188 octavo pages, is divided into 14 chapters, contains 38 tables of data and is illustrated by 18 text figures.

The author points out the close relation between the intensity of solar radiation and related problems of interest to mankind, such as climatology, the thermodynamics of the atmosphere and forecasting the weather.

He also refers to the difficulties encountered in attempting to obtain measurements of the degree of accuracy necessary to obtain comparisons between the intensities of similar elements at different points on the surface of the earth, as is done in forecasting the weather. For example, in order to exclude all sky radiation from measurements of the intensity of direct solar radiation, it has been found necessary to cover the outer end of the long tube, or vestibule, of the pyrheliometer with a thin glass cover, which must be kept free from dust. A long vestibule requires a driving clock of considerable power and accuracy. It has been found that at Blue Hill, the ratio between the readings of the Smithsonian silver disk pyrheliometer and the Eppley pyrheliometer, which records automatically on a Wheatstone bridge, does not vary from 0.400 by more than ± 0.001, provided all adjustments are accurately made and maintained.

In Chapter V, Table V, are summarized monthly means of atmospheric transmission for stations varying in latitude from 2° south to 51° north, and from altitude 8 m to 3,492 m above sea level, for each season of the year. The greatest monthly variation is shown at Turin, 66 per cent. in September to 79 per cent. in February and April. The least variation is shown at Calama, Chile, from 79 per cent. in January to 84 per cent. in August and September. The latter location was selected by the Smithsonian Institution for one of its stations for determining the value of

the solar constant of radiation, on account of the small amount of variation from month to month in the atmospheric coefficient of transmission.

Linke adopted the factor

$$T = \frac{\text{Total atmospheric depletion}}{\text{Depletion by pure dry air}}.$$

This factor becomes large in industrial cities, as is shown in the more equable climate of urban than of suburban regions.

Chapter VI treats of the total radiation received on a horizontal surface, directly from the sun and diffusely from the sky, and also from cloud sheets, either transmitted or reflected. This is an important subject, and Ångstrom's treatment of it is given in detail.

In this chapter, "Global radiation" is defined as the total radiation received from the sun, either directly, or diffusely from the sky; and in Fig. 11 are shown typical records, obtained on a day with sunshine, and also on cloudy days.

In chapter VII the radiation from the earth to the sky is considered, which is easily measured during the night hours, but which is taking place at all hours of both day and night, although under certain conditions of cloudiness its intensity becomes very low, or even negative in direction, when a cold surface is covered by warm clouds.

The seven chapters reviewed treat of the subject under consideration from the statistical standpoint. The remaining chapters consider it from the theoretical standpoint, which is quite apart from the treatment here reviewed.

HERBERT H. KIMBALL

VITAMIN B_1 AND ITS USE IN MEDICINE

Vitamin B_1 and Its Use in Medicine. By ROBERT R. WILLIAMS and TOM DOUGLAS SPIES. The Macmillan Company Monographs. The Macmillan Company, 1938.

DEFICIENCY of vitamin B_1 (thiamin) is the cause of beriberi, which, since the dawn of medical history, has been one of the major health problems, as it is to-day, in populations subsisting largely upon polished rice. There is increasing evidence that deficiency of this nutrient occurs in the United States to a degree which impairs the health of a considerable number of people. It is, therefore, one of the most interesting of the food factors which are essential in the diet. Since its existence was first demonstrated by Eijkman, in 1897, thiamin has been investigated by many investigators. The greatest achievement in this field of research was the improvement of the yield of the vitamin by Dr. Williams from rice polishings, so that about an ounce of crystalline material was made available for chemical study. With this material, Dr. Williams and his associates succeeded in determining the structure of the molecule and in following up this knowledge in an astonishingly short time by its synthesis. The synthetic vitamin has now become available at moderate cost in any quantities which may be necessary for the prevention of beriberi and for clinical use.

In Part I of the book, "Vitamin B_1 and Its Use in Medicine," the authors have discussed in a concise way all aspects of thiamin deficiency which may be instructive to medically trained readers, and suggest the clinical conditions in which thiamin deficiency may be suspected. Every clinician should be familiar with the recorded experience with thiamin in therapy, and many will gain by reading this excellent discussion suggestions which they will want to apply in their practice.

Part II is devoted to the fascinating story of the researches which have yielded our present knowledge of the vitamin, its physiological role and its final synthesis.

This book should be read by every biochemist, physiologist and progressive physician. The reader may be assured that he will be entertained and instructed by it.

E. V. MCCOLLUM

THE JOHNS HOPKINS UNIVERSITY

SPECIAL ARTICLES

A FATAL DISEASE OF PIGEONS CAUSED BY THE VIRUS OF THE EASTERN VARIETY OF EQUINE ENCEPHALOMYELITIS

DURING the recent epidemic of equine encephalomyelitis in southeastern Massachusetts, a number of human cases of encephalitis were observed, which were shown by Fothergill, Dingle, Farber and Connerley[1] and by Webster and Wright[2] to have been due to the virus of the Eastern variety of equine encephalomyelitis. As part of our investigation of the human disease, it became of importance to consider the possibility of other host reservoirs of the virus. We were informed by a number of pigeon breeders residing in the area where the horse disease existed that during the period of the equine epidemic they had suffered unusual losses in their flocks both of special breeding stock and of the common, domestic pigeon, the species so numerous in our cities. Indeed, one of these breeders made the interesting observation to us by letter that his "losses of pigeons began to cease as soon as the cold weather set in."

[1] L. D. Fothergill, J. H. Dingle, S. Farber and M. L. Connerley, *New Eng. Jour. Med.*, 219: 411, 1938.

[2] L. T. Webster and F. H. Wright, SCIENCE, 88: 305, 1938.