

the original approximate values of f by the means of its values at the neighbouring corner points. The successive approximations found in this way converge to the exact solution of the difference equation—and this solution is an approximate solution of the original Laplace's equation.

The theory and practice are equally simple. All that is demanded of the computer is inexhaustible patience and energy. The method is clearly capable of wide extension to many other problems of mathematical physics. In practical computation there are numerous devices for facilitating the application of the general principle, but these artifices are best learnt, pencil in hand, reworking such problems as are described in Southwell's treatise. G. TEMPLE

10/6

LIFE AND FOOD OF INSECTS

Insect Dietary

An Account of the Food Habits of Insects. By Prof. Charles T. Brues. Pp. xxvi + 466 + 22 plates. (Cambridge, Mass.: Harvard University Press; London: Oxford University Press, 1946.) 28s. net.

IN these days the amateur in natural history needs to absorb more and more of the products of scientific study if he is to get the fullest enjoyment from his observation of Nature; and the professional biologist has equal need of the knowledge, the enthusiasms and the gift for sympathetic observation of the field naturalist if his biology is to remain the science of living things. Therein lay the virtue of the late W. M. Wheeler's vivid books on insect life, "Social Life Among Insects" and "Demons of the Dust". These are inexhaustible mines of information about the creatures with which they deal; but, throughout, the natural history is informed by a profound knowledge of scientific theory and, for that matter, of the philosophical implications of science.

It is in this light that the book on the diet of insects by Prof. Brues, for many years an intimate colleague of Wheeler at the Bussey Institution at Harvard, is to be viewed. The reader is not to look for a carefully documented and systematic account of the vitamin requirements of insects, of the relative nutritional value of different proteins or amino-acids, of the ability of insects to utilize specific sugars, or of the properties and distribution of their digestive enzymes. Rather, the author displays the whole vast panorama of ravenous jostling insects, carnivorous and vegetarian, saprophytic, predaceous and parasitic; sucking the juices of plants and animals; destroying the crops of man or devouring one another. The importance of detailed scientific analysis is fully recognized, but as a rule the field is lightly sketched in; the reader is then told where to go if he wishes to pursue the subject for himself.

Getting food is such an important part of life that the author is led into many by-ways of the natural history of insects. The diversity of insects, their abundance as species and as populations are reviewed. Their range of habitats comes in for discussion; the lack of marine insects; aquatic life; adaptation to existence in the desert, in caves, in the soil, or as parasites. The colours of insects are found to be a part of the story; so is the determination of castes in social insects—how far is this controlled by food, and how far by genes? Seeking food for its own consumption or providing for its offspring involves the insect in all the complexities of behaviour. So

we have sections dealing with the selection of host plants by the egg-laying female; ancestral memory; conditioning; and biological races associated with particular food plants. There is no special emphasis on economic entomology, but this necessarily comes frequently into the picture; and the use of insects in the control of weeds or of other insects and such-like topics are lightly touched upon.

This catalogue represents only a fraction of the subjects covered; the book indeed amounts almost to a general natural history of the insects. It is written in a discursive style and the author enjoys an occasional joke. The author refers to the aberrant coccinellids of the genus *Epilachna* as vegetarian insects which can proudly trace their distaste for flesh as far back as Mesozoic times; and what are commonly contrasted as determinate evolution and orthogenesis, he depicts as natural selection and natural cussedness. The reader who is fond of insects will find new facts to interest him on every page; and after each chapter there is an elaborate classified bibliography which will be invaluable to the serious student. For those who can remember what a host of topics are embraced by 'insect dietary', this book will prove a most useful source of reference. It has good indexes to authors and subjects, and the text is lightened by a series of well-chosen line drawings and excellent photographs, mostly by the author.

V. B. WIGGLESWORTH

BIOCHEMICAL PERSPECTIVE

A Textbook of Biochemistry

By Prof. Philip H. Mitchell. Pp. xv + 640. (New York and London: McGraw-Hill Book Co., Inc., 1946.) 25s.

THIS addition to an already lengthy list of textbooks of biochemistry which have appeared recently, in the most part in the United States, is, we may say at once, very well done. A glance through its pages shows the very extensive changes which have come over the biochemical scene in recent years. The older books began with rather lengthy accounts of the necessary background of organic chemistry, and sometimes physical chemistry; leading to a description of those compounds which are of importance as the products or intermediaries of vital processes. The materials of which living organisms are constructed now occupy the centre of the stage, and this book, which excellently illustrates the trend and direction of the science, spends very little time on the organic and physical background. Indeed, in the preface the author states his belief in no uncertain way: "The central theme and the chief goal of biochemical study is an explanation of the real chemistry of life. While the chemistry of foods and of dead tissues is helpful corollary material, the essentials are the reactions of living protoplasm. Accordingly emphasis in the text has been given and major space allotted to such subjects as the constitution and activity of enzymes, the intermediary reactions of anabolism and catabolism and the vital significance of hormones and vitamins".

After preliminary chapters on carbohydrates (this seems unnecessary if organic chemistry is taken as known), on photosynthesis and on fats, the author plunges at once into the central part of the subject—the proteins and amino-acids, the nucleoproteins and nucleic acids, the vitamins and enzymes. With this basis he can then deal with what he regards as his