

nearly always operate in conjunction with others to produce their effects; the effects of salinity provide the key to the invasion of freshwaters by marine organisms.

The final chapters are devoted to biological productivity of freshwater (here called production) and methods of ecological research are particularly timely in relation to the present stage of preparatory work for the International Biological Programme. The end comes rather abruptly for, after a discussion of ways in which populations of organisms can be estimated, the last sentence reads "Cellulose paint is used to mark insects."—and you turn the page expectantly only to find the list of references, which runs to some 35 pages. A summing-up chapter would have been welcome, but perhaps that will come from Dr. Macan later, for his philosophy is summarized as follows on p. 167: "The study of ecology is like climbing a rounded mountain; the horizon retreats as the climber ascends".

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ENZYME INHIBITION

Enzyme and Metabolic Inhibitors

By J. Leyden Webb. Vol. 1: General Principles of Inhibition. Pp. xxi+949. (New York: Academic Press, Inc.; London: Academic Press, Inc. (London), Ltd., 1963.) 186s.

THE ubiquity of enzymes is emphasized by the substantial literature concerned with their action. A four-volume work is now devoted to methods for combating the activity of enzymes. Subsequent volumes will deal with individual classes of inhibitors, the present one covering the general aspects of enzyme inhibition.

In an early chapter, an outline of the principles involved in investigating enzyme reaction kinetics is presented. As Dr. Webb stresses, a knowledge of these concepts and of the methods for their investigation will be an essential preliminary to further analysis of the kinetics of an inhibited system. One of the minor tribulations encountered in the literature of enzymology is the frequent lack of consistency of the symbols used, especially those for kinetic constants. An important feature of the present work is the table of symbols; this list, I believe, will meet with the general approval of enzymologists.

Chapter 3 introduces the different classes of inhibition, together with methods for their kinetic treatment. A discussion of substrate and product inhibition follows. Chapter 5, a very valuable one, summarizes methods for the graphical analysis of enzyme inhibition, and stresses the care needed in obtaining and interpreting the data. Correctly used, these data can provide a wealth of information concerning the inhibitory mechanism. Physico-chemical principles of atomic and molecular interactions occupy Chapter 6, which will introduce new concepts to many biologically oriented readers. Being concerned with what Dr. Webb correctly believes to be of increasing importance to investigations of reaction mechanisms, this is a welcome contribution.

An investigation of the effect of an inhibitor on a complex system involving several enzymes will present problems not encountered when dealing with single, isolated enzymes. Such effects on multi-enzyme systems are examined in Chapter 7. These include the important concept of feed-back inhibition. Investigations of inhibition in whole cells and organisms follow, the evaluation of the intracellular concentration and localization of inhibitors, metabolites and enzymes forming a necessary preamble. Discussion of inhibitory effects in living systems involves an understanding of the interdependent nature of metabolic processes, topics including lethal synthesis, pacemaker enzymes and isoenzymes being introduced. Enzyme repression is, however, omitted.

The consequences of the simultaneous use of more than one inhibitor, on mono- and multi-enzyme systems, are covered in Chapter 10, subsequent chapters dealing with methods used for localizing the site of action of inhibitors, factors influencing the rate of onset of inhibition (an important contribution, since it is all too often assumed that inhibition is achieved almost instantaneously), and mechanisms for the reversal of inhibition. One hundred pages are devoted to a discussion of the effects of pH on both the activity and inhibition of enzymes. An examination of the influence of other variables, temperature, pressure, dielectric constant, ionic strength and composition of the medium follows, and the penultimate chapter evaluates the problem of the specificity of enzyme inhibitions.

As subsequent volumes of this work will surely demonstrate, the use of enzyme inhibitors has enabled significant advances to be made in investigations of enzymatic mechanisms and metabolic interrelationships. A maximum of information can be obtained if systems are correctly investigated, and throughout the volume Dr. Webb stresses this fact. His final chapter offers suggestions for planning and reporting inhibition investigations, and the dedication is a heartfelt plea for clarity in publications. Investigations of isolated enzymes have so far been the most fruitful, but the value, as well as the difficulties of investigation, of whole organisms is another salutary general theme.

The volume contains few misprints, is attractively produced and can be warmly recommended as an authoritative contribution to an important field of metabolic investigations.

C. J. R. THORNE

ENERGY IN ITS PLACE

The Geography of Energy

By Gerald Manners. (Hutchinson University Library.) Pp. 205. (London: Hutchinson and Co. (Publishers), Ltd., 1964.) 15s. net.

THE *Geography of Energy* can be warmly commended to two sets of readers. On one hand it will interest the student who seeks to gain a clear understanding of the complex relations between the different types of mechanical energy and the various factors which determine the choice made by the consumer. On the other hand, it will help the science teacher who seeks an imaginative approach in promoting the influence of science and technology in society.

Mr. Manners limits himself to the consideration of the geography of mechanical energy. Therefore, since the use of animate energy is excluded, the discussion of the transport and location of energy in the less-developed countries may require qualification, in particular circumstances or at particular periods—a reservation which he himself emphasizes. Furthermore, he does not claim to present more than a preliminary explanation of the spatial characteristics of the consumption, production and transport of energy; it is his novel and penetrating approach that gives the main value to a stimulating book which is a useful contribution to the public discussion of any national energy policy.

A brief introduction points out that the correlation between the consumption of energy and the standard of living in a country or region, while unmistakable, is far from perfect. It directs attention to the significance of questions which determine the location of 'energy industries', the patterns of production, and the economics and methods of its transport. This is followed by a chapter in which the general complexity of their various factors is briefly surveyed and summarized. It includes some sound comments on the location of nuclear power plants in Britain, and is followed by three chapters dealing with