

code and, briefly, with the organization and regulation of multicellular structures.

The author has not been well served by his publishers. In comparison with many other books which deal with molecular biology at about the same level it is too expensive. A paper-bound edition would have reduced the price, and surely have made it more accessible to its potential readers. The diagrams also leave something to be desired when measured against present standards of popular scientific publications. Many of the simple line diagrams, especially those which depict the elements of complex biological structures, have the virtues of simplicity and clarity, but others are old fashioned and quite unmemorable, particularly the structural formulae. Some of the full-page plates are very bad because of the printing process used and the resulting poor contrast. All the plates are sub-divided and some of the resulting sections are too small to provide adequate representation of the structure they are intended to depict.

These shortcomings detract from, but do not entirely obscure, the virtues of an otherwise excellent book. The progressive exposition of the main themes of molecular biology is very well done and the writing is both simple and careful. Some of the references to the current literature would be too specialized for the general reader, but the book can be specially recommended to sixth-form and undergraduate students who require a lucid introduction to the biological aspects of molecular biology.

G. H. BEAVEN

HOW PLANTS WORK

The Physiological Aspects of Photosynthesis

By O. V. S. Heath. Pp. x+310+8 plates. (Heinemann (Educational): London, March 1969.) 60s.

THE author describes himself, with characteristic modesty, as a botanical plant physiologist who must compensate for his relative ignorance of biochemistry, biophysics and mathematics by a better knowledge and understanding of the behaviour of intact plants. His object is to study how a plant operates in various environmental conditions including those in which it exists naturally. In this book he has placed particular emphasis on the description of experimental methods and on examination of the data obtained. He emphasizes the need for factorial experiments in which different levels of several factors are applied in combination and the results subjected to regression analysis. This is explained, for example, in his discussion of the effects of intermittent illumination on the rate of photosynthesis. The author succeeds admirably in his objective. Inevitably, he considers in much less detail the interpretation of the data in terms of current theories of chemical mechanism of photosynthesis. He avoids altogether biochemical discussion of recent work with radiocarbon and describes in two pages present biochemical views of the photochemistry of photosynthesis. He considers that experimental methods and data constitute the enduring aspects of science and this may well be valid for the research worker. Students will find the book useful as supplementary reading, but must appreciate it does not attempt to present a broad view of present concepts of photosynthesis.

The first chapter provides a brief introduction to the structure of the chloroplast, its chemical composition and, rather briefly, information on the absorption spectra of leaves. In a later chapter, when the effect of light quality and duration on photosynthesis is discussed, the data on action spectra and enhancement effects are confined to studies with algae with unfortunately little discussion on light quality in relation to leaf structure. The value of the absolute quantum efficiency of photosynthesis is only briefly referred to, and again only with respect to the alga *Chlorella*. This points to the paucity

of data on the aspects of photosynthesis from leaves of higher plants. By contrast, several chapters are concerned with work on the diffusion of gases into and out of leaves of higher plants. The value of the concentration of carbon dioxide in the intercellular spaces of leaves is discussed at length, and the importance of this in distinguishing two major groups of photosynthetic higher plants. The relationship between this parameter, the presence of photorespiration and the initial pattern of carbon fixation is briefly discussed. Another considerable section discusses the effect of such factors as the concentration of carbon dioxide and light intensity on the rate of photosynthesis and their interaction.

In accordance with the general philosophy of the book, there is a complete account of methods which have been used for the measurement of photosynthesis. Many are included rather for their historical interest than their present day significance as methods of measurement. In a book of this type it was surprising to find little discussion of photosynthesis in relation to crop yields and potential productivity of crop plants.

C. P. WHITTINGHAM

STEROID REACTIONS

Steroid Reaction Mechanisms

By D. N. Kirk and M. P. Hartshorn. (Reaction Mechanisms in Organic Chemistry: a Series of Monographs.) Pp. xi+476. (Elsevier: Amsterdam, London and New York, 1968.) 200s.

By any standards, this book is a workmanlike job: comprehensive in its field, authoritative, carefully produced, readable and well organized. Within some 450 pages of text and eleven chapters one is taken through an amazingly wide variety of chemical reactions, each outlined in mechanistic detail, which is usually (but not always) available from studies in the steroid field.

This book does not deal at all with steroid biogenesis or with steroid synthesis. One might ask what it gives which is not included in Fieser and Fieser's classic *Steroids*. The answer is that it is more comprehensive in dealing with reaction types and relatively up to date (the literature is covered up to the early part of 1967 and a classified appendix extends the coverage to the beginning of 1968). The detail available in the book is perhaps best exemplified by citing representative sections from within two chapters. Thus the chapter dealing with solvolytic reactions and skeletal rearrangements includes discussion of carbonium ions, kinetics of tosylate solvolysis, the 3,5-cyclosteroid rearrangement, the "C-nor-D-homo" rearrangement, the dienone-phenol and anthrasteroid rearrangements, and the like. Perhaps of more widespread general interest is the chapter dealing with ketones which includes excellent discussions of reductions with complex metal hydrides, reactions of ylids with ketones, and enolization, alkylation and halogenation of ketones. The chapters dealing with photochemical reactions and functionalization of angular methyl groups are particularly welcome because comprehensive discussions of these topics have not previously been available. The treatments of the Favorskii reaction, conformation transmission and "back-bone rearrangement" are relatively detailed and clear.

Criticisms of the text are few and relatively minor. In many places one admires the caution of the authors in not accepting previous ideas without a word of caution or qualification. One hopes that the readers will also keep open minds as to the possible intervention of species such as $\text{RR}'\text{C}^+-\text{Zn}^+ \dots \text{Cl}^-$ and $\text{RR}'\text{C}^--\text{Zn}^+ \dots \text{Cl}^-$ in the Clemmenson reduction (page 134), and as to the concept that the inductive effect may be transmitted by a through-bond mechanism from C-3 to C-11 (page 234) (rather than a field-effect).

This book is largely intended for final-year under-