

and auxin gradients and the regulation of cambial activity. It is a pleasure to find Prof. Melin's name among the contributors, with a paper on mycorrhiza, a subject which has received his attention over the past forty years.

An up-to-date book on trees, comprehensive enough to cover the modern morphological, physiological, ecological and genetical aspects, in fact a book which will consider in all aspects the tree as a life-form, is much to be desired. *Tree Growth* goes part of the way to satisfying that need, although a collection of papers by a number of authors must clearly lack the homogeneity of a unified work. Its editing, however, has been in experienced hands, for Prof. Kozłowski is the joint author of the modern book *Physiology of Trees*. If the desired book on trees comes to be written, *Tree Growth*, with its wealth of information and valuable bibliographies, will be an essential source-book for the author.

F. W. JANE

## RECENT ADVANCES IN PLANT PHYSIOLOGY

### Annual Review of Plant Physiology

Vol. 12. Edited by Leonard Machlis, in association with Winslow R. Briggs. Pp. vii + 502. (Palo Alto, Calif.: Annual Reviews, Inc., 1961.) 7 dollars.

THE twelfth *Annual Review of Plant Physiology* follows the lines of previous volumes, and the twenty contributions it contains cover a wide range of topics. Under the general title of cell structure and function, mitochondria are dealt with by F. L. Crane and cell walls by G. Setterfield and S. T. Bayly. Two aspects of mineral nutrition are considered: minor element nutrients and soil-plant relationships in ion uptake. The former is discussed by D. J. D. Nicholas, who pays particular attention to the part played by micronutrient elements in nitrate metabolism and phosphate metabolism. A consideration of iron metabolism is also included. In their consideration of ion uptake from the soil, M. Fried and R. E. Shapiro indicate the processes involved in the movement of ions from their place in the soil to the place in the plant where they are utilized.

Nitrogen metabolism is represented by an article on amino-acid synthesis by a leading worker in this field, A. I. Virtanen, and one on protein synthesis by G. Webster in which the complexity of the mechanism of protein synthesis is emphasized. Here it might have been as well if the writer had defined the abbreviation sRNA, as this contraction is of comparatively recent introduction and may not be familiar to readers who have not followed the rapid developments in the study of protein synthesis which have occurred during the past few years. An article under the general title photosynthesis by G. Hoch and B. Kok deals mostly with recent work on aspects of the photosynthetic mechanism, while J. F. Talling reviews the subject of photosynthesis under natural conditions. The biosynthesis and function of carotenoids, a subject on which much new information has been obtained during the past three or four years, is considered by T. W. Goodwin. Other articles dealing with metabolic aspects of plant physiology are on phosphorylation in higher plants by E. Maré, the biochemistry of senescence by J. E. Varner and plant water deficits in relation to physiological processes by Y. Vaadia, F. C. Raney and R. M. Hagen.

Six contributions are included under the general heading of growth and development. Three of these are concerned with growth regulators, auxins by C. H. Fawcett, gibberellins by N. W. Stuart and H. M. Cathey, and kinetin and allied substances by C. O. Miller. The remaining articles in this group are on photoperiodism by F. B. Salisbury, the physiology of mitosis and meiosis by J. H. Taylor and geotropism by H. Rufelt.

The review generally contains one or two articles on less familiar topics. In the present volume there are two which may be regarded as coming into this category. They are on photochemical air pollution damage to plants by J. T. Middleton and the physiology of wilt disease by T. S. Sadasivan.

The volume concludes with very useful cumulative indexes of authors and titles covering the last ten volumes of the *Annual Review*.

W. STILES

## A COMPENDIUM OF BANANA RESEARCH

### The Evolution of the Bananas

By N. W. Simmonds. (Tropical Science Series.) Pp. xii + 170. (London: Longmans, Green and Co., Ltd., 1962.) 42s.

IN 1922 the disastrous wilt known as Panama disease threatened with extinction the banana industry of the West Indies. The foundation of the Imperial College of Tropical Agriculture in that year was also the beginning of a research project which had as one of its aims the breeding of bananas resistant to the disease. At the same time it was realized that lack of knowledge of the genetics, cytology and taxonomy of the bananas was a serious handicap to scientific breeding. The succession of botanists who, with vision and versatility, have investigated these topics during the past forty years have now compiled a wealth of information on which the banana breeder may draw for guidance.

The same information may also be used to attempt a reconstruction of the evolutionary history of both the numerous wild species of *Musa* and the cultivated varieties derived from them. N. W. Simmonds, whose own contribution in the research project has been very considerable, has in this book summarized with admirable clarity the discoveries which assist this reconstruction. He assesses the relationships between the wild bananas in terms of morphology, geographical distribution, cytology and the results of interspecific hybridization, and derives a scheme of evolution which fits the evidence, though he is careful to avoid unwarranted inferences about the ancestors of modern bananas. Turning then to the evolution of cultivated bananas he discusses at some length the origin of the two features which are essential in a successful edible variety, namely, parthenocarpy and seedlessness. There is also an evaluation of the part played by interspecific hybridization and triploidy, and finally, a discussion of the spread of bananas from their centre of diversity in South-East Asia to Africa, America and elsewhere. On all these subjects there is substantial evidence to support the speculation inevitable in phylogenetic arguments, and the picture which Simmonds draws is remarkably complete.

The book is certain to be of great value to those working with bananas, but it is strongly recommended