

turned into lantern slides. The text, on the other hand, reads like a catalogue, with all the disadvantages of this type of format. Moreover there is no flicker of interpretative insight directed towards a reader who may not spontaneously appreciate the scientific interest of the phenomena or structures described.

This is not all the result of compression to reduce costs since, minor errors or omissions apart, some hazards to potential users have been deliberately inserted by the author or publisher without effecting great savings. Thus all too many micrographs are labelled with a generic name only, as if species of algae do not matter. One picture of scales is even labelled "*Chrysochromulina?*". Perhaps some tyro may value this and memorise it as an examination gimmick. An older reader, on the other hand, perhaps a non-botanist hoping to enter the fine structure field personally, must learn at the outset that, especially among algae, species may matter very much and carelessness here can invalidate or render unrepeatable the most elaborate exercises of other kinds. Any book which suggests, even by its format, that this is not so is being less than helpful to a serious and desirable type of reader.

Further, the omission of titles from the papers listed at the end, removes at a stroke the future usefulness of the book as a work of reference while greatly increasing the difficulty of effective proof reading. Thus on page 166 an important topic is said to have recently been summarised by an author dated 1972e while in the literature list one finds only 1972f (subject unknown) following 1972d (subject also unknown).

While, therefore, this book will be useful for a limited time and purpose for which it ought to be bought by libraries, it is not one which I would give as a present to a friend, colleague or student. Considering the intrinsic interest and beauty of the subject this is disappointing.

I. MANTON

The first clover leaves

The Primary Structure of Transfer RNA. By T. V. Venkstern. Translated from Russian by Basil Haigh. Pp. x+296. (Plenum: New York and London, 1973.) \$29.

THIS monograph sets out to cover the entire field of transfer RNA primary structure in textbook form. It is an extended edition of a Russian text first published in 1968 and in this revised version surveys the literature up to July 1971. Each of the 22 transfer RNAs which had been sequenced by that time are described in considerable detail. The constant features of transfer

RNA architecture are also discussed, together with the evidence supporting the clover leaf hypothesis of the base-pairing of transfer RNA sequences. Little serious attempt is, however, made to relate features of individual sequences to the functional centres which determine the acceptor or adaptor roles of transfer RNA, other than in a consideration of the codon recognition properties of different anticodon loop structures. Hence those wishing to comprehend the structure-function relationship of transfer RNA will not find in this monograph a topical account of how the nucleotide sequence of a transfer RNA molecule can determine its function. The three-dimensional structure of transfer RNA obtained from X-ray crystallography is now clearly on the horizon and it should soon be possible to provide a more meaningful topological interpretation of the significance of those regions of transfer RNA sequences which lie outside the anticodon.

Much of this book is given over to a clear and detailed account of how the first few transfer RNA sequences were determined. The author takes us back to the initial attempts to determine nucleic acid primary structures and enables us to re-live that exciting period when the first few transfer RNAs were being sequenced. A considerable proportion of the narrative describes methods for the sequencing of non-radioactive RNA and many of these procedures have been largely supplanted by newer methods of sequence analysis which greatly reduce the work load of the experimentalist. There is little more than passing reference to the methods developed in Sanger's laboratory for sequencing ³²P-labelled RNA, even though most transfer RNA sequences are now derived using these techniques. Furthermore several other publications give a much more comprehensive and useful description of nucleic acid sequencing.

The chapter of this book which discusses the minor nucleotides of transfer RNA is by far the most topical and presents a thorough account of the physicochemical properties of these components. In view of the elaborate system of enzymes which exists for modifying transfer RNA it is hard to conceive that the modifications do not have an important biological function. Nevertheless the more inquisitive reader would probably wish to see expanded the sections of this book which describe the roles of the different isoacceptor transfer RNAs and the functions of the different minor components of transfer RNA.

As a result of the considerable effort now being expended in determining nucleic acid structures it is clearly

almost impossible for any book on transfer RNA to be up to date by the time that it is published. It has taken three years for the English version of this book to appear and during that time the number of sequenced transfer RNAs has increased from 22 to nearly 70. A complete summary of all known transfer RNA structures (*The Handbook of Nucleic Acid Sequences*, by B. G. Barrell and B. F. C. Clark) has recently been published as a loose-leaved folder by Joynson-Bruvver, Oxford. This is to be annually updated and will be rather more realistically priced. T. V. Venkstern's book is more of value as a comprehensive account of the beginnings of nucleic acid sequencing.

P. W. PIPER

Evolution of plants

Chromosome Botany and the Origins of Cultivated Plants. By C. D. Darlington. Third (revised) edition. Pp. xvii+237. (Allen and Unwin: London, September 1973.) £4.40.

THE fascination of plant evolution is the great variety of mechanisms that have been involved. Plant species have certainly not plodded dully through time, losing a few genes here, gaining a few genes there: they have flashed into polyploidy, chromosome structural changes, inbreeding, apomixis, hybridity, with almost breathtaking frequency. The plant species which have stuck to an ordinary outbreeding diploid type of evolution are probably fewer than those which have not.

Since so much of this cunning and opportunism is tied up with chromosomal change, a book on chromosomes in plant evolution, by the cytologist to whom much of our understanding of chromosomes is due, is surely to be welcomed and respected, especially since it now reaches the eminence of a third edition. The book is also important because it is one of the very few in which the origins of cultivated plants are discussed, making use of recent evidence.

Alas for high hopes. The trouble is that the author falls a victim of his own enthusiasm. One is given too great an impression that plant evolution can be explained solely in terms of chromosomes: changes at the level of the gene cannot be disregarded. One is given a fascinating picture, but one which is capricious and worrying, and sometimes difficult to understand.

Yet the book contains the distillation of a lifetime: a provocative variety of evidence and conclusions on plant evolution that is unique, and a collection of information on crop plant evolution that is not available elsewhere. This is the reward for the reader.

A. D. BRADSHAW